TELETEXT AND VIDEOTEX
A CANADIAN PERSPECTIVE

by

Peter J. Booth
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(604) 669-7175

WESCOM COMMUNICATIONS
STUDIES AND RESEARCH LIMITED
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ABOUT THE AUTHORS

Peter J. Booth is President of Wescom Ltd. and is engaged in economic and social research on behalf of the telecommunications industry, the government of Canada and private interests in Japan, Singapore, the U.S. and Europe.

Russel M. Wills is Vice-President of Wescom Ltd., a consultant to the World Bank and in 1985 did industrial planning and policy work for the governments of China, Malaysia, Tunisia, and Canada.

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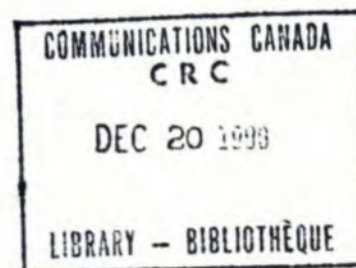
CHAPTER 1

Telidon, Videotex and Teletext:
Description, History and Standards Evolution

Videotex and Teletext -- Descriptions

Videotex can be viewed as a computer technology that enhances the way in which textual and graphic information can be displayed and handled. It simplifies the process necessary to accomplish remote access, retrieval and exchange of computer-stored information.

Videotex represents a technological advance in software development. It represents a new way of packaging computerized data and enables the widespread dissemination of textual and graphic information by wholly electronic means for display on low-cost terminals which are under the selective control of the recipient, using control procedures easily understood by an untrained user.

Videotex is simply one family of data packaging technology for computer communication systems. Log-on procedures, transmission medium and the particulars of other system features must necessarily be specified before any Videotex application can come into being, and such system trappings are not part of the technology of Videotex itself.

There are a number of videotex systems, such as Prestel, Antiope, Telidon or Captain. Prestel, for example, is the name of a specific presentation layer protocol that has also become the name of the standardized Videotex system in England. In Canada, Telidon has been used to define the particular configuration of Videotex that was developed by the Communications Research Centre of the Canadian Department of Communications.

Since its early developments in the early 1970s, changes have been made to Telidon protocol, leading to the current configuration referred to as NAPLPS (North American Presentation Level Protocol Syntax. This protocol is an enhancement of the basic Telidon system.

Teletext

Teletext refers to a system where information, consisting of alphanumeric characters or graphic images, is edited on a keyboard or generated from a computer-stored database. It is encoded in a bit stream of digital data at a transmission rate that is compatible with colour TV systems. In North America this is represented by the NTSC standard of 525 scan lines on a standard television set. In Europe, this is on the basis of a 625 line picture. In one particular format, encoded data is multiplexed onto a video signal and transmitted over the TV signal using the unused portion of the vertical blanking interval (vbi). In another configuration, full channel Teletext is possible with new advances introducing two-way interactive services utilizing CATV networks with a decoder operated by the end user. Data sent using the TV signal is detected by a decoder attached to the television set or directly wired into the RGB (Red/Green/Blue) beam circuits of the colour TV. The digital data is accepted, stored as one or more pages in a memory and then displayed on the screen as directed by the user. This can be accomplished through utilizing a keypad or keyboard. A page of information received over the broadcast signal is transferred to the television screen via a character and graphics generator that is part of the decoder. The page remains on the screen until the replacement page is requested by the user, or the system is switched off.

In general, when utilizing the vbi, between 100 and 250 pages of information are capable of being broadcast. Full channel TV allows more pages and more access to be achieved, with up to 5,000 pages in some cases. Various transmission media can be utilized for a Teletext service and could include CATV, cellular radio, low-powered TV, multi-point distribution systems, direct broadcast satellite, FM radio, etc.

Videotex

With Videotex, pages of information are edited on a keyboard, which could be a standalone unit or a microcomputer. Increasingly, microcomputers are serving in this function. The databases are generally designed such that they permit the accessing and rapid retrieval of specific items of information on the system. Transmission between the user and the computer could be accomplished on the public telephone network, CATV, or a hardwire Local Area Network (LAN) type system. Generally, a modified TV signal with a decoder

translates the data and builds up the video image on the screen. As with Teletext, the decoder may be plugged into the antenna socket or the RGB (Red/Green/Blue) socket. Page transmission is selected by the user through a keypad or a keyboard, and in some cases touch screens or voice-activated systems are possible. The system generally has two-way capability, allowing the user to send messages to the computer, the database or another terminal on a network. When telephone systems are utilized, transmission of data to the user is usually at a higher speed than transmission from the user to the system. In Videotex systems the databases are not routinely cycled, but rather are set up with search procedures for access to individual pieces of the database called pages. Access time is generally a function of the processing capability and capacity of the computer, and the volume and pattern of usage in the system.

For Videotex and Teletext, the standard which is most common in North America and the one which is most relevant to the Canadian systems is NAPLPS. This is an acronym standing for the North American Presentation Level Protocol Syntax. This standard specifies textual and other graphic codes which have the same status in a data network as ASCII codes in systems that deal specifically with alphanumeric information. It can be used for a wide variety of applications in which graphics are important. NAPLPS, in other words, is an outgrowth of the original Telidon system.

History of Telidon

Telidon was invented at the Communications Research Centre of the Canadian Department of Communications. The Communications Research Centre (CRC) had been engaged for several years with interactive computer graphics and computer design for applications in Canada's space satellite program. In 1969, research and development was begun into a new and interactive visual communications system.

Between 1969 and 1970, effort was concentrated into building the requisite hardware and software to advance Canadian capabilities in this interactive graphics area. This research led initially to a new interactive programming language (IGPL) and to a preliminary definition of picture description instructions (PDIs).[1] In the intervening years, until 1979, both the Telidon hardware and various communication protocols involving PDIs evolved to a point where the Telidon terminal contained its own intelligence. There were a number

of possibilities for Telidon's display technology to transmit pictorial and alphanumeric imagery. The Telidon developers felt it would be incorrect to design a picture coding scheme which was tied to a particular display technology; as a result the terminal-independent alphageometric PDI coding scheme was defined.

In 1975, the CRC gave a contract to Norpak Limited to develop an interactive colour display technology which was based on the work that the CRC had previously done. This contract led to further work between the CRC and Norpak to develop specialized terminals and other colour display systems.

By the end of 1977, the CRC research on interactive graphic systems resulted in three patent applications: one for a touch sensitive input mechanism for computerized graphic displays; one for a new interactive visual communication system; and the last for a new interactive graphics programming language.

During this same time, Bell Canada had been investigating the development of Videotex technology based on an alphamosaic coding scheme. CRC researchers felt this system was inferior to the interactive computer graphics they had developed and consequently proceeded to further refine a Videotex system which utilized picture description instructions and the alphageometric format.

Throughout 1978-79, vendors representing rival Videotex services from France and Britain began actively marketing their Videotex services internationally. A number of organizations in Canada expressed interest in these services, most notably, the Ontario Education Communications Authority was considering the use of the French Antiope system.

(C) The first Telidon terminal had a public demonstration in August 1978, and in that month, the Department of Communications announced its first four-year Telidon development program, which was funded at a level of $9.7 million. Under this program, the Department of Communications planned a number of ways to encourage the private sector and government agencies to utilize Telidon technology. These included field trials and public demonstrations of the technology to the Canadian private sector, foreign firms and governments, lobbying in the Videotex standards negotiations, international marketing efforts, and the formulation of policies to deal with social and political effects of the new technology.

By the end of May 1979, Alberta Government Telephones had signed a contract to add a Telidon trial to its ongoing Vidon program. In July, the Manitoba Telephone System announced Project Ida, which would include Telidon services.

In August 1979, Bell Canada announced that it would use Telidon technology exclusively for its Videotex trial. This was a major trial planned for Ontario and Quebec in which residential and business applications would be explored using both French and English language databases.

This first stage of the government's Telidon program also provided financial and technical support for the use of Telidon in trials by New Brunswick Telephone (Project Mercury), Telecable Videotron, the Ontario Educational Communications Authority, and WETA in Washington, DC.

To monitor and guide these activities, the Department of Communications created the Canadian Videotex Consultative Committee (CVCC). This committee included representatives from the broadcasting and cable industries, the telecommunications carriers, the Department of Communications, educational institutions, communications equipment manufacturers, consumer and civic groups. A number of Videotex sub-committees were formed to investigate emerging issues in this new area and to provide consultation to the federal government and industry.

In February 1981, the Department of Communications approved a $27.5 million increase in funding of the Telidon program for 1981 to 1983. The motivation behind this was to increase the fiscal stimulation to the Canadian Telidon industry and to encourage the private sector to assume responsibility for marketing and further industrial growth.

In addition to these technical and political developments, a considerable government and industrial infrastructure arose to meet the objectives of the Telidon program. In the words of Doug Parkhill, the Telidon program's objectives were, "To promote development of a national Videotex infrastructure through appropriate standards, regulations and technology; and to encourage the creation of a viable Telidon industry producing hardware, software, systems and services; to encourage joint government-industry research and development, product development, promotional activity and support market trials and operational systems."[2]

In Canada, the Telidon industry is comprised of commercial and public enterprises, regulated monopolies and government agencies. The main role of the government in this effort has been a catalytic one, to assemble these various elements into a working industrial infrastructure under a common Telidon standard -- the main purpose being to encourage the transfer of this government-developed technology to Canadian industry and business. The initial means the government used to accomplish this was through financial support of the Telidon field trials.

DOC funding was used to support the Telidon terminal manufacturing industry, the development of information provider and user terminals, and service implementation software. To support the field trials, the DOC purchased user terminals which were then lent to the organization developing the trial. In addition, in some cases it also lent its central computing facilities. The DOC attempted to stimulate the testing of Telidon applications using a wide variety of transmission media ranging from telephone wires and cable television to new media such as direct broadcast satellite and optical fibres. It was intended that specific content and applications should be determined by free market mechanisms.

In 1979, the International Telegraph and Telephone Consultative Committee (CCITT), the United Nations agency responsible for standards for international telecommunications, recommended the adoption of Telidon's protocol as one of the three world Videotex standards. By May 1981, American Telephone and Telegraph (AT&T) announced that it was adopting a Telidon compatible Videotex protocol. This announcement was critical to the later establishment of a single Videotex standard for North America.

In 1983, AT&T, Bell System and the DOC augmented the picture description instructions which had been published by the Canadian government. This led to the formation of the current standard, NAPLPS. Corresponding developments in the Teletext market led to the NABTS standard.

In February 1983, the federal cabinet approved the funding of a further $23 million for a two-year extension of support for the Telidon program. The major areas of funding involved further research and development, government applications and international marketing. It was planned that the Department of Communications would administer around $7 million, and the rest would be administered by External Affairs and Supply and Services.

The initial introduction of Telidon into Canada began in 1979 and by 1982, 24 field trials were being carried out in different parts of the country under a variety of conditions. A field trial is a recognized method for conducting an operational trial of a technology in a real-world setting. These are useful for assessing potential problems and for testing service configurations in preparation for actual commercial service. The majority of the trials offered information retrieval services to the home and business market. Tele-shopping was limited, and none of the trials offered telebanking. The bulk of the trial activity was undertaken by the telephone companies, where 11 of the trials accounted for the placement of approximately 1,500 terminals. More recently, cable TV companies have become entrants in the field trial scene operating five trials, accounting for close to 500 terminals. In addition, services have been instituted as joint ventures under either the federal government's content development program or the Information Industry Stimulation Program (IISP). Two of the larger ventures are the Teleguide system which has approximately 1,200 terminals, and the federal government's Cantel project with approximately 100 terminals distributed throughout the country. Teletext trials have been undertaken by TV Ontario and CBC in Toronto and Montreal.*

New Directions for Videotex and Teletext

Over the past two years, dramatic changes have occurred in the nature and orientation of the Videotex industry in Canada, the United States and worldwide. This is the case for both Videotex, Teletext, and for a set of emerging technologies which have come about largely through the merging of Videotex with other established electronic communication devices such as video discs, high definition TV (HDTV), large screen displays, personal computers, local area networks, mobile satellites and FM broadcasting of Videotex signals.

The initial phase of Videotex/Teletext activity in Canada was dominated by field trials. One of the most important findings from the field trial phase in Canada was that far too little emphasis had been placed by system operators on the development of content and the design of Videotex applications. For a variety of reasons, technology concerns dominated the industry in the early stages, which led to this limited content development.

* A complete review and description of these trials is provided in Chapter 3.

More recently, however, a reassessment of applications and implementation strategies has been taking place among most of the service operators. Consequently, specialized applications such as those developed for in-home transaction services — banking and shopping — are providing an important impetus in the penetration of selected segments of the consumer market, which, it is believed, will lead to further developments as more services are added. In Canada, only a few commercial services are now operational. These include Grassroots, Teleguide and Cantel.

Assessments of the market opportunities for Videotex are beginning to focus on a number of areas quite different from those originally envisioned. No longer, for example, is a mass market for in-home standalone Videotex terminals seen as a likely possibility: In addition to the high price of such terminals, a number of complementary technologies, with higher market penetration, lend themselves very nicely to Videotex applications at a much cheaper price than is currently possible with the purchase of a standalone terminal. Today, as a result, NAPLPS Videotex is more likely to be seen as an add-on feature of a management workstation, embedded as graphics software in an office automation product, or to be placed on a floppy disc operating on a personal computer with a colour monitor, primarily in the business market.

The original players in this industry were telephone companies, newspaper publishers and the federal government. Of significance, however, is the fact that the telephone companies, initially the main service providers in this industry, have become reticent to be involved in full scale Videotex applications. Bell Canada and B.C. Telephone Co., two early trial operators, decided in 1983 not to continue participating as service providers for Videotex. In another case, the Teleglobe Novatex service, designed to provide access to an array of databases worldwide, terminated after expenditures of $4 million and two years of operation.

A number of reasons can help explain the reluctance of the telephone companies. First, the field trials provided an opportunity to assess the technical feasibility of implementation but were not very good laboratories for assessing market demand. As a result, after two years of activity, most telephone companies had very little information on which to judge the commercial viability of services. Second, issues of regulation for content-based services, provided by companies such as Bell Canada and B.C. Tel, remain unsettled.

Until a clear regulatory stance is made, it is not likely that the telephone companies are going to make large committments to the implementation of a Videotex-based service. Their interests will lie in network utilization and the potential revenues that can accrue from the carriage of content rather that the development and operation of full scale Videotex services.

Today, banks, financial service companies, software and high technology firms represent the key players in the Videotex/Teletext industry. Specialty services for business, education, training, and public service are all actively being pursued. Videotex NAPLPS software is playing a major role in these applications, available on a variety of microcomputers acting as display, page creation units and data base systems, at prices ranging from $99 to $1,500. Within the hardware sector, the most significant developments have been the shift to the production of VLSI chip sets, which can be placed into existing personal computers, and decoders, providing both NAPLPS and NABTS capabilities.

Technology development in transmission has also taken place, providing the capability for using telephone lines, CATV, satellite broadcast, microwave, FM radio and optic fibres. The display technologies now include adapted TVs using set-top RGB monitors, decoders, microcomputer colour terminals, digital television screens, touch screens, video laser discs and monitors.

Banking and Interactive Services

Currently, there are over 80 banking and related interactive services, and a growing number of business-related on-line transaction services in the United States.[3] Approximately 85% of the North American Videotex and Teletext trials include some form of home banking or home shopping in their service offering. Many use NAPLPS or some variant of Telidon-compatible presentation level protocol. In the retail business, NAPLPS protocol has become popular for the development of on-line advertising in high traffic pedestrian malls. Shopping and product information is now widely used as a promotional tool to build traffic in stores, with selected retailers using Videotex-based systems to advertise products and services as well as to provide prices and locations where products can be purchased. Systems are in place which use touch screens, cable television, personal computers, video discs and voice synthesis.

Over 50% of the banking trials and commercial services now use personal computers as home terminals. Banks are beginning to design and utilize systems which can be sold to other financial institutions on a franchising basis. Organizations including banks, retailers, government departments, newspaper publishing consortia, communication companies, cable operators and broadcasters, as well as telephone companies, have all been examining the potential for transaction services. Their interest varies according to the particular area of business. Cable companies, for example, are interested because they offer a profitable add-on feature that could represent a significant source of non-programming revenue. Banks and retailers see the opportunity in increased efficiency with which they provide goods and services. In 1983, home banking revenues in the United States were approximately $1 million, accruing from about 5% of all the eligible homes having a PC. Assuming that by the end of the decade over 50% of North Americans will have PCs, it is likely that home banking revenues could exceed $800 million annually. A recent IRD study indicated that between 200,000 and 300,000 micros are capable of providing such services.[4]

Shopping Services

The size of the non-traditional shopping market and direct marketing activities in North America is difficult to gauge precisely. However, in 1982, total sales arising from direct marketing were in excess of $120 billion in the US, and $13 billion in Canada. The US-based Yankee Group has predicted that teleshopping sales will exceed $5 billion by 1985 and may reach $20 billion by 1990.[5]

Technologies which are being used in addition to the standard 800 telephone number credit card purchase system include Videotex and Teletext, addressable cable TV converters, computerized voice synthesis systems and optical video disc players. All allow direct market retailers to communicate greater quantities and more detailed information to a potential customer.

Videotex for in-home shopping is seen as an efficient complement to catalogues offered by direct marketers: it offers cost advantages, graphic enhancement and can be used as a supplement or adjunct to printed media by providing faster and more economical means of placing orders. Some of the more well known teleshopping services include the Sears

Department Store, Catalogia, PC Telemart Inc., Cableshare's Videopress System, Viewmart and Viewtron. The Viewtron service, which is being conducted in southern Florida, has a number of interesting teleshopping innovations, one of which is a bartering and auction system whereby users can interact in an auction process for special products and services, with price reductions introduced as no bids are received.

Related to the on-line Videotex-type interactive systems are a number of technologies such as Smart Cards. Smart Cards have emerged in the past few years and offer both complementary and competitive opportunities to the more well known Videotex/Teletext network services for transaction purposes. The purpose of the card is to incorporate computer processing power into a small card rather than a terminal. The card uses a microchip which gives it memory and intelligence and the capability to allow transaction data to be recorded.

Cable Industry and Videotex Services in Canada

The past few years have seen increasing activity and interest by cable TV companies toward non-programming and interactive services. This stems essentially from the fact that revenues for programming services, particularly for such things as Pay TV and all movie channels, have not been as successful as initially anticipated. As a result, the cable industry is currently looking at ways to increase its service offering, and ways to gain a share of the increasing market for interactive and non-programming services such as in-home banking, shopping, games, downloading of computer software, interactive business graphics, stock market information, financial services and commodities exchanges.

Two types of cable networks can be distinguished: those comprised of residential subscribers - the industry's historical base - and those comprised of industrial networks or business networks supplying non-residential locations. Although these business networks have not yet undergone significant development, they comprise significant opportunities for the transmission of data and voice services. In the business market, however, two-way cable will be competing with suppliers of local area business networks, such as Ethernet and Wangnet, who use cable to connect business equipment.

There are also significant opportunities for cable in providing broad band transactional capabilities for the residents' market. Cable can provide features such as sound, downloaded software, computer games, teleshopping and home banking, with content sent to specific subscribers via addressable terminals.

While cable has significantly greater advantages for the provision of Videotex and Teletext services than do the telephone lines, this industry's activities to date have been somewhat less than those of the telephone companies. In Canada, this is attributable to an overall general slowness in the cable industry itself due to the economic downturn of the past two years. However, it is widely expected that the industry will participate in a variety of non-programming services in the next few years, and recently there has been some movement toward an alliance between broadcasters and cable companies. There is a considerable amount of uncertainty existing with respect to regulation, particularly as it relates to non-programming services. The CRTC has postponed several regulatory decisions pertaining to cable in the last two years. At the present time the CRTC is, however, encouraging cable experimentation with non-broadcasting services. Both the CRTC and the Department of Communications are attempting to encourage cable services in order to delay the proliferation of satellite dishes, since Canadian content may not be controlled on these. As well, the Canadian Broadcasting Act has served to restrict cable legislation and this is not immediately applicable to non-programming services such as teleshopping and banking.

Cable firms in the U.S. have been experimenting with banking and home shopping and have demonstrated the use of systems providing video pictures in association with graphic information. The technology uses video disc players with cable TV along with "force tuning". A two-way cable system, which has a force tune ability, will allow a subscriber to change back and forth from video to Videotex to access product information. These are actually intermediate devices between addressable cable systems which can handle requests from individual subscribers and totally non-addressable systems. Cox Cable in the US was the first North American station to use force tuning for teleshopping. The basic notion involves the viewer shopping for a brand name, say for some particular product, being force tuned or switched to a cable shopping channel which at that time shows a moving video demonstrating the product.

Currently, Videotex and Teletext cannot rapidly incorporate still and moving picture quality images, but optical video discs plus personal computers offer instantaneous retrieval. Video discs used with two-way cable systems can provide a near instantaneous switching of video and graphic images. Several firms in Canada, the US and Europe are now developing such systems. Using random access search capability, the combination of video discs, personal computers and efficient networking is a useful merchandise tool for video catalogues in high traffic areas, such as airports, shopping malls, lobbies and point of sales displays. In 1983 there was an installed base of 1,300 such video merchandising systems in the United States and Canada; these are expected to grow to about 14,000 by 1985.[6]

Cable services are an important element in the overall Canadian communications industry. Operating revenues for telephone, telecommunications, broadcasting and cable services approached $10 billion in 1981. Of this total, cable operators grossed about $400 million and employed over 5,000 people, serving approximately 5 million homes. It is generally considered that the cable industry in Canada has reached a mature stage and has largely satisfied the demand for basic services. It is anticipated that the late 1980s and early 1990s will see a significant amount of development and activity by the cable industry in the provision of non-programming interactive services. This, combined with an enhanced delivery network, will enable the providing of full video with enhanced graphics using NAPLPS.*

A 1983 study conducted for the Canadian Telecommunications Research Institute by Nordicity of Ottawa estimates that by 1990, approximately 20% of cable industry revenues will arise from the sale of non-video services.[7] It is anticipated that the cable industry, which in 1983 received most of its revenue from TV subscribers and pay TV services, will be receiving additional revenue from transactional services, Teletext, downloading of software and games, and the use of personal computers by 1990. It is anticipated that by 1990, the tiered services of Teletext, plus all other transactional services, will comprise revenues of close to $500 million.[8]

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* A detailed discussion of the market aspects, opportunities and expected growth for CATV is provided in Chapter 3.

EXHIBIT 1.1

Two-Way Videotex Cable Services

NAME	CHARACTERISTICS	SERVICES	SYSTEM
CANADIAN TWO-WAY SERVICES INTOCABLE	- Data, Audio & Video Commun. Techniques - Developed through Cable Telecommunication Research Institute	Games/Financial Planning/ Education & Information Pkgs. Business Related Services (i.e., Credit Card Validation	Hard Copy Printer for Accessing Information from Central Database Home Micro Computers (NABU) Downloading of software
INFOPRESS	- Joint Venture, London True Press & Cableshare Ltd. - Information & Advertising Service	Community Information/ Weather/Shopping Info. News/Transit Schedule/ Advertising	Telidon Based Located in Shopping Malls/ Public Places 3 large screens 3 touch terminals tied into smaller screens
IDA MANITOBA TELEPHONE	(Trial Completed) - Trial: 100 homes - Winnipeg . 33 homes also received Telidon terminals . telephone lines were initially used vs. cable	Cable tv service Videotex, Alarm & Metering	Subscriber Terminal Unit/ Basement; External Terminal-Distribution Control; Channel Converters
PREMIER COMMUNICATIONS	Proposed: - Addressable & Interactive Services - Vancouver Area/10,000 homes	Interactive Community Programming,User Feedback Interactive Education, SFU, BCIT Teleshopping, Fire/Security Alarm Monitoring, Medic Alert, Energy Management; and Time Shared Telidon; Local Grants	10 groups of 1000 homes would 'Time Share' Telidon units, therefore max. waiting time more than 3 mins. -State-of-the-Arts Terminals
SID System for Information on Demand	In Progress	Trial to Include: - Telidon Services, Video Games, Home Monitoring Services	Advanced packet-switched, two-way cable transmission network

EXHIBIT 1.1

(continued)

NAME	CHARACTERISTICS	SERVICES	SYSTEM
INDAX	Pilot - 6 mo. Project - 300 homes	Banks/Retailer, etc. offering home services	Intelligent Terminal & unlimited access to a number of services
QUBE (WARNER AMEX CABLE COMMUNICATIONS INC.)	35,000 subscribers		Cable
SAMMONS COMMUNICATIONS	Trial: 200 subscribers	Information provided by BELO/DOW-JONES/MERRILL LYNCH	Cable TV. NSU Texas Instrument Micro Computers
SOURCECABLE	15,000 source users	Databases: New York Times/ Travel Information/ Financial & Acct. Pkgs. Classified Ads/Shopping Services Electronic Messaging & Games	Local telephone dial-up connecting to Telenet or Tymet packet switching; can be used with computer terminals or Micro Comp.
TIMES MIRROR	Trial: Compare telephone & cable delivery of Videotex Services 150 homes - 2-way cable 200 homes - Times	Info. provider L.A. Times 20,000 pages database	Alphanumeric keyboard Host Computer; front end microprocessor plus 3 external computers; personal Acctg./Travel/Teleshopping

EXHIBIT 1.1

(continued)

NAME	CHARACTERISTICS	SERVICES	SYSTEM
Vidéotron Communications Ltée.	20 community "telematique" centers 250 terminals	- Telidon Inform. Serv. Alarm Services Stores Personal Computing Info. - Community Programming - Demand "TV" System	To Develop: Intelligent Cable TV Decoder; Channel Decoder, Decodes Pay-TV
U.S. TWO-WAY SERVICES: BISON (BELO INFO. SYSTEM ONLINE NETWORK)	Result of Belo Trial 2-Way Cable Trial - 200 subscribers	Information supplied from the Dallas Morning News newspaper	Trial: . Texas Instrument Computers Sammons Communications Cable Co.
COMP-U-CARD (C-U-C) - COMP-U-STAR - COMP-U-STORE SHOPPING CHANNEL VIDEO SHOPPING SERVICE COMP-U-SERVE	2M members 25,000 subscribers On-Line Extension - seeks out desired merchandise Video pictures of product prior to ordering merchandise 2-hour daily "Shopping by Satellite" Any cable household can view show Only C-U-C subscribers can purchase goods	Teleshopping Services Video demand Includes show cases for new Discount Information Business/Home/Hobby	 Videodisc In-Store locations with application for Cable TV being developed Cable system reception Packet-switched computer networks Local telephone dial-ups Can be accessed by computer terminals
DOW-JONES			Trial - Apple Computer Sammons Communications System

International Developments

The 1983/84 worldwide annual growth for Videotex terminals has been estimated by Link (1983)[9] at approximately 118%, more than double the previous year's growth of 41%. The worldwide Videotex installed base is approximately 55,000 terminals.[10]

In North America, the number of IPs increased in 1983 by 56%, rising to 2,056 from 1,318. Banks are now the most prevalent information provider (IP) with 200 in total, accounting for 17% of all IPs, with 82% of the systems in place having at least one bank as an IP.[11] As well, there is a trend towards a number of banks co-existing on single systems or creating systems of their own. This is particularly true in the European marketplace where individual banking operators are forming consortia to achieve greater distribution and larger customer bases. Another significant component of these services are brokerage and commodities houses, emphasizing the importance of financial offerings within a Videotex data base. As the regulatory distinctions between security houses and lending institutions disappear, the services offered by these two categories will likely increasingly resemble each other.

Estimates of the number of Teletext decoders for in-home use reveal that the greatest number exist in the United Kingdom, where there are approximately 1.1 million users. Comparatively, in Germany there are 300,000 users, in Austria 300,000, in the Netherlands 250,000 and in Sweden 250,000. Belgium, Finland and Switzerland also have large numbers at 30,000, 25,000 and 10,000, respectively. Currently, there are no commercial Teletext services in the United States and Canada, however, a number of tests are being conducted and various plans have been announced.

Teletext Services

In the previous sections of this chapter, attention was placed on the role that Teletext will play in Canada and North America. To date a number of factors have been constraining its development. Uncertainties, particularly those related to the regulation of carriage and content, have created a situation which has inhibited the development of Canadian Teletext services. It has been argued that broadcast Teletext over the vbi is part of a broadcaster's responsibility, as defined under the Canadian Broadcasting Act,

and that the television broadcasting regulations are therefore applicable. Although there are problems in applying unmodified Canadian broadcasting regulations to Teletext, the main issues include:

1. whether content rules are even applicable to broadcast Teletext
2. given the ease with which content rules have been circumvented in other industries, particularly for pay TV, can the spirit of these rules be effectively enforced?

The regulatory issues surrounding Teletext have been identified as one of the prime reasons that a slower than anticipated development of these services has occurred. The Canadian Department of Communications, as early as 1981, indicated that use of the vbi for TV broadcasting of Videotex required CRTC approval:

> "CRTC approval is required for carriage of this category of the signal. Users are advised that the CRTC might require deletion of signals, which it has not previously authorized. All types of signals intended for use by the general public must be planned on non-interfering basis to regular pictures. Permission for their use is subject to approval on a non-interfering basis to regular transmission and might be subject to CRTC approval." [12]

The Ontario Education Communication Authority Teletext trial and the Canadian Broadcasting Corporation's (CBC) Iris trial required no such approval by the CRTC with respect to these Teletext services. As well, several television stations in Canada also broadcast encoded signals in the vbi for the hearing impaired. Currently, the programs are encoded in the format developed by the Captioning Institute for the PBS system in the US. Decoders are available for service to the general public through the Sears stores in Canada and the US. To date, approximately 5,000 units have been sold in Canada. A number of other broadcasters have applied to the CRTC for the right to transmit these services.

The current deregulatory environment of North America suggests that a much more flexible situation is likely to exist in the future with respect to the kinds of services cable operators are likely to provide. Although vbi Teletext functions on a broadcasting frequency, important questions are raised about whether it should be treated as regular broadcasting subject to content rules.

Teletext could have a significant amount of growth in the next few years. This is due to the increasing interest of the cable companies in the provision of non-programming services, and to the implementation of the CBC's project Iris trial which recently received $6 million from the federal government to expand its service to a number of major cities in Canada. Finally, the environment in the US and Canada is becoming more deregulatory in nature and more receptive to competition, a situation which should encourage new applications for Videotex and Teletext.

At the present time two incompatible standards exist for Teletext. One is the UK World Teletext Standard based on the Teletext network of the British; the other is the North American Broadcast Teletext Specification (NABTS) which is becoming the de facto standard in North America and which has evolved out of Telidon and Antiope. The Federal Communication Commission (FCC) in the US has given approval to broadcasters to launch commercial Teletext services in the US, but, at the same time, has not chosen between the two standards. The NABTS standard is favoured by the French, who are actively marketing a system in the US and worldwide through Videographics Systems of America. The NABTS standard is supported by a number of very large communication companies including AT&T, CBS, NBC, RCA and PBS. All Canadian television networks working with the technology are committed to NABTS.

Several forms of Teletext have emerged, but in most instances the short term will see services similar to those planned by CBS, NBC and CBC, which can be considered as a more limited version of Teletext utilizing the vbi. In such cases, only up to about 250 pages of information are being transmitted. This compares, for example, to the ambitious proposals of Time Inc. for providing up to 5,000 pages using full channel Teletext.

While on the one hand there are fundamental advantages of CATV over the telephone network for Videotex transmission in the form of Teletext, it should not be forgotten that currently there are no low cost, reliable, two-way cable converters and much of the physical plant in Canada does not allow for two-way transmission. Therefore, until the cable industry has a major capital expansion and upgrading program, the use of cable for Teletext services is going to be somewhat restrained. However, a number of companies are working on this problem, most notably Electrohome with a new version of its EGT 100 decoder, being sold in the United States.

The major impetus for Teletext in Canada has come from the CBC, which has been conducting its Project Iris trial. This is a joint venture between the DOC and CBC being conducted in Montreal, Toronto and Calgary. Other notable Teletext experiments include those conducted by TV Ontario, and the WETA trial which was conducted in Washington, DC and funded by the Canadian federal government. The TV Ontario trial for Teletext and Videotex has been operating since 1980. It handles between 100 and 130 Teletext pages for a number of institutions. The network has also produced a local mode of Teletext that allows information to be loaded and saved in the memory of the receiving terminals for viewing at a more convenient time.

Only Norpak, Electrohome and A.E.L. Microtel are providing Teletext decoders in the appropriate protocol for use in the Canadian market. A number of Japanese firms, however, have promised to mass produce these at a much lower price, with Panasonic currently undertaking development to supply the US market.

Some of the issues which are likely to affect Canada's Teletext industry developments in the near future have been specified as:

1. The deregulation of Teletext transmissions in the US. US Teletext services are currently available or will be shortly available to in excess of 75% of all cable households.

2. VLSI technology under development in Canada and elsewhere is likely to bring the complexity and cost of Teletext decoder equipment down to an acceptable level. Canadians will have direct reception of US Teletext signals which are unregulated, regardless of whether those Canadians subscribe to cable TV. Teletext is an embryonic industry, and as such, in the first few years no service will be economically viable.

3. Teletext using the vbi combines electronic transmission techniques, data processing, local storage and either/or narrow casting and broadcasting. Technology available today permits addressable receivers and closed user groups"; thus members of the general public can be completely excluded from a transmission of service. A portion of the vbi screen could be designated

only to a closed user group, while other data could be designated to the general public.

4. A number of groups have suggested there should be no regulation over content in any form. Technical standards could be regulated insofar as the transmission standard should not interfere with the main carrier or with other broadcasting services or point-to-point services.

5. Vertical integration in the communications industry is enhanced with the deregulation and encouragement of Teletext type services. Teletext using vbi resembles in many ways the print media. Experiences in the US have involved experts in print media joining their resources with those of the broadcast industry.

6. The largest players in the US Teletext and Videotex market are all vertically integrated in TV, radio, print, cable, pay TV and newspaper, and many have pooled their resources with other print industry companies. It is felt by a number of industry spokespeople that any attempts in Canada to limit the pooling of resources among broadcast, print and cable media would be disasterous in view of competition that the Canadian systems would face from the US. There is a likelihood of having the Teletext industry gradually taken over by the totally unregulated US media.

7. It is clear that multiple unregulated foreign vbi Teletext services are now growing in the US and are slowly making themselves available across the US/Canada border. Imposing a tightly regulated environment may produce a further impairment to the development of the Teletext industry. As well, a further consideration is the fact that over the next two years multiple direct broadcast satellites will allow unscrambled TV signals from the US into Canada along with vbi sub-carrier services.

Standards

The setting of the North American Presentation Level Protocol Syntax, or NAPLPS, is one of the most significant industry developments of the past two years. Three standards exist and have been approved by CCITT for Videotex systems throughout the world. These are the alpha-geometric NAPLPS, the alpha-mosaic CEPT format endorsed by the Conference of European Post and Telecommunications Administration, and Japan's alpha-photographic Captain system, Lum (1983).[13] In reviewing the history of the development of international Videotex standards, Lum pointed out the United Kingdom was the pioneer in developing their Viewdata system, Prestel, which was based on the alphamosaic scheme. The French Antiope system was based on a parallel alphamosaic scheme. In Europe, a merging has occurred with the definition of a CEPT standard, combining serial and parallel schemes by means of a time independent switch. In 1981, AT&T announced the development of PLP, the Presentation Level Protocol based on the Telidon geometric coding scheme with a number of enhancements. In 1983, the AT&T Bell System PLP and the Canadian Telidon augmented picture description instructions published by the Canadian government. This led to the formation of the current standard known as NAPLPS in 1983, following agreement by the American National Standards Institute (ANSI) and the Canadian Standards Association (CSA). Corresponding developments were made for Teletext where the de facto standard is NABTS.

While NAPLPS has only recently been promoted as the official standard in both the US and Canada, there has been unofficial acceptance of NAPLPS as the de facto North American standard for some time. In the US, work is now underway to develop NAPLPS chips by Western Electric, Synertec, Motorola and Intel. It is expected that by mid-1984, it will be possible for manufacturers to buy NAPLPS chip sets at prices of less than $100. Canadian manufacturers are now using this standard in their products, with Norpak and Electrohome manufacturing and marketing NAPLPS and NABTS chip sets and decoder boards for Videotex and Teletext. NAPLPS software is produced by a number of companies: Tayson, IBM, Microtaur, Genesys and Manitoba Telephone.

Many observers believe that the settling of the NAPLPS standard is the key to the ultimate success of a Videotex industry in North America. The setting of a standard has significantly reduced the uncertainty in the industry and has already encouraged invest-

ment in the development and manufacture of VLSI chips and software on floppy discs for microcomputers. Computer manufacturers are also examining these chips sets, with a large number showing interest including Apple, IBM, and DEC. Related to this is the fact that the European CEPT standard and world standard Teletext incorporate the NAPLPS protocol. Likewise, in the Southeast Asian markets, Japanese manufacturers are examining NAPLPS protocol for incorporation into their products and services. There has been gradual adoption of NAPLPS and NABTS in foreign markets such as Japan, Singapore, Korea and other parts of Europe. In North America, AT&T, IBM, CBS, NBC, Keycom and Sears stores are all using NAPLPS systems.

The relative merits of NAPLPS include:

1. Its independence of hardware technology. Terminals may have high, medium or low resolution, and may have different ranges of colour capabilities. NAPLPS allows for these variations and has what is referred to as a forward and backward capability. Forward capability means that existing terminals can receive all future command formats, including future enhancements at the current standard, while backward capability means that the future terminals will be able to access old data bases.

2. Since its incorporation of the Unix screen concept, coordinate systems are not expressed in physical dimensions or fixed grid formats, but rather in normalized units or binary code. This ensures that pictures will be displayed independent of the hardware configuration, and objects within pictures will remain in the same relative position with respect to each other, even though the resolution of the physical display may be changed.

3. NAPLPS code is based primarily on the use of point, line, arc, rectangle and polygon encoding schemes. With these, one can draw very simple pictures such as graphs, pie charts, etc., or alternatively, very complex pictures. The incremental point function allows photographical type pictures to be drawn. Dynamic redefinable character sets (DRCS) capability for NAPLPS is independent of hardware implementation of the terminal. DRCS capability is achieved by a downloading process which uses the unit screen for the

description of a symbol shape, which is then scaled down to the storage character size as implemented within each terminal. Only the shape of the DRCS character is stored.

4. A mosaic code table, which is the union of the French and British mosaic standard, is also included in NAPLPS, primarily to facilitate the interworking with the European system.

5. Macro instructions are an efficient way of coding and transmitting information to a terminal which uses that same information several times. In the case of the transmit macro, it provides the user terminal with what has been called programmable function keys, i.e. functions of these keys depend on the macro instructions being sent back to the data base computer.

6. In NAPLPS, the primary set is the 7 bit ASCII code table, which is the de facto world standard for ordinary computer terminals. The objective in using this is to ensure that NAPLPS Videotex terminals, equipped with a keyboard with alpha numeric text, can be used as normal computer terminals, thereby enhancing the utility of the NAPLPS terminal.

Other key features of NAPLPS include its colour capabilities, blink capabilities, texture filling capabilities, character size scaling, rotation, scrolling and its wait command.

Additional conforming features have also been noted by Lum (1983):[14]

1. Videotex and Teletext services using NAPLPS can have blind interchange, i.e. the data base is independent of the terminal. Data base information pages created for Videotex and Teletext can be easily interchanged, ensuring a widescale portability of data base pages.

2. A unified specification for Videotex and Teletext allows the design of one VLSI chip set and encourages manufacturers to build larger volumes of the product rather than small volumes for each of several specifications.

The specific features of the NAPLPS protocol are outlined in Exhibit 1.2.

EXHIBIT 1.2

NAPLPS – Features and Implementation Requirements

Functions	SRM Requirements

Functions | **SRM Requirements**

1. Character Sets
   - 94 Primary (ASCII)
   - 94 Supplementary

2. Geometric Drawing Primitives (PDIs)
   - Point
   - Line
   - Arc
   - Rectangle
   - Polygon (256 vertices)
   - Incremental point
   - Incremental line
   - Incremental polygon
   - 256 vertices limit for Polygon and Spline

3. PDI Attributes:

   - Domain
     - Single-value operand
     - Multi-value operand
     - 2 & 3 dimensional modes
     - Logical pel

   - Text
     - Rotation in 4 directions
     - Move in 4 directions
     - 4 inter-character spacings (1, 5/4, 3/2 and proportional)
     - 4 inter-row spacings (1, 5/4, 3/2 and 2)
     - 4 attribute combinations
     - 4 cursor styles
     - display formats (40x24, 40x20, 40x10, 32x16 and 20x10)

   - Texture
     - 4 line textures
     - 4 define & 4 programmable masks
     - highlight in all colours

   - Colour
     - 3 colour modes (0, 1 and 2)
     - 16 colours out of 512 palette

   - Blink
     - 16 simultaneous blink processes

EXHIBIT 1.2

(continued)

Functions	SRM Requirements
3. PDI Attributes: (cont'd)	
– Wait	– 0 – 1/10 sec minimum duration
– Reset	– Selective
4. Mosaic Set	– 65 codes
5. Macro Set	– 96 macros
6. DRCS	– 96 characters
7. Control Sets:	
– C0	– Execute and present all
– C1	– Create macro, DRCS and programmable masks
	– 40 unprotected fields

Source: Chang, K., "Videotex through Microcomputers with a Review of Current Developments in Canada," Ottawa, April 1984.

Response to NAPLPS

Until recently, the uncertainty surrounding the Videotex industry was attributed to the lack of a North American Videotex standard. Decoder manufacturers, it was argued, could only benefit from economies of scale if a unified market environment were to exist. A report produced for the Videotex '84 Conference[15] in Chicago stated that while the adoption of NAPLPS by the relevant North American Standards Organizations ensures manufacturers the potential for economies of scale, the short term production of reasonably priced full NAPLPS terminals is constrained by the nature and extensive scope of the NAPLPS standard. The development of a Videotex industry in North America, it is argued, may centre on the issue of standards, but more specifically on the short term viability of the full NAPLPS standard.

NAPLPS reconciles the three major presentation systems -- Telidon, Prestel and Antiope -- by incorporating certain coding features of each, giving the standard the status of universality and, at the same time, becoming a standard with a number of redundant features. As a result, the requirement to incorporate all aspects of the NAPLPS standard into Videotex decoders could lead to non-optimally priced products. The main stumbling block in terms of production is the high price associated with memory storage capacity requirements. A number of industry spokespersons have suggested that NAPLPS, or at least full geometric coding, is too advanced for the current set of applications likely to take place in the near future.

A number of very special features of NAPLPS enhance its capability and possibilities for commercial services. NAPLPS codes require only about 10% of the space used by equivalent presentation modes to define the same picture. This means that hundreds of pages of graphics can be stored on a floppy diskette and that NAPLPS frames can easily be transmitted in a reasonable length of time using normal voice grade telephone lines. NAPLPS is also display independent in that a vast range of terminals will display a minimal approximation of the intended picture.

NAPLPS and ASCII

Currently, two commercial services -- Grassroots and Viewtron -- use NAPLPS. Grassroots was jointly launched by Infomart and the Manitoba Telephone System, whereas Viewtron is a mass market NAPLPS service introduced about a year ago in Florida by Videotex Corporation of America. Each have approximately 1,500 current users. There are, by comparison, at the present time more than 200,000 users of some form of ASCII-based Videotex service. There is also an estimated population of more than 6 million ASCII terminals in North America, 25% of which are already equipped with telecommunications capabilities. It is not likely that NAPLPS-equipped micros will become as widely available in the marketplace until at least the 1990s. Within the current market context, therefore, the main competitor to NAPLPS-based services are ASCII-based services such as The Source and Compuserve.

NAPLPS will probably be successful if users and advertisers are attracted to the enhanced graphics and will therefore support the extra costs of the data bases. There is still some speculation, however, as to the exact degree to which full geometric graphics exceed mosaic graphics with DRCS coding in terms of subjective picture quality. If the difference between the two types of graphics is not perceived by the average consumer, then it is arguable that mosaic or enhanced mosaic DRCS Videotex could supplement existing ASCII services in a much shorter time frame than NAPLPS. Another key factor will be the rate of penetration into the micro market of colour monitors. As well, it is important that NAPLPS become compatible with a variety of microcomputers, since the market is still very fragmented despite the early dominance in the business market of the IBM PC. Exhibit 1.3 provides a breakdown of the relative number of terminals using each protocol in the US market and Exhibit 1.4 provides a summary of selected Videotex trials with the chosen protocol. At the present time, the relative cost of each system and the subjective evaluation of the net benefit of one type of encoding scheme versus another are likely to be prime determinants of the industry's success in the 1985-1991 period.

EXHIBIT 1.3

Current Overview of US Videotex Terminals

**TOTAL US VIDEOTEX, TELETEXT, CABLETEXT AND
VIDEOTEX-LIKE TERMINALS BY STANDARD (1983)**

Prestel 1.65%

PLP/NAPLPS 0.92%

Telidon 0.03% and
Antiope 0.58%
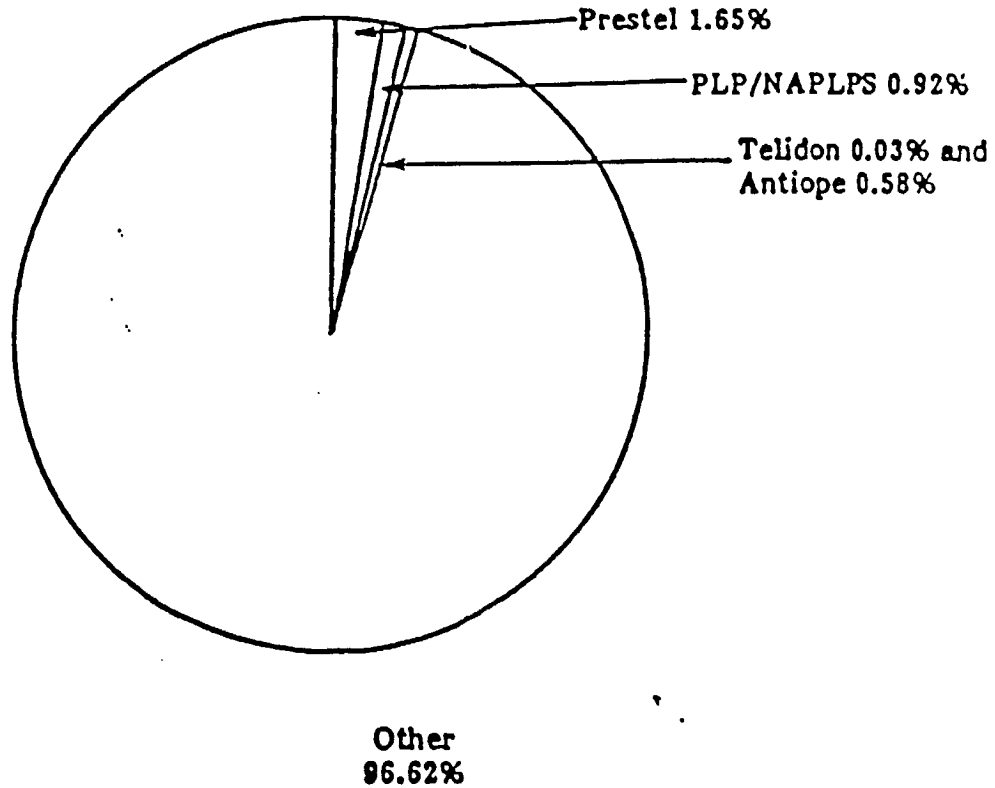
Other
96.62%

Total Terminals in US = 278,582

Source: Incontext Update, April 1984, Vol. 4, No. 6.

Other includes ASCII, proprietary alphamosaic services (e.g. Radio Shack or Virtex)
sideband teletext and VBI line 21 services.

EXHIBIT 1.4
Summary of Selected Videotex Services

Service	Commercial Start-Up Date	No. of Distinct Consumer Services	Estimated Average User* Charge/Year	Terminal Standard	Current No. of Terminals	Growth Rate/Month
Grassroots	9/81	Agriculture: (14) Lifestyle: (9) Finance: (1)	$264 (Primarily advertiser supported)	NAPLPS	1,500	7-10%
Teleguide	4/82	2	Free (Advertiser Supported)	NAPLPS	400	N/A
Viewtron	9/83	10 plus gateway	$312	NAPLPS	1,500 (Estimated)	2%
The Source	6/79	Consumer: 6	$744-$900	ASCII	50,000 (1/84)	2%
CompuServe	7/79	Consumer: 24	$360-$600	ASCII	100,000 (1/84)	2%
Micronet (Prestel)	1983	All Prestel Services	152 plus phone charges	Mosaic	5,000** (approx.)	10%
Neckermann	Early 1980	N/A	N/A	Mosaic	In-house	N/A

* Consumer
** CSPI estimates a total of 35,000 Prestel users.

Terminal pricing is another important issue, since it is known that users are not willing to buy expensive dedicated Videotex terminals for anything but the most highly specialized applications. While the expense of a full NAPLPS decoder can be overcome through the use of special purpose software for personal computers, this strategy, it seems, limits the potential market for the Videotex service. What remains as important is whether the use of a compatible subset of NAPLPS, providing a reasonable level of picture quality at lower cost per terminal, is a viable strategy. It has been suggested that it may be more advantageous in the short term to introduce mass market services that employ the most cost effective protocol, requiring inexpensive user terminals or personal computers, and to limit geometric coding to special applications.[16]

This strategy has to some extent already been employed, particularly in Canada, where the applications that have been successful with NAPLPS are those which are highly specialized and which to a large extent use Videotex software run on personal computers.

The rapid growth of micro-based NAPLPS is attributable to a large extent to the belief in a burgeoning personal computer market. There is evidence to suggest that while the early stages of personal computer growth have been quite rapid and met forecaster's expectations, in the last year or so this growth has slowed somewhat. In 1982, there was an installed base of 4.5 million microcomputers in home and business markets in the United States, and by 1983 the base had grown to approximately 9 million. The 1984 projections were for 15 million units.[17] In Canada, this industry is predicted to grow by 20% annually, with personal computers likely to comprise approximately $8 billion of the domestic computer expenditures.[18] There were an estimated 60,000 microcomputers in 1983 in Canada, with the most rapid growth predicted in the business sector.

NAPLPS Software

Most microcomputers equipped with the appropriate software and add-on modules can serve now as decoders, page creation terminals or integrated data base systems for NAPLPS Videotex. A wide variety of microcomputer-based software and hardware products using the NAPLPS standard are now on the market. The software industry is showing a significant amount of confidence in the growth potential for these services, as demonstrated in their investment in bringing these onto the market. Some of the more

well known products are those by Lumicon, Tayson, Genesys and the SVS-1 system developed by IBM. Prices range from $100 to $500 for decoder software and from $500 to $2,500 for encoding software. Mitsui Corporation of Japan recently paid $250,000 for the manufacturing and distribution rights in Japan and Southeast Asia of the Canadian Microtaure encoding and decoding system. Software packages are widely available for a number of personal computers including Commodore, Apple II, IBM PC and compatible machines. Page creation systems have been produced by Cableshare, Tayson, Lumicon, Formic, Async, Microtaure and TV Ontario (Exhibit 1.5). Hardware encoding units are being produced by Electrohome for $10,000. The price for NAPLPS decoders is currently in the $700 to $1,000 range, with NAPLPS decoding software packages available for a number of personal computers.

EXHIBIT 1.5

Microcomputer-Based Telidon/NAPLPS Decoders

Company	Base Micro-Computer	Memory Required	Operating System	Language	Display Resolution	Simulta-neous Colors (3/ch.cell)	Extra Hardware Required	Remarks
AVCOR	Commodore 64	64K	C64 Kernal	Assembly	320 x 200	16 palette	No	Cartridge based
ASHTUNE	Commodore 64	64K	C64 Kernal 3.2 or 3.3	C and Basic	320 x 200	8 colours or 8 grays	No	
	Apple II, II+, IIe	48K	Apple DOS	C and Basic	180 x 140	6 colours or 8 grays	No	
NORPAK/APPLE	Apple II, II+, IIe	48K	DOS 3.3	Pascal	128 x 96	15	Telidon inter-face card	
MICRODURE	IBM PC,XT	128K	PC DOS	Machine	256 x 200	16/512	Real Colour colour card	Features inc.: downloading, slide show printing
MICROSTAR	IBM PC,XT	192K	PC DOS	Basic & Assembly	320 x 200	16	Plantronics colour card	Also available for Hyperion, Compaq, Colum bia, etc.
PEN	IBM PC,XT,PCjr	128K	PC DOS 1.1 or 2.1	Forth	320 x 200	16	Techmar or Plantronics colour card	
MICROPDOL	IBM PC,XT	NTL	PC DOS 2.0	Machine	256 x 200 x4 planes	16 out of 16 million	EDT 100-based Board	Full SRM 16K Telesoft-ware, 8K Macro Composite video output
MANITOBA TELEPHONE SYSTEM	Commodore 64	64K	C64 Kernal	Machine	160 x 200	13 + 3	No	3 out of 13 colours and 3 gray scales per ch. cell
FORMIC	Apple IIe	64K	DOS 3.3	Machine	256 x 190	16	Texan card	Also requires a 64K, 80 col. card

Source: Chang, 1984.

World Standard Videotex

Efforts have recently been made by the French, Canadian and Japanese to derive a universal Videotex standard. This represented the initial step toward a worldwide unified Videotex standard (WWUVS). The principal idea was that the three conflicting standards would accept North American NAPLPS. In late 1982 and early 1983, it was announced that each of the three standards would be left intact, but that enhancement to these, such as the addition of audio or photographic capabilities, would be worked on jointly with a single standard to be developed at a later time.

Summary

The initial early advances of Canada in Videotex, NAPLPS and Teletext have been overshadowed somewhat by the development of the US banking and financial services industries. NAPLPS is not the sole or largely preferred protocol since a majority of services are ASCII rather than NAPLPS-based.

The relative net benefit of NAPLPS to users is still very much in question, emphasizing the need for service providers to place utmost efforts on content development applications and target audience identification.

Combining Videotex (NAPLPS) with a variety of display and storage technologies for special applications in business, public service, arts and culture has been shown to be successful and to offer significant market opportunites. Specialized applications utilizing artificial intelligence and distributed systems for storage are increasingly seen as overcoming the problem of large databases, computer and network capacity, complex search procedures and tree structures. These, combined with enhanced display systems, such as High Definition Television (HDTV), allow the relative benefits of NAPLPS to emerge.

On-line, interactive banking and financial services and shopping applications are believed to be economically beneficial to business (reducing costs and offering more efficient services) and have received significant positive response from test users where user charges are either fully internalized (by the provider) or highly subsidized.

In business, NAPLPS graphics for office automation, on-line information retrieval, and interactive services for finance and banking have been assessed quite positively but still face significant competition from existing technologies offering comparable functionality, usually at lower prices and with less need for acquiring peripheral support services.

The growing penetration of microcomputers with graphics and colour monitors provides significant opportunities for NAPLPS software and VLSI chip sets. The majority of these are in business, underscoring the importance being placed on business graphics and information access. More important are the specialized market sectors likely to use these services -- medicine, animation, real estate, inventory, sales, advertising, banking, investment and travel.

In Canada, much of the industry activity has been implemented because of government support. This applies to the original field trial activity and to a lesser extent the current commercial services. With the government program now being terminated, the industry is required to become more effective in its product development, marketing and operations. The main focus of the industry is increasingly being directed to the expanding US market for Videotex software, VLSI chips and system implementation.

New and emerging applications, in summary, emphasize that technical characteristics are secondary to the content and applications development. Linking Videotex to other established and functioning systems represents the most attractive entry point into the marketplace, particularly for business users.

Footnotes - Chapter 1

1. Bown, H.G., O'Brien and W. Sawchuck, "Telidon Technology Development in Canada," Department of Communications, Ottawa, undated manuscript.

2. Parkhill, D.F., "Developments on the Canadian Scene," Paper presented at Viewdata '81, International Conference and Exhibition, October 6-8, 1981, London, England, p.2.

3. Wills, R. and P. Booth, "Transactional Services, Technology Diffusion and Consumer Issues," Department of Consumer and Corporate Affairs, Ottawa, March 1984.

4. IRD, Financial Information Services, 1983.

5. Speech to the New York Banking Associated, cited in Teleservices Report, November 1982.

6. The Yankee Group, "Teleshopping, New Electronic Marketplace," July 1981, p.13.

7. New York Times, February 2, 1984.

8. Nordicity Group, "Non-Programming Services," Study for the Cable Telecommunications Research Institute, Ottawa, 1983.

9. Nordicity, 1983, p.17.

10. Link, "Worldwide Videotex Evaluation, Systems and Services," Link Videotex Planning Services, July 1983, p.18.

11. Link, 1983, p.28.

12. Extracted from Canadian Videotex, Information Service Providers, response to questions on the CRTC Public Notice 1983-77.

13. Lum, Y.F., "Videotex Standards, A World Perspective," Videotex '83, Sao Paulo, Brazil, October 10-11, 1983.

14. Lum, op. cit., p.16.

15. Chang, K., "Videotex, Through Microcomputers with a Review of Current Developments in Canada," Ottawa, Department of Communications, April 1984.

16. CSP International, In Context Update, April 1984, Vol. 4, No. 6.

17. Op. cit.

18. Booth, P.J., "Videotex Trends, Developments and Emerging Opportunities, Volume V," Department of Communications, Ottawa, April 1984, p.16.

CHAPTER 2
Videotex/Teletext Industry -- Structure and Developments

Canadian Situation

Canada has been the scene of intense activity in experiments, field trials and commercial services for Videotex and Teletext. The range and scale of these trials and operations has varied, and a diversity of system configurations have been used.

The development of Videotex and Teletext services can be seen as a part of a much broader communications service sector. In Canada, telecommunications and computer users have traditionally been leaders in the implementation and development of advanced systems. There is a high level of penetration for telephone, cable services and data communications. These factors make Canada an appropriate arena for the adoption of vertical and value-added service additions to the telecommunications infrastructure.

Canada has an extremely high level of telephone penetration, with estimates indicating upwards of 96% of all homes in Canada having telephone lines.[19] The telecommunications infrastructure is quite well developed, with about one-quarter of the telephone exchanges being connected to electronic switching centres which facilitate provision of advanced services based on data communications. As well, there has been rapid penetration in recent years for digital trunk services providing fully digital point-to-point communications, particularly in the high volume, high traffic urban areas.

Canada also has an extremely well developed system for cable television services with a relatively high penetration of over 86% of households having access to these types of services. Television penetration is approximately 90% of all households.[20]

Within the cable and telephone industries, service providers are currently anxious to explore new and varied markets through the offering of vertical services. Basic services are generally considered to be saturated, and as a result, industry players are now looking for ways to enhance service offerings to their customers through the provision of such things as value-added telephone and cable subscription services.

Trends in the data communications and computer markets show increases in a number of sectors. Growth rates for the penetration of small computers into Canadian industry, for example, within the last few years have been averaging between 17% and 25% annually. This is expected to continue over the next five years, providing a substantial user base of small and microcomputers into the 1980s and 1990s. Recent surveys conducted by the Canadian Information Processing Society and Wescom Ltd. have indicated that growth rates of over 35% were experienced in the 1978-81 period for microcomputers. It is estimated that by 1985, small computer machines will outnumber all other types in the marketplace, with sales in the microcomputer area expected to reach $1 billion. There is also an acceptance and high utilization of on-line databases by business and by a growing number of home computer users in Canada. Revenues for on-line database use have been estimated to be increasing by 25% to 30% each year, with one new database being added almost every month for public use.

The established base of computer users and a sophisticated transmission network have combined to produce a strong demand for all types of computer and telecommunication services. This indicates there is a strong likelihood for a wide range of application areas to be developed for Videotex services in the home and business markets in Canada.

A significant feature of the Canadian Videotex/Teletext industry has been the role of the federal government, which over the past five years has committed over $100 million to Telidon over the past five years. This sum has been matched by approximately $200 million from the private sector -- involving over 200 companies between 1979 and 1983. In the recent past, was the announcement in 1984 of the allocation of a further $5 million in assistance under the Telidon Program. This was directed towards 27 projects, primarily to assist in the development of software and content for Videotex/ Teletext-type services. Under this program, the federal government provided 30% of the eligible costs for a project with a maximum contribution of $500,000 and a minimum of $15,000.[21]

Today, emergent applications stemming from this government support can be examined in terms of specialized databases for retailing, automated sales, on-line stock market and commodity information, on-line advertising and information services, teleshopping and consumer information databases, promotion packages for product and service announce

ments and advertising, educational training, research services and general information for students, faculty and staff, and with respect to community information, the development of specialized databases for social and community work for the disabled and for ethnic groups.

Other significant industry developments are typified by the applications software of Genesys, a Canadian company which produces Videotex-based transit information. This service is currently provided in Ottawa and allows public transit users to dial up Videotex databases to find the latest bus arrival and departure information, schedule changes and other relevant information to assist in the completion of trips using the public transit bus service. Genesys' service has also been developed and applied in a number of other cities in North America.

Another interesting application that has emerged is called TABS which provides weather aids for pilots. This service plugs into the aviation weather service database operated by Canada's Department of Environment and provides forecast weather reports, aviation forecasts for different altitudes, and a variety of weather maps that pilots can use to help save time and fuel in their route selection.

In the government service sector, the Cantel database, operated by the Department of Supply and Services in Canada, offers a variety of government and job information. It recently added a section devoted to the Canadian Human Rights Commission which uses graphics and text to illustrate the provision of human rights on 125 pages in French and English.

A number of hardware developments are also worth noting which are related to microcomputer-based Videotex and Teletext applications. One of the most notable developments has been the production of VLSI chip sets for both NAPLPS Videotex and NABTS Teletext. Norpak Corp., for example, recently announced an agreement with Rockwell International of Newport, California, to develop, manufacture and market chip sets for the NAPLPS and NABTS protocol. The sets will be available for sale to packagers of Videotex systems and system integrators. Norpak hardware will also support the IBM Videotex system, SVS 1.1. In addition, the RCA Service Corp., a unit of RCA Corporation of New York, has agreed to provide maintenance for the Norpak products in the United

States. Norpak is also providing a Teletext encoding system consisting of a communication broadcast management processor, mass storage, RAM memory and a Teletext inserter with its own processor. The system, which will handle a broadcast cycle containing up to 5,000 pages, will store the broadcast in RAM memory to achieve rapid access and easy modification. The system supports the vertical blanking interval and full-channel NABTS Teletext data insertion.

Another Canadian company, Electrohome, has recently introduced a low cost, user-friendly NAPLPS Videotex terminal for the North American market. This product, the EGT 100, which is fully NAPLPS compatible is expected to sell initially for around $1,000 US, coming down to $600 as large market volumes emerge. Currently, this is being used by Keycom in their Chicago Videotex service, which commenced in April 1984.

AT&T International has also been developing Videotex terminals and recently announced the production of their Sceptre system. The terminal is designed to be used with a TV set and includes a 42 key remote control keypad with full keyboard which communicates with a Videotex decoder through an infrared signal. The unit can operate through a modular telephone jack to the telephone line and includes a 1200 baud modem. The terminal has dual functionality, operating either in ASCII or NAPLPS. This is particularly useful as a gateway technology and makes it unique to NAPLPS terminals that have already been announced. The terminal also allows either dial-up or auto-dial and the storage of telephone numbers for access to particular databases. Another special feature is its encryption device incorporated into the terminal to ensure security for home banking and transactional services. The product offers a number of features which have been identified numerous times as critical to the success of a standalone Videotex system in the home. Primarily the terminal has a call-waiting feature which allows the customer to know that a telephone call is incoming. This feature solves one of the primary consumer oriented problems which has been identified -- that of tying up extra telephone lines in the home when using Videotex services. Further, the price is reasonable, and a method of overcoming congestion on the telephone lines or tying up telephone lines has been achieved. The product is already viewed as an effective competitor to other standalone computer by users who may wish to hook into Videotex databases, since it offers both ASCII and NAPLPS compatability.

IBM has also become active in Videotex with the announcement of a joint project with Sears and CBS in the United States for home Videotex services. IBM has begun to promote its personal computer using a series of software packages which allow the PC to be used as a Videotex terminal. IBM has been agressively marketing its IBM PC Videotex service, a licenced Videotex program which allows the IBM PC, PC Junior or PC XT to serve as an end user Videotex terminal. Using these types of systems, the user can establish communications with a Videotex host, receive frames for display on a colour monitor or TV, enter data from transmission back to the host computer, and save incoming calls on a disc for making copies. The service also provides access to a variety of Videotex networks. The session level protocols for Videotex communication links are also supported. The protocol currently being implemented by the Norpak Mark IV terminal on the IBM series is the SVS 1 program product. The protocol currently implemented by IBM for Videotex in the United States is fully compatible with NAPLPS.

Infomart, a Canadian company, will soon be expanding its Grassroots system into the US market. Grassroots America is projected to penetrate 10% of the estimated 750,000 farmers in a five year period which would make Grassroots one of the largest commercial Videotex undertakings in America.[22] The service is planned for implementation in Maryland, Delaware and Pennsylvania using dedicated Videotex terminals. Farmers equipped with a Commodore 64 computer will also be able to hook into the service using a $99 Videotex software package provided by the Manitoba Telephone System. The cost to the farmers would include terminals, software and the communication linkages. Currently, in the commercial Grassroots service, users pay 5¢ per minute for the service and have average expenditures of $30 per month.Services currently include interactive farm management, electronic messaging, teleshopping and telebanking.

Infomart, however, Canada's largest provider of Videotex services, has also announced that it plans to eliminate in-home consumer service by the end of 1985. Cost estimates for servicing the Toronto area are between $10 million and $25 million.[23]

Industry Participants

In Canada, the initial Videotex/Teletext trial activity instituted between 1979 and 1983 was undertaken by six major groups:

1. Telephone companies such as BC Tel, Alberta Government Telephone, Bell Canada, Saskatchewan Telephone, Manitoba Telephone and New Brunswick Telephone.

2. Cable companies such as Telecable Videotron and Canadian Cable Systems.

3. Broadcasters such as the Ontario Education Communication Authority (OECA) and the CBC.

4. System suppliers such as Infomart and the government Cantel service.

5. Information provider companies.

6. The federal Department of Communications.

The Department of Communications in Canada was involved in the promotion of the field trials, the sharing of resources and recently has become more involved with respect to the export of hardware, software, serviceware and the promotion of Canadian activities abroad.

In the early stages of the Videotex/Teletext developments, hardware was manufactured by a number of companies in Canada. Telidon Videotex terminals were manufactured by both television manufacturers and computer equipment suppliers. The largest suppliers of terminals were Electrohome, Norpak and Microtel. In the early stages, i.e. the 1979-81 period, the emphasis was placed on the development of enhanced television receivers and TV sets with plug-in adapters. In the more recent past, dedicated business terminals have been developed by these suppliers. Some of these dedicated terminals have been used in the various trials which were operated. As well, dedicated public Videotex terminals were produced by Microtel for placement in public locations such as malls, shopping centres and hotels.

One of the fundamental problems which emerged in the hardware industry with respect to terminal development was the high price of these systems, which ranged initially between $1,800 and $2,500. Throughout the early Videotex/Teletext development period, hardware

manufacturers felt that as demand would increase, the terminal prices would decrease to the point where, ideally, they should be selling for less than $600. However, results from trials and commercial services have yet to see the required penetration levels being achieved. Even today, dedicated Videotex terminals are quite expensive and out of the range of most home buyers and a large segment of business users.

Two of the more significant developments with respect to terminal manufacturing are the increased emphasis on the use of personal computers and the development of VLSI chip boards. Another major development is the realization by the terminal manufacturers that specialized applications require specialized terminal designs. More emphasis, therefore, was being directed in recent years to the development of specialized Videotex/Teletext systems and terminals.

In addition to the production and development of user terminals, page creation terminals were also produced by companies such as Norpak. These terminals provide capabilities for editing and formatting large amounts of text and graphics, using PDI-encoded symbols. These systems generally have their own microcomputer keyboard, display unit and graphics tablet, PDI decoder and colour TV monitor. Several modes of IPS terminals were being used in the trial period and included Norpak's Mark I, Mark II, Mark III and Mark IV. Northern Telecom produced a VIPS system while Cableshare's was referred to as the Picture Painter system.

These hard-wired standalone systems were priced at approximately $35,000. Today similar systems are being produced based on microprocessor software, priced anywhere between $1,000 and $3,000 for a complete page creation system. Such developments have caused major changes in the way pages are produced in the IP industry sector.

The structure of the Canadian Videotex industry in its early stages was oriented primarily around the development of content and services for the field trials. Service providers were generally either cable companies or telephone operators. These service providers allowed access by information providers, i.e. companies which created pages of information for input onto a specific network either provided by the telephone or cable companies. The information providers gathered information from sets of sub-IPs which, in most cases, were business, government departments or community groups. These

target populations were, in some cases, home users, and in other cases, simply public users accessing terminals in public places, and in still other cases, business users. In total, approximately 31 IP companies emerged in the first three years of operation, and approximately 400 sub-IPs provided information for placement on the databases developed for the trial services.

Information Providers

During the operation of the Canadian Videotex/Teletext experiments, information provider companies represented educators, government agencies, businesses of various types, retailers and large service operators. Two of these were Infomart, one of the largest in Canada, and Dominion Directories, an affiliate of BC Tel, which provided most of the page creation services for the BC Tel Videotex trial between 1980 and 1982.

Infomart, is the operator of the successful commercial venture referred to as Grassroots. The strategy developed by Infomart for the operation of the Videotex service was based on an independent development of specific market sectors and the definition of information needs for these specific sectors. In most instances a wide range of specialized databases and specialized applications were implemented for services in the home and business markets. Infomart focused on the rural farm services.

Within the experimental period, 1979-1983, a number of companies operated as sub-IPs. These are companies which participated in the field trials by providing information in one form or another to a large information provider who would then place the information on a computer system for access using the Videotex/Teletext services. These companies were generally organized under the umbrella of a major IP who would supply pages of information within each of the various operating services and trials. The IP or umbrella IP provided management and maintenance of the database on behalf of the sub-IPs.

In addition to IPs and service provider companies, broadcasters and cable companies have also played a role in Canadian Videotex industry developments. The advantages of cable have been elucidated in other sections of this book. However, it is recognized that the future holds the most promise for these service providers as two-way capabilities become widely available within Canada. At the present time there is only limited two-way capability which consequently is restricting the way these services are being provided.

Broadcasters in Canada did not have a major role in the initial presentation of Videotex or Teletext services. Two trials were operated by broadcasters in this period -- one by the Ontario Education Communications Authority in Toronto (OECA), and the other by the Canadian Broadcasting Corporation. OECA set up its own IP group and also acted as an umbrella organization for information provided by other public agencies, schools, libraries, educational organizations and special user groups such as the handicapped. CBC involved homes in Toronto, Montreal and Calgary. A further description of this trial is provided in a succeeding chapter, which details the Canadian field trial experiences.

From the perspective of competitive services, there are a number of threats posed to broadcasters by the new medium of Teletext, particularly in terms of the possibility to generate revenues from advertising. In Canada, the main concern is that there may be an erosion of traditional advertising revenue sources if Videotex and Teletext pages provided by cable or telephone companies become widespread. Essentially, this is because advertisers may shift their expenditures from the mass media to more targeted methods operated through Teletext and Videotex type services. Broadcasters, however, feel that Teletext may be a viable service, primarily viewing it as advertising driven, whereby various information pages would be sponsored by business. Already, significant interest has been expressed in the development of this medium for advertising, particularly in systems which are directed towards point-of-sale shopping services such as those operated in the Toronto area by Cableshare.

Another important feature which emerged in the Canadian experience and which has typified the industry is the development of gateway technologies. These allow users in one service territory, e.g. British Columbia, to access databases available in other service territories or service offerings, such as those provided by Grassroots in the Manitoba Telephone service. This development was an integral component of the long range plans of all the trial participants, particularly those in the telephone company sector. Typical of this is a service called Inet, provided by Telecom Canada, an amalgam of Canada's telephone companies, which is fully dependent on the gateway technology. The basic concept of a gateway is that it allows communications between computer terminals and other data communication systems which would otherwise be incompatible on account of varying protocols, transmission speeds and character coding schemes incorporated into their design.

Gateway services were planned for the Bell Canada Vista trial, BC Tel services, Infomart's Grassroots, the federal government's Cantel program, the OECA program and the Videotex services of the New Brunswick Telephone Co. and Saskatchewan Tel. This development was viewed as critical to opening up the availability of content to a variety of participants, and also to enhancing the marketing possibilities for services provided on all of the various Videotex systems. This type of technology enhances the decentralization of control of information throughout the industry and is a major inducement for the standardization of the quality of various databases between various service locations and service operators.

In examining the overall structure of the Videotex and Teletext industry, the majority of service offerings in Canada followed a model composed of four levels. These include the main service provider, a large umbrella information provider, other secondary or smaller information provider services, and a large number of sub-IPs. This particular approach to service provision evolved mainly because of the reluctance of telephone companies to become full service providers of information as well as network carriers and system operators. This reluctance was due to the unsettled nature of the regulatory environment in Canada, which currently leaves open the question of carriage and content with respect to Canada's telephone companies. A second reason for this reluctance was the problem of efficiently providing a prototype system while keeping the possible risks involved to a minimum. The Videotex industry evolved from a number of companies coming together, each possessing expertise in areas such as publishing, directory production, network provision, software development and computer operations. As a result, there were very few existing businesses capable of providing a fully integrated service in the period of time and with the amount of investment required to develop a full Videotex system in Canada. There was also a need to develop service offerings in a variety of locations simultaneously across the country in a relatively short time frame, and as a result the development of joint and cooperative efforts was considered most expedient.

Finally, the nature of government support was based on the idea that a variety of companies should participate in the industry, which would encourage more companies and individuals to become involved in a relatively short period of time.

Economics of Videotex Industry Participation

The main force behind the Canadian trials was the federal government; nevertheless, a significant amount of investment was provided by the private sector.

Overall investments in the Videotex industry between 1979 and 1982 totalled $50 million on behalf of the federal government, with a corresponding $150 million provided by all sectors of the Videotex industry for the period of 1978-82. This provided a total of close to $200 million by the end of 1982 and it is estimated that by the end of 1985, close to $500 million will have been invested in this new industry. Exhibit 2.1 illustrates the breakdown of the estimated investments made by various service operators in their trial activities over a sample two-year period -- 1981-1982.

EXHIBIT 2.1

Funding for Trial Operations

Company	Amount
Bell Canada	$10,000,000*
New Brunswick Telephone Co.	1,000,000
Manitoba Telephone System	2,000,000
Telecable/Videotron	4,500,000
BC Telephone Co.	2,800,000
Alberta Government Telephone	N/A
OECA	N/A
Infomart	12,000,000

* Based on Wescom industry interviews.

Consideration of the various configurations which emerged in the provision of Videotex services allows the estimation of the kind of cost breakdowns necessary for the development of a viable, integrated system operation, as typified by most of the Canadian trial activities. The support costs for a service can be broken down into five basic areas which include software, database maintenance, billing, staff and administration, and research and development. As Exhibit 2.2 illustrates, these costs reveal the relative proportion of expenditures required when planning the development of a Videotex service.

EXHIBIT 2.2

Support Costs
Proportion of Total Investments for Typical Integrated Videotex Service

Software	18%
Database Maintenance	12%
Billing	41%
Staff and Administration	21%
Research and Development	8%

Exhibit 2.3 shows the actual allocation of dollars required to maintain a Videotex service over the experimental two year period of most trials.

EXHIBIT 2.3

Allocation of Dollars for Services Required to Maintain
Telidon Field Trial Operations Over a Two Year Period

Software	27%
Database Maintenance	7%
System Equipment	3.5%
User Terminals	23%
IP Terminals	7%
Staff & Engineering Requirements	31%
Background Development & Research	7%

(Actual dollar amounts will vary according to the scale of operation. These estimates are based on a trial involving between 200 and 500 terminals and staff of between 12 and 25 individuals.)

The three largest components in any service offering were the manpower and labour inputs, software requirements and finally, user terminals and decoder costs. In the Canadian situation, it must be remembered that much of the funding for terminals was provided by the Department of Communications, and allocated against the cost of purchasing user and IP terminals. The costs of development of software, database management and engineering were borne solely by the system operators.

Information providers and sub-IPs were responsible for developing pages, maintaining their pages of information on a database, keeping pages up-to-date, marketing services to acquire new page creation contracts, and conducting research and evaluation to define new applications. Exhibit 2.4 provides a breakdown of expenditures incurred by information providers in the various field trial operations.

EXHIBIT 2.4

Expenditures by Other Industry Sectors -- IPs and Sub-IPs
(not operators or system carriers)

Publishers	$2,500,000
Retailers	1,500,000
Banks	500,000
Government Agencies*	4,000,000
Educational Institutions	400,000
Other Organizations	1,500,000

Source: Canadian Information Provider Industry, P. Dolan, Paper
            Presentation, Videotex '81, Toronto.

Estimates adjusted by Wescom, based on industry interviews.

* Includes Cantel.

(Sub-IPs are defined as companies which provide content to page creation companies. These companies, in most cases, do not have their own IP terminals and do not create their own content for display. As an example, Dominion Stores in the Bell Vista trial, Canadian Cancer Society and BC Tel trials, or Winnipeg Magazine in Project Grassroots.)

Costs in this exhibit included system operator and storage charges, data collection charges, editing, data entry and frame maintenance charges. Charges for storage of information, as implemented in the Canadian situation, reveal that a stepped approach was utilized, e.g. system operators charged between one dollar per page for volumes under $1,000 and $2 per month per page for volumes under 1,000 pages. On this basis the average annual fees paid for services (based on the number of pages in each of the various trial services at the end of 1982) were close to $25,000. Costs for data collection varied according to the extent to which information was provided to an IP in camera-ready form.

In such cases, it is estimated that the per hour rate for designing graphics would be between $25 and $45 per hour per page. Estimates of the cost of preparation of pages ranged between $6 per page, for simple text, upwards to $100 for complex graphic systems.

More recent developments reveal that where hardware, software and specialized services were provided, charges ranged up to $1,000 per page depending on the complexity of the equipment involved.

IP companies levied charges to sub-IPs for page creation in the range of $75 to $250, and in addition to these were fees for editing and updating of pages. Infomart, for example, had a page pricing structure in 1982 and 1983 of approximately $30 for page creation, $10 for page updating and $1 per month for each page in storage. It is estimated that the actual cost to information providers would be on the order of $50 to $75 of the price levied to the sub-IP, providing for total charges of around $30 per page.

Maintenance services are composed of storage charges, page creation charges, editing and entry fees. In the Canadian experience, storage charges per frame varied between $1 and $2. The cost of page creation varied between $25 and $225, with the average charge per page between $50 and $125. This, however, could be signficantly higher depending on the complexity of the service involved.

Employment and Job Opportunites -- Economic Impacts

One of the fundamental areas of economic impact analysis is the consideration of the type of employment opportunities created and particularly, the job functions which emerged during the field trial phase. To assess this particular aspect of the industry, reliance was placed on conducting a number of interviews with key industry players. The breakdown of interviews conducted in different sectors of the industry is presented in Exhibit 2.5. The main kinds of jobs identified for the industry are listed in Exhibit 2.6.

EXHIBIT 2.5

Industry Interviews
(Selected Representatives)

Company Type	Number
Cable Companies	4
Telephone Companies	7
Hardware & Software Manufacturers	6
Page Creation Videotex Service Companies	21
Sub-IPs	13
Total	51

EXHIBIT 2.6

Job Types Identified by Videotex Industry Representatives

Software Specialists

System Engineering/Analyst

Administration

Database Managers

Page Creation Specialists

Graphic Designers

Copy Editors and Writers

Marketing Consultants

Research Specialists

Clerical Support

In the field trials, most staff were generally drawn from other sectors of participating companies. Individuals were drawn from technical areas such as installations to supply the new job functions required for a Videotex/Teletext service. Job types most frequently created were computer programming, engineering, marketing and sales, page creation, database management and clerical support.

Most Videotex service operations by telephone companies in the field trial phase involved between 10 and 12 employees. Of these, about one-half were systems personnel, one out of twelve were clerical, two would be classified as management, one was an advisor or consultant to the service operation, and two were in research primarily examining application areas.

Cable companies identified similar types of jobs to those identified for telecommunication companies. In the information provider sector, the most common job types were page creation specialists. These were generally categorized as page creators, Videotex/Tele-text artists, IPS operators and graphic artists. In a number of instances freelance personnel, writers and graphic designers were brought into the Videotex team to assist with colour selection, design and graphic specification.

Actual numbers of new jobs temporarily created varied between the different field trial system operators. In most instances, jobs could be divided between those individuals that were operating directly in the provision of a Videotex/Teletext service and those that were operating indirectly. While the core number of jobs varied between 12 and 15, in most trials between 30 and 40 people were involved, providing a ratio of approximately 1:1 in terms of full time and part time individuals operating in a service establishment. For example, in one large telecommunications Videotex service, 40 people were identified in jobs directly related to the service. In other instances, fewer numbers were mentioned and ranged between one or two working full time in the operation to 25 working in some of the larger trials operated by western telecommunication companies.

In the two major cable services that were operated, approximately 30 employees were identified in new Videotex/Teletext related jobs. Among the six manufacturers surveyed, 350 jobs were identified as directly related to Videotex and Teletext services and trial operations in Canada.

Industry Investments

In Canada, the federal government set up a fund matching system for most of the early Videotex/Teletext services. This provision took the form of the purchase of hardware based on a formula of a 50:50 ratio of government expenditure to operator expenditure (at least in the first phase of operation of the industry development stimulation program). In the latter parts of the program, emphasis was placed on providing grants for innovative applications within particular programs, such as the government's industry investment stimulation program (IISP) for Videotex, and the more recent content development program, which was part of the final section of funding provided by the federal government in 1983.

Variations in funding ratios were noted between each of the various sectors, with telephone company representatives indicating 75% of their trial funding came from internal sources rather than from government funding. Across the telephone industry, estimates ranged between 80% and 90% of private investment with upwards of $14 million being provided by the two largest telephone companies involved in the Videotex industry. In the cable sector, most (80%) of the funding reportedly came from private sources. In the information provider sector there was a higher ratio of private funds to government funds, which in most cases was estimated to be 90:10 rather than the anticipated 50:50 ratio which was specified as part of the government's mandate.

Returns on Investments

The early stages of Videotex/Teletext development in Canada have provided few examples where profitable returns on investment could be identified. Most industry participants expressed the belief that in the early stages of this service, learning and understanding of this new technology and how the services should be implemented were the most important considerations. While revenues have been generated for some companies through sales of software and consulting services to other companies in Canada and the US, this was certainly not high enough to generate a profitable return on investments over the first three years.

Investments were considered part of a long term strategy, with attempts to generate revenues in the short term of only minor importance to the service operators. In the most recent years, 1983 and 1984, the situation has changed somewhat with a number of companies aggressively selling products. However, activities are too premature to project likely sales and to estimate the value of these services, or what the likely rates of return will be. It is expected that profitable returns on investments will begin to emerge in a three to seven year period, making the 1986-88 years the critical ones for the industry.

A significant part of early developments were contingent upon government subsidy. It is therefore worth examining the way companies in the industry view the role of the government in providing these subsidies. In some instances, company spokespersons expected the government to continue the subsidy program for as long as necessary until a viable market could be defined for Videotex and Teletext services. Disagreement, however, pervaded the beliefs about how this particular strategy should be accomplished -- whether it would take the form of direct funding to proven applications supporting commercial services or whether it should be some type of government procurement program. Other industry representatives felt that a reduction in government activity and funding would encourage more investment from the private sector, and that there would thus be more of an inducement for enterprises to become profitable within a shorter time period. Increased funding was identified as necessary for the development and investigation of market needs, applications assessment and the matching of technology capability with specific market requirements.

Industry Development and Stimulation

Consideration of the ways that government could operate effectively in stimulating the Canadian Videotex/Teletext industry centers on, we shall see, fiscal and tax incentives, encouragement to universities and colleges for developing advanced computer services and increased emphasis on research. Other considerations include tax write-offs for software development costs, low interest loans, depreciation allowances, and research and development write-offs for software and content development. To stimulate growth, encouragement is needed for broader and more in-depth research into the issue of content, database structures and enhanced software applications.

Education is also a key component, along with the need to encourage provincial governments in Canada to examine in a systematic way the educational applications of the technology and to support the development of service and software sectors addressing the education applications.

Another important concern is the need to provide support for the export of Videotex and Teletext products and services in addition to the current practice of supporting trade missions and fairs in foreign markets. Finally, policy and regulatory stances are required which foster an open market approach to service provision and which critically examine the current monopoly control of enhanced services in Canada.

Canadian and US Regulatory Traditions

Since Videotex/Teletext technologies may also involve new transactional applications such as electronic mail, shopping and banking, they are being forged within a regulatory tradition governing the non-electronic equivalents of each of these new applications. This section, then, examines the regulatory climate in which Videotex and Teletext are emerging and also delineates the basic policy issues which the new technologies raise. The Canadian and US regulatory traditions are closely linked since there has been significant importation in recent years of US content and because the Canadian regulatory decisions typically mirror those in the United States, but by a lag of five to ten years.

Policy decisions affecting Videotex, Teletext and information technology in general may arise from a number of sources, ranging from regulatory bodies such as the CRTC to standards-setting industry organizations. Policies may arise from both judicial and regulatory bodies at the national, provincial or even local level. Videotex policy is largely influenced by existing Canadian regulatory traditions affecting related media such as cable TV, broadcasters, telephone companies and computer services, since both Videotex and Teletext involve combinations of all these media.

The United States has a lengthy tradition of separating communications media such as newspapers, mail and phone. The regulatory traditions for these respective media are summarized in Exhibit 2.7. However, changes in information technology, specifically the merging of computers and communications technologies, are causing problems in the

established traditions. As a result, the US regulatory climate has been undergoing considerable changes during the past decade, with a general trend away from regulation, culminating in the Telecommunications Deregulation Bill of 1981.

EXHIBIT 2.7
US Regulatory Traditions*

Component Technology	Traditional Regulatory Assumptions	Challenging Factors
Newspapers	No government involved; constitutionally guaranteed free press promotes multiplicity of voices	Electronic newspapers utilizing telephone lines and cable TV systems currently being tested
Broadcasting	Locally based radio-TV with licencee serving as public trustee; limited spectrum must be regulated to ensure public interest	Multiplicity of video sources including distant signals on cable, pay programming, videocassettes and videodiscs
Telephone	Telephone service provided on non-discriminatory basis through monopoly common carrier; rate and rate-of-return regulation; no content regulation	Increasing competition for equipment and services
Computers	No direct government intervention; market-drive technology	Merging of computer technology and communications technology
Mail	A government monopoly for first-class mail; uniform rates; cannot be used for illegal purposes; limited subsidy for distribution of books, periodicals and newspapers; universal service guaranteed	Electronic mail already commercially available

(F)

* Source: Tydeman, John et al., op. cit., p.171.

In the US, cable licences are issued on a local level with franchises given to operators by local city governments. However, cable regulations are set by the federal FCC (Federal Communications Commission). Many cable regulations have been often directed to protecting local broadcasters from "imported" channels originating elsewhere, and extensive deregulation has recently occurred.

Under existing US rules, or lack thereof, any cable firm may provide home information services and control service access. But as Tydeman notes, "As cable penetration increases, there may be pressure for some access policy concerning cable systems. Information and service providers who are excluded from a major market may ask policymakers for relief."[24] Meanwhile, in the US (unlike Canada), under certain conditions cable operators have been required to provide access to entire channels for leased use or community purposes.

The US then has no real Videotex/Teletext policy, but as early as 1956, in the so-called Consent Decree, Bell agreed not to engage in unregulated activities such as the sale and leasing of computer equipment and services if these were not part of their normal telephone service. Thus, the phone companies were forbidden to either provide cable TV or sell time on its own computers.

Given the continuing blend of communications and computers, by 1971 the FCC, in a decision called Computer Inquiry I, ruled that all data processing was outside its jurisdiction; this effectively excluded AT&T from any unregulated business. This decision banned AT&T from engaging in virtually any computer-related business services. However, in Computer Inquiry II in 1980, the FCC identified two types of services: basic services (the use of transmission media for the delivery of information) and enhanced services (comprising everything else besides transmission, i.e. the storage and retrieval of data). The first type of service was subject to the usual rate regulations, while the latter was not, and under this ruling AT&T was allowed to enter portions of data processing, but only through subsidiaries. Finally in 1982 AT&T divested its 22 local phone companies, and in return the US Justice Department freed them from the Consent Decree of 1956, allowing phone companies to enter the hitherto forbidden computer business. The AT&T divestiture essentially rendered the Computer Inquiry II distinctions irrelevant.

Diversity in Information Sources

Telephone Companies

Canadian telephone companies operate under the role of the "common carrier", a concept transferred to electronic communications from the physical transport of goods, by which a common carrier must be prepared to carry goods for any person or to carry any passenger, no matter who they may be. Content and carriage functions are fundamentally separated and the idea of non-discrimination and non-preferential treatment is central. The Railway Act, which governs those telecommunications carriers which are federally regulated (Bell Canada, BC Tel, CNCP Telecommunications, Telesat Canada), speaks emphatically against any discrimination or preference with respect to tolls. Other telephone companies (except SaskTel, which is self-regulated) are responsible to a Public Utility Board for setting rates, and in the three prairie provinces telcos are provincially owned; universally, however, common carriage prevails. At the same time, telephone companies have been viewed as "natural monopolies" because of compelling economies of scale and massive investment in plants, and have been regulated for attendant responsibilities, such as limiting their rates of return.

The intent in the common carrier approach is a clear one: to ensure that any parties wishing to send their messages to any recipients should be able to do so on an equal basis. The identity of the sender and the content of the message receive no special consideration. The common carrier approach is the broadest possible in terms of granting access; anyone may input into the system.

It assumes, however, a virtually unlimited capacity to handle input. While this suits the switched, point-to-point service of telephone companies, quite different principles arose with "scarce resources" media, where input of content is physically very limited. Broadcasting was the first such medium.

Broadcasting

Broadcasting in Canada has been viewed consistently as the use of a scarce resource, the radio spectrum. In the Broadcasting Act, radio frequencies are public property, and for a

broadcaster to utilize them, a licence and the assumption of certain responsibilities are required.

Canada's Broadcasting Act includes a number of content provisions. Some have been translated into Canadian content rules, which are perhaps most prominent in the public eye, but other provisions broadly concern diversity and freedom of expression. Licencess, the CRTC has noted:

> "... have a responsibility for programs they broadcast, but the right to freedom of expression and the right of persons to receive programs subject only to generally applicable statutes and regulations, is unquestioned;

and

> ... the programming provided by the Canadian broadcasting system should be varied and comprehensive, and should provide reasonable balanced opportunity for the expression of differing views on matters of public concern."[25]

(The CBC is further enjoined to provide "a balanced service" for people of different ages, interests and tastes, as well as to express Canadian identity.)

The CRTC has interpreted Parliament's ideals as follows:

> "The Commission considers that Parliament, in the Broadcasting Act it enacted, made clear its intention that the broadcasting system should strengthen and enhance the open, democratic political system and culture of Canada, characterized by <u>freedom of expression, diversity of tastes and the availability to the public of the widest possible range of opinions."</u> [26]
>
> <div align="right">(emphasis added)</div>

Cable TV

In the tightly constrained operations of broadcasting where there are limited VHF channels in an area and each broadcaster programs a single channel, cable TV appeared as the media of abundance, with multi-channel capacity. The CRTC was relatively restrained in the promise it perceived for cable television:

"... cable television can also contribute forcefully to the achievement of the fundamental objectives of Canadian broadcasting. It can widen the choice of programs offered to Canadians. Not only can cable television systems provide programmes from the United States, but they might some day, via satellite, give access to programmes from other countries of the world like France and Great Britain. They can also provide more means of communication for education under provincial authority; make local community expression easier; offer channels of distribution for more numerous kinds of social information, more diverse sources of knowledge and more varied styles of thought within our country." [27]

In practice, cable companies also presented a case of scarce resources, though not in the same sense as broadcasters. Once a licence has been granted to a broadcaster to use a particular frequency, the broadcaster works with an 18-odd hour day to program content on that single channel. The broadcaster's decision-making concerns choice of content, and is constrained by time, now in effect its "scarce resource" to be allocated. The cable company's primary function is to assemble a package of channels of programming (provided in the main by off-air broadcasters) which it offers to its subscribers. Its "scarce resource" is channel space. (Although, with converter service, the midband channels are under no strain at this time in Canada, disputes about which channels appear on the basic service bear out this scarcity.)

As a result, cable licencees have been subject to certain required allocations and priorities in channel usage, which essentially ensure that Canadian (as opposed to US) education and community channels have a place in basic service.

Regulation of cable has not been simple. Though it has not been fully treated as a "natural monopoly" by regulation, a cable company has an exclusive licence for an area, and functions much like a carrier in that it passes on signals originated by others (i.e. broadcasters) to its subscribers. At the same time, the cable company programs certain channels -- in particular the community channel (which it is required to provide). The CRTC has considered that cable TV licencees do not "make the kinds of programming and editorial decisions that give rise to concerns about content and diversity expressed for broadcasters" and has endorsed a "hybrid role for cable as programmer and carrier."[28]

Computer Services

The computer service industry presents an entirely different history: it is an unregulated activity in which any willing participant is permitted to compete and demands relatively low entry and capital costs. Services make use of telecommunications carriers, public or private, and the industry's aims are to promote access and terminal attachment to these systems to facilitate its activities. Government policy goals for this industry, to the extent that they have been articulated, have stressed sovereignity and benefits for Canadian industry, though some statements imply a concern for diversity and opportunity for entry:

> "It is government's objective to foster the continued development of efficient and reliable nation-wide systems of publicly-accessible facilities for use equally in the provision of, or access[29] to, computer or data communication services by any sector of society."

Additional statements in the 1973 Green Paper on Computer Communications stressed competition and access to transmission facilities. Subsequently, however, there has been an official silence on regulation. Government apparently presumes a broad and diverse participation in the industry, in a competitive environment with low entry barriers.

Anyone in Canada, then, can offer a database information retrieval service, using a common carrier, and an open market competitive approach has been used to develop content according to demand.

Newspapers

Newspapers have operated in a market that is essentially unregulated regarding who can enter and what content they can provide. The philosophy behind this stance is founded on a belief that diversity of opinions should be allowed expression.

The idea of "freedom of the press" is time-honoured, dates back centuries, and has been closely associated with issues of human rights and democratic objectives. In the US, the First Amendment guaranteed the maintenance of a free press, while in the United Kingdom and Canada the advocacy of an unfettered press was associated with the needs

for a free marketplace of ideas in a democratic society. As such, concentration of ownership has been seen as a particular threat to the public interest. It can only appear as an irony that newspapers, which operate in an enshrined, non-regulated open market-place, have consistently tended to belong to fewer and fewer voices as ownerships have concentrated.

The "electronic newspaper", though still in an embryonic state, is nonetheless clearly an heir to the rhetoric of the press; open access and wide diversity of content are foreseen, even to the point of the "every person a publisher" idea, by which any individual could offer databases accessible to all (via an appropriate telecommunications infrastructure). The basic philosophical link between the free press and democratic society has been extended to the new technologies since their earliest days.

> "... it would seem to be a fundamental principle of public policy in a free society to strive to maximize participation and diversity, and strongly oppose anything which could foster concentration of control. For it seems obvious that such control of the electronic media, whether by state or private interests, would represent a serious threat to the freedom of expression that is the lifeblood of a democratic community.
>
> ... it is therefore of vital importance that we establish now, while systems like Telidon are still in their infancy, those fundamental principles concerning freedom to publish and freedom from censorship that lie behind the time-hallowed slogan, 'Freedom of the Press'." [30]

Summary

Regulatory concerns about diversity of opportunity for information sources are fundamental to the future of Videotex/Teletext in Canada. While these concerns have not been the sole rationale for regulation (which also involve protection of the public from monopoly privileges, cultural expression and benefits to Canadian industry), they lie very deep in our attitudes, and relate to central beliefs:

> "If well-informed public opinion is an essential of sound public policy, then the channels through which information flows to the public have an importance which cannot be over-emphasized." [31]

In sum, where there are no constraints on physical capacity, unconstrained input of content has been encouraged in Canada by:

1. The "common carriage" principle in telephony which ensures that all messages from all sources are carried on equal terms.

2. The "freedom of the press" ethos for newspapers.

3. An unregulated marketplace for computer services.

In Canada there is a tension between two sorts of regulatory measures, taken when the marketplace appears to fail in the opportunity it offers to information sources:

1. With telephony and other instances of unconstrained capacity, regulation ensures non-discriminatory treatment of messages carried.

2. With broadcasters and cable companies, regulation causes certain content to be treated preferentially to ensure a place in a physically limited medium.

Where a non-discriminatory attitude toward content has been taken, it is worth noting that while telephony has been robustly diverse in content because it is a point-to-point service characterized by individual and unique inputs, Videotex is a service that may implement a one-to-many asymmetric information flow over the telephone lines. (Network capacity can even be questioned.)

Footnotes – Chapter 2

19. Hough, R., "Office Automation Equipment: The Present Base and Future Prospects to 1985," DOC, 1980.

20. Booth, Peter J., "Cable Industry and Videotex," Wescom, 1981.

21. Booth, Peter J., "Videotex: Trends, Developments and Emerging Opportunities, Volume V, Department of Communications," Ottawa, 1984.

22. Ibid.

23. Chevreau, J., Globe and Mail, March 9, 1984.

24. Tydeman, J., "Videotex and Teletext in the US," McGraw Hill, New York, 1981.

25. Broadcasting Act, 1970, RSC CB-11, Sections 3(c) and 3(d).

26. CRTC Decision 78-669, October 12, 1978.

27. CRTC Decision 79-9, January 9, 1979.

28. CRTC, "A Review of Certain Cable Television Programming Issues," Ottawa, March 1979, p.9.

29. Department of Communications, "Computer/Communications Policy: A Position Statement by the Government of Canada," Green Paper, Ottawa, 1973.

30. Godfrey, D. and D. Parkhill, eds., Gutenberg Two, Toronto Press Porcepic Ltd., 1979, p.78.

31. Special Senate, Committee on Mass Media, Report, Vol. 1, The Uncertain Mirror, Ottawa, 1970, p.4.

CHAPTER 3
Field Trial Assessment and Impacts on Industry Development

Field Trials — What Are They?

In a review of research methods used in communication studies, Tyler[32] has pointed out that studies to assess effectiveness and acceptability have generated more use-oriented research in telecommunications than any other type of study. These have made use of a variety of social science instruments such as controlled psychological laboratory experiments, experimental and quasi-experimental field trials, statistical and survey research.

In the sphere of telecommunication, an increasing proportion of the cost of development is located not in technological advances, but in the infrastructure which is necessary to support an operational system. The development of Videotex and Teletext falls within that sphere since the technology has evolved to a large extent apart from existing technologies. The supporting infrastructure of an operational Videotex system requires a continuous updating of the database, the provision of information and content, and the maintenance of hardware at regional sites or at various operating companies around the country.

When the costs involved are high, it becomes expedient to build in checks. An important part of these checks is to set up a program of user research as opposed to the research required to develop the system. Within this realm of user research are field trials for telecommunication systems. These essentially give the system or information provider a set of information on which to base decisions for future investments. The field trial serves as a test case in a real world setting where there are users, the provision of service and pages of information placed on a system. Users can interact with the technology, much as they may in an actual operating environment.

Field trials may be designed or implemented as: (1) true experiments in field settings, (2) quasi-experiments or (3) non-experimental designs. These usually include:

1. A control group.
2. The specification of a test or treatment group.
3. The application of pre-trial measures.
4. The observation of post-trial results.

Specific measurement instruments used in a field trial may include:

1. A pre-test questionnaire.
2. An extensive survey questionnaire.
3. A method of system monitoring.
4. Structural interviews with various industry and service personnel.

Data in field trials may be collected by means of surveys, in-depth discussions and direct observation. Additionally, other information could be collected using tracking systems. Requirements could also include comparative data obtained from other possibly competing systems, against which comparisons can be made; longitudinal data, sets of data collected prior to the introduction of a system throughout the conduct of the trial, and upon completion of the trial. Finally, contextual data could be obtained -- this might be information on the context into which a system is placed, such as work patterns and organizational structures.

In the most general terms, field trials supply valuable guidelines for introduction strategy, training programs and support infrastructures, as well as providing a base for further market research.

Three basic aims can be defined for a field trial:

1. To determine system effectiveness.
2. To assess user acceptability.
3. To estimate future demand (or at least to provide a basis on which to structure a model and an approach to evaluate the demand).

Related to these three primary objectives are a number of other more specific objectives:

- To identify system components requiring alteration.

- To identify factors influencing system use, e.g. the organizational context which is being introduced, the geographical area, the location of a terminal, etc.

- To identify the characteristics of users - male, female, business, residence, young or old.

- To examine the success of the introductory strategy, i.e. to assess the way that the field trial was put together and presented to a particular public by a service provider, and to provide feedback in terms of its capability for promoting use among the potential target population.

- To determine requirements for user education and training programs, e.g. one might want to assess the need for training manuals, information programs, promotional material, user education, etc.

Other ways that field trials trials can be used include:

- To assess the technical specifications for the communication linkages, protocols, hardware and software.

- To assess system capabilities for the provision of full service at maximum capacity.

- · To evaluate organizational and management requirements for the provision of Videotex services.

- To assess the infrastructure required to coordinate technical policy, public relations, marketing and service aspects for service provision.

In discussing the basic features of field trials, Hough[33] has provided an in-depth discussion of their limitations. Essentially, these revolve around the short time span of the trials

and the generally primitive content in the early months. Other weaknesses have emerged which have severely limited the extent to which commercial viability can be assessed as a result of measuring the response to trial services. This has left, in many cases, the technical criteria as the only realistic measure of the services, with important marketing and commercial questions left unanswered.

The Government Perspective

In 1978, the Canadian federal government's four year Videotex program was designed primarily to affect the transfer of Videotex/Teletext technology from the research laboratory into private industry. This program supported research and development, public trials, standards, promotion and awareness activities, and industrial, commercial and public sector exploitation. In tandem with this program, the Department of Communications created a senior advisory committee, the Canadian Videotex Consultative Committee, involving representatives from various sectors of broadcasting, publishing, manufacturing and consumers.

The basic purpose of field trials and the proposal to use field trials emerged in 1979. A report produced by Hickling and Johnson[34] provided to the Federal Department of Communications an outline of proposed activities for the introduction of Videotex activities in Canada. Field trials were identified at that time as key components in an overall introduction strategy and as a means to encourage industry to participate in its development. In that study, field trials were defined as having four basic purposes:

- To promote the introduction of Videotex terminals to the Canadian field trials.

- To stimulate the development of applications which take advantage of Videotex's inherent capabilities.

- To enable Videotex to demonstrate its superiority over competing systems.

- To demonstrate the cooperation between government and industry in the development of the potential for Videotex and to bring the various parties together in establishing a vehicle which can take the product to market.

From the federal government perspective, field trials then are designed to stimulate the working together of people conceiving, designing, producing, testing, operating, maintaining and enhancing: new equipment, new software programs, new telecommunications systems and new electronic databases.

The trials were also considered important for the following reasons:[35]

- To stimulate the Canadian Videotex manufacturing industry.

- To stimulate the development of a Canadian electronic publishing industry.

- To permit software, hardware and systems designers to improve subsequent products.

- To permit users to experiment with the technology and to explore markets without making disruptively huge investments.

- To permit potential users to learn about Videotex in a non-threatening environment.

- To stimulate the interest of users from specific sectors of society, especially education, libraries and tourism, agriculture and advertising.

- To stimulate interest on an international scale.

More specific government goals for the program were:[36]

- To see operational Videotex services in all major centres in Canada and in most of the rural areas, involving both telephone-based and cable-based services by 1985.

- To have two national Teletext services in both official languages -- one operated by the government-owned Canadian Broadcasting Corporation and the other owned by CTV.

- To have Canadian-manufactured Videotex terminals and adapters available in over-the-counter retail merchandise and electronics stores throughout the country.

- To have Telidon become the basis for the North American standard.

- To develop an operational mobile Videotex service for aircraft, ships and automobiles.

- To develop the Canadian task force on service to the public.

- To provide a provincial government public information service through Videotex.

- To provide a viable electronic publishing business.

- To develop an export business supplying hardware systems and information to the world.

Service and Hardware Provider Perspective

Service provider objectives for the field trials were defined as:

1. The assessment of technological capabilities, i.e. how the network functions, what capacities the various computer services can handle, what the port capacities are, how well do the telephone lines function, how efficient is the broadcast mode relative to the telephone line transmission model, etc?

2. Learning about the technology, to refine the technology, to improve and upgrade the services over time, to assess the potential life of equipment.

3. To evaluate internal organizations, management staff capabilities, to encourage spinoff activities and evolution in new types of applications, to encourage the build-up of a base of new businesses around which the Videotex

system will operate, e.g., the growth of small information provider (IP) companies, graphic design companies, equipment suppliers, etc.

4. To assist in the ultimate development of a marketing plan for the service providers resulting from the assessment of the user pilot trials, with specific reference to the IP's specific goals, which may be to learn what kinds of content are most valuable for the consumer and business markets.

5. To understand what market segments exist, e.g. the consumer, the business and the public market; to understand how much consumers might be willing to pay for services.

6. To know how soon market sectors such as the retail sector, the banking sector, the travel industry, electronic mail sector, etc., will see the service as worthwhile and cost efficient.

7. To gain some sense of a mass market appeal of the services to gauge the general trends in the population vis-a-vis these technologies.

8. To assist in the development of standards in sectors such as education. The field trials were looked upon as a way to evaluate Telidon as an educational medium in its own right, and also to look at various modes of delivery -- telephone, cable, television, broadcast, etc. The stated objectives of the trial program were to develop and demonstrate a new medium, inform the public in a preliminary way, and to stimulate public institutions to examine the potential role regarding Telidon. A variety of different types of measures were included in this evaluation, including waiting times for various modes, educational effectiveness of various materials offered, impact on television viewing and education experience, relevance of content, organization of content, types of information preferred on various modes, technological efficiency of systems, reliability of systems, impact on institutional processes, sociological impacts, and the assessment of special applications such as captioning for the deaf.

Canadian Field Trials -- Types, Arrangements and Functions

Field trials for Videotex and Teletext services were conducted over three years by major telephone companies, cable companies and broadcast organizations in Canada. Services were provided in trial settings to residential communities, business groups, and public locations in urban as well as rural areas. A variety of transmission mechanisms were used including broadcast, telephone lines and optic fibres. These field trials varied in size as well as in terms of their basic objectives, the types of information provided and the mechanism implementation.

Within Canada, uniformity was provided through the use of the Videotex protocol while diversity was maintained in service delivery, the internal organization of service providers, and the type of content made available. Taken together, these trials were viewed initially as offering the opportunity to provide a largescale "laboratory" where the relative merits of varying approaches to the provision of Videotex/Teletext could be assessed.[37]

Across Canada and the United States, a varied list of organizations -- telephone companies, banks, retailers, governments, newspaper publishers, cable companies and broadcasters -- are now examining the potential of Videotex. In many cases, these use the Telidon and NAPLPS forms of Videotex for the delivery of services. Field market trials involving both residential and commercial customers were conducted, with many of these being funded at the outset by government subsidy followed by a movement to commercial service.

In assessing the various field trials and the services which have emerged, the following framework can be used for understanding the activities that a field trial involve.

1. Information Assembly. In a Teletext or Videotex system there is a reliance on information providers to collect and assemble information into a usable and saleable form. Service providers are responsible for:

    a. collection of raw or transformed data
    b. processing or reprocessing of data

c. formatting into frame size

d. editing or changes.

In some Videotex network configurations, information and service providers may also supply their own computer databases which can be linked to a Videotex system. Within the Canadian context, a group of what have been referred to as sub-IPs emerged. These were individuals who collected information, usually of relevance to a group of clients, and then provided that information to a service provider. These service providers create pages for a set fee.

2. Information Management. Information management includes the storage and indexing of data as well as potential user billing. Essentially, this function involves computer storage facilities for pages of information which have been created either by sub-IPs or umbrella IPs. In only a few cases in Canada were the umbrella IPs capable of providing the information management function. This function, for the most part, was provided by telephone companies.

3. Information Transmission. The transmission media and the supporting facilities differ between Videotex and Teletext systems. In the Canadian situation, transmission could take place by broadcast, over optic fibres, using standard telephone coaxial cable or using standard telephone paired cable.

4. Information Received. This constitutes the user group which has been provided with information services as part of the Videotex/Teletext trials. These could be:

a. residence users (rural or urban)

b. business users

c. public access users

d. institutions users (government, schools, etc.)

e. special groups (handicapped, hard of hearing, mentally disabled).

In Europe, there has been a tendency for single arrangements for each of the components in Exhibit 3.1. This is because the systems have been developed with a large degree of government support. This, it should be noted, is not significantly different from the Canadian situation where the federal government provided support and direction for the emergent Videotex/Teletext services at the field trial stage. The Canadian situation was much more closely aligned to the European model than the more open American models which are now emerging.

In the United States, there has been virtually no central planning or development, and as a result, emergence of these technologies in the US has been characterized by great diversity in terms of the organizations that have played the key roles. In the US, there are banks, television broadcasters, cable companies, electronic publishers, newspapers publishers and educational institutions, not to mention telephone companies, sponsoring trials.

Another feature of the Canadian situation was the attempt to bundle different types of services together in a trial offering. In the early stages of the New Brunswick telephone trial, for example, attempts were made to combine the home monitoring services with those of information retrieval. This was also proposed for the Alberta Telephone trial and in the initial planning stages of the BC Telephone trial.

EXHIBIT 3.1

·Service Components and Tasks

Principal Roles	Primary Task
Information Service Providers	Data collection, assembly and page creation.
Sub-IPs	Solicitation of information from sets of clients or potential participants in trial activity. Creation of pages using an IPS terminal and submission of those pages to an umbrella IP, as in the case of Infomart, or to a system operator, as in the case of BC Telephone.
System Operator	Management of field trial activity, coordination of page creator activity, coordination of information service provider activity, maintenance of the database, provision of software, and maintenance of the hardware services provided to the trial participants.
Communciations Network Provider	The transmission of information over the appropriate medium, i.e. cable, broadcast, telephone lines, optic fibres.
Users	The consumption and access of information. These can be classified as residence subscribers, public access subscribers, special needs groups for community program subscribers.

EXHIBIT 3.2

Videotex/Teletext Penetration (1981-1983)

	No. of Terminals
Canada	
Videotex	3,500
Teletext	700
USA	
Videotex	4,850
Teletext	1,429
Cabletext (Teletext)	223,000
Info Retrieval Services	124,775
Europe/South America/Australia	
Videotex	46,124
Teletext	1,041,050
French Teletel	200,000
	1,645,428

United States Trial Activity

In the United States, the 1981-1983 period saw an enormous growth of interest in Videotex services. By then there were 223,000 subscribers receiving Cabletext, Teletext services and a further 124,775 subscribers receiving the information services of The Source, Compuserve and Dow Jones. Of major significance in the US is the utilization of the Canadian Telidon technology for most of the trials, either for Teletext or Videotex services, and the rapid proliferation of interactive services, particularly in the banking sector in that country.

In the US, services included Comp-U-Star, which was a discount buying service allowing a home computer user to reach a database and perform product and price evaluations, along with purchase capabilities. CompuServe, H&R Block's information utility, initiated a Telidon/Videotex information service in 100 cities across the US. The system offered news, games, quizzes and a financial program which allowed visual representation of a range of price and trading volumes of 40,000 stocks and options. CompuServe was testing these types of information deliveries as a system operator for a group of thirteen newspapers.

AT&T participated in various segments of Videotex trial procedures. Its involvement incorporated the role of information service provider, system operator and target user group. AT&T's first test (EIS) provided households with terminals to access white and yellow pages information and public service announcements in Albany, New York. A jointly sponsored trial with Knight-Ridder Newspapers called Viewtron was designed to evaluate consumer reaction to home information linking television sets and telephone lines to a central computer for Teletext services. Services included news, shopping, travel, banking services, games and computer-based education. AT&T's third trial, jointly with CBS, began in 1982 in New Jersey, concentrating on the delivery of information related to publications, shopping, banking and travel arrangements. The CBS/AT&T venture, tested in 200 homes, offered the home banking customer features such as cheque balances, bill payment, transfer of funds and retrieval of financial information.

The growing interest in transaction services is typified by the conduct of field and market trials in the US over the 1981-1983 time period. These involved the placement of

approximately 7,000 terminals of various types in home locations. In total there were as many as 40 Videotex/Teletext trials being conducted across the US at this time.

There are a number of other trials joining newspaper/publication institutions with cable or telephone company carriers. Times Mirror linked with Infomart to market and operate Telidon Videotex systems in the Los Angeles area. A number of households were linked via telephone lines, while other homes accessed the service via two-way cable. A principal motivation for this trial was to compare the benefits and costs of the two transmission media. Another project linked Centel Corporation, the fourth largest independent telephone company in the United States, with Honeywell Inc. and Field Enterprises. Cantel provided the data transmission medium over telephone lines, while Honeywell supplied the Videotex terminals, and Field Enterprises the information services. Subscribers were charged on an hourly basis and were able to retrieve information on business and entertainment, pay bills and utilize computer-based instruction.

(M) **The Canadian Field Trial Experience**

Trial Diversity and Growth

A total of 24 Videotex and Teletext services were offered in Canada between 1981 and 1983. The majority of the trials, presented in Exhibit 3.3, offered only information retrieval services to the residence and business market. Significant numbers of terminals were also placed in public locations, with a much smaller number directed toward special needs groups such as the physically and mentally handicapped.

The greatest amount of field trial activity was undertaken by the telephone companies, with eleven of the trials accounting for the placement of 1,581 terminals. Cable companies were more recent entries to the field trial scene, operating five trials and placing 524 terminals. In addition, governments developed four test sites, including the Ontario Teleguide system, which was the largest with 1,200 (projected) terminals, while the federal government's Cantel project consisting of 100 terminals. Finally, educational experiments with the technology involved the placement of 258 terminals. The CBC broadcast Teletext trial was initially based on the placement of 500 terminals.

EXHIBIT 3.3

Trials and Commercial Services in Canada, 1980-1983

Project/ Operator	Location	Operation	No. of Terminals	Transmission Medium
Project INET/ CCG-TCTS	Across Canada	July 1982	275	Datapac
Project CANTEL/ Task Force on Services to the Public	Across Canada	April 1982	100	Telephone Circuit
ELECTRONIC MESSAGE SERVICE/B.C. Tel	Vancouver, B.C.	Dec. 1981	200	Telephone Circuit
Project AGT- TELIDON/Alberta Government Tel.	Calgary, Alta.	Aug. 1981	30	Telephone Circuit
City of Calgary Telidon Field Trial	Calgary, Alta.	June 1982	Open Channel	Coaxial Cable
Project IRIS/ Canadian Broad- casting Corp.	Toronto, Ont. Montreal, Que. Calgary, Alta.	Sept. 1982	500	Broadcast
Project PATH- FINDER/Sask. Telecomm.	Regina, Sask.	July 1982	125	Telephone Circuit
Project PALAIS DES CONGRES DE MONTREAL	Montreal, Que.	June 1983	TBD	Telephone & Coaxial Cable
Project MERCURY/ New Brunswick Telephone Co.	St. John, N.B.	Apr. 1981	45	Telephone Circuit (dedicated)
Maritime Telephone and Telegraph Trial	Nova Scotia	Mar. 1982	15	Telephone Circuit

EXHIBIT 3.3
(continued)

Project/ Operator	Location	Operation	No. of Terminals	Transmission Medium
Project CABOT/ Memorial University of Newfoundland	Newfoundland	July 1982	3	Telephone Circuit
Marketfax/ Cableshare	Canada	Nov. 1981	12	X.25 Digital Network
Premier Cablesystems	Vancouver, B.C.	Dec. 1981	Open Channel	Coaxial Cable
Project GRASS-ROOTS/Infomart and MTS	Southern Manitoba	May 1981	150	Telephone Circuit
Teleguide to Ontario/Infomart	Toronto, Ont.	June 1982	1,200	Telephone Circuit
Videopress/ Cableshare	London, Ont.	Nov 1981	6 interactive 6 non-interactive	Telephone Circuit
Project ELIE/ Man. Telephone System	Elie, Man.	Sept. 1981	150	Optical Fibre
Project IDA/ Manitoba Telephone System	South Headingley, Man.	June 1980 – Dec. 1981	33	Coaxial Cable
Ontario Telidon Network/TV Ontario	Across Ontario	Mar. 1979 Jan. 1980 Oct. 1982	55 100	Telephone Broadcast Telephone & Broadcast
Project VISTA/ Bell Canada	Toronto, Ont. Montreal & Quebec City, Que.	May 1981	491	Telephone Circuit
Project INFO-CABLE/Cable Telecommunication Research	Brockville, Ont.	June 1982 Fall 1983	Open Channel Number TBD	Coaxial

EXHIBIT 3.3
(continued)

Project/ Operator	Location	Operation	No. of Terminals	Transmission Medium
Telidon 2/Tele-cable-Videotron	Montreal, Que.	Fall 1982 Fall 1983	250 250	Teletext-Coaxial Videotex-Coaxial
Project AGORA/ Universite du Quebec a Montreal	Montreal, Que.	Apr. 1982	100	Coaxial Cable
Project NOVATEX/ Teleglobe	Inter-national	Feb. 1982	67	Telephone Network
Videotex America Field Trial/Times Mirror Videotex Services and Infomart	Rancho Palos Verdes & Mission Viejo CA	Mar. 1982	200 phone 150 cable	Telephone & Coaxial Cable
Time Inc. Teletext Trial	Orlando FA San Diego CA	Fall 1982	150	Satellite & Coaxial Cable
Bakersfield Telidon Trial	San Joaquin Valley CA	Fall 1982	500	Telephone Circuit
WETA Teletext Service	Washington, D.C.	May 1982	64	Broadcast
Myer Emporium Telidon Trial	Australia (countrywide)	Mar. 1983	TBA	Telephone
Venezuela Telidon System/Infomart	Caracas, Venezuela	Early 1981	25	Telephone Circuit

EXHIBIT 3.4

Technical Aspects of Canadian Field Trials
(Selected Sample Trials)

	Terminal Type/ Keyboard or Keypad	Delivery Method	Host Computer	Information Provider Equipment
B.C. Tel (150 office, public & quasi-public)	Microtel keypads in public locations; keyboards in private locations	Direct dial telephone	DEC PDP 11/70	Norpak IPS-1
Elie (145 residential)	Norpak/Electrohome keyboards	Fibre optics	DEC VAX 11/780	
Vista (241 residentials, 180 educational & others, 12 public)	Northern Telecom keypads	Direct dial telephone	PDP 11/70 & VAX	Norpak IPS 1.5 & 2
AGT (7 libraries, 6 school systems)	Norpak MK II decoders, keypads	Direct dial telephone	PDP 11/70	Norpak
Sask Tel Pathfinder (100 rural/ urban, business/ residential)	Northern Telecom Microtel keypads	Direct dial telephone Fibre optic to Yorkton	PDP 11/70	Northern Telecom (VIPs)

EXHIBIT 3.5
Terminal Types Used in Canadian Videotex Trials

(1) Business Videotex Terminals

- Standalone unit - usually auto dialer
- Keypad or keyboard - ASCII
- 256 x 200 resolution
- 6 colours

(2) "RF" Videotex/Teletext Adapter

- Connection to television receiver enabling it to operate as a Videotex terminal.

(3) "RGB" Videotex or Teletext Adapter

- Connects directly to the red, green and blue "guns" of a television receiver, thereby enabling it to operate as a Videotex terminal.

(4) Cable Television Converter/Adapters

- Set top frequency converters already used in cable television to enable the user to select from the full range of television channels.

(5) Television Receiver

- Linked to shared decoder.

(6) Personal Computers

- Parallel to serial interface
- Modem
- Videotex decoder/character generator card
- Graphics display

EXHIBIT 3.6
Canadian Trials by Operator Type

Telephone Company	11
Cable Company	5
Broadcasting Company	1
Government, Federal, Provincial & Municipal	4
Education	3
	24

EXHIBIT 3.7
Applications Available in Canadian Field Trials

Services	BC Tel	Path-finder	Elie	Vista	Mer-cury**	AGT
Gateways to Third Party Databases	X	X	X	X	X	
Messaging	X	X	X			
Financial Information	X	X	X	X		
Cantel (gov't)	X	X	X	X	X	
Information Retrieval	X	X	X	X	X	X
Teleshopping		X	X	X		
Telebanking						
Games			X	X	X	
Education Courses			X	X		X
Community Information	X	X	X	X	X	X
Community Bulletin Board		X	X	X	X	
Keyword Searching	X	X	X			
News & Weather		X	X	X	X	
Home Security					X*	X
Electronic Directories	X	X	X	X	X	

EXHIBIT 3.7

(Continued)

Services	TV Ontario	IDA**	Cantel	Cabot**	Maritime T&T
Gateways to Third Party Databases					
Messaging					
Financial Information					
Cantel (gov't)			X		
Information Retrieval	X	X	X	X	X
Teleshopping					
Telebanking					
Games		X			
Education Courses	X				
Community Information	X	X			X
Community Bulletin Board		X			
Keyword Searching			X		
News & Weather		X			
Home Security		X*			
Electronic Directories	X	X	X		

* Part of trial to test other services.
** These trials are no longer operating.

Applications Emerging from Trial Activities

One of the most important lessons which emerged from both U.S. and Canadian trials was the realization of the need to direct information to special user groups and to design databases which are organized around particular applications. For example, Dow Jones provided a service for stock market and financial news, and using that as a base, has broadened their scope to include a variety of on-line and regularly updated information. The Source took a more eclectic approach by developing topical databases dealing with restaurants, stocks, employment, education, wines, cinema, messaging and business services.

An emerging area for on-line information, and one which already has been successfully implemented, is agribusiness. These types of applications are typified by Grassroots in Canada, where today 1,500 users access a wide range of farm-related information. Two of the most popular areas of content are weather reports and commodity prices. It is instructive that each are timely services requiring continual updating, and both are vital to farm operations.

Recent forecasts suggest there is every reason to expect agribusiness use of Videotex and interactive electronic services to continue to grow. It has been estimated, for example, that 75% of US commercial farms will be equipped with computers by 1990.

Applications which have emerged in the Videotex trials and commercial services for agriculture are listed in Exhibit 3.8. An indication of the interest in agricultural uses for Videotex services in North America is provided in Exhibit 3.9.

EXHIBIT 3.8
Agricultural Applications on Videotex

1. Commodity and financial reports, including prices (current and futures, market volumes and trends).

2. Crop and livestock control and management reports, featuring data such as pesticide use, feeding and fertilizer utilization.

3. Advice on marketing of produce and livestock, including legal and accounting ramifications.

4. Information concerning government regulations and reporting requirements.

5. Government (federal, state and local) information.

6. Agribusiness bookkeeping guidelines and procedures.

7. Weather data.

8. Emergency conditions data (before, during and after a critical situation).

9. Banking services to expedite management and marketing activities.

10. Retail purchasing (or "teleshopping").

EXHIBIT 3.9
North American On-Line Agribusiness Service

Project	Operator	Service Area
AACSYS (ACCESS) American Agriculture Communication System	American Farm Bureau Federation	200 Farmers in 8 states
AGNET Agricultural Network	University of Nebraska	40-50 states
AGRITEXT	Harris Electronic News	10 county areas around Hutchison, Kansas
AGVISION	ELANCO/Professional Farmers of America	17 southern states
CMN Computerized Management Network	Virginia Polytechnic Institute and State University	500 users in 44 states
Electronic Marketing Association Cattle Auction	Electronic Marketing Association	Eastern US
ESTEL	University of Maryland Cooperative Extension Service	Pilot serves 3 counties in MD
FACTS Fast Access Computer Terminal System	Purdue University, Indiana	Serving 91 counties of Indiana Co-Op extension offices
FARM MARKET NEWS	Public Broadcasting Service/USDA Agriculture Marketing Service	5 PBS host stations: Tampa, FA; Springfield, MO; Fargo, ND; Denver, CO; Fresno, CA
FIRSTHAND	First Bank Systems, Minneapolis, MN	Fargo, ND
GRASSROOTS	Infomart (Canada)	Manitoba
GREENTHUMB	University of Kentucky Extension Service	Kentucky (200 farmers)

EXHIBIT 3.9
(continued)

Project	Operator	Service Area
INSTANT UPDATE	Professional Farmers of America	Cedar Falls, Iowa (see AgVision)
QUOTRADER	Quotrader Corp. Inc.	Cabel TV systems receiving "WTBS" superstation
TELEPLAN	Michigan State University	400 users
TIFFIN ADVERTISER TRIBUNE	Tiffin Advertiser Tribune	Tiffin, Ohio
VIEWCOM/GRASSROOTS	Frittsco (Bakersfield, CA)	San Joaquin Valley

Transactions

A second major growth area was identified as transaction services such as banking and shopping. Their proliferation has been very encouraging, particularly in the US where Videotex trials currently involve between 1,000 and 2,000 users. At the present time a service provided by the Chemical Bank is planned for commercial operation, allowing for an initial user base of 3,000. The services which are considered typical of most transactional offerings include:

1. Bill paying.
2. Investment data.
3. Stock quotations.
4. Publications.
5. Electronic shopping services.

The growth of non-store retail sales and services requiring reservations also has emerged as likely to offer significant potential for Videotex services. This is emphasized particularly when it is realized that non-store sales in the US were in excess of $100 billion annually in 1981,[38] with $36 billion spent on products sold through all forms of direct mail marketing. In Canada these estimates range between $10 and $13 billion, respectively.

Industry Evolution and Growth

The Page Creation Sector

One sector which was able to generate significant revenues through field trials were page creators. In most cases, this function was provided by a number of commercial service organizations utilizing the page input terminal. It should be noted as well that there were a number of non-profit organizations providing page creation, including the Community Information Centre of Toronto and the Greater Vancouver referral service. Each of these, however, were subsidized by government grant programs or by matching grants from industry.

By the end of 1983 there were approximately 55 Canadian companies involved in Videotex, of which 31 offered commercial page creation services. The majority of these were in Ontario where there were 16, four were in British Columbia, six in Quebec, two in New Brunswick, and one each in Nova Scotia, Manitoba and Alberta. Together, these companies created only approximately 200,000 pages of information, not including updating, editing and replacement pages.

In addition to the services directly related to the field trial activities, it is also worth noting that only three commercial services are presently offered in Canada. Grassroots, which provides database access and Videotex services to farmers throughout Manitoba, is a joint product of Manitoba Telephone Systems and Infomart. Another is an international service with Videotex terminals in cities throughout the world operated by Teleglobe (Novatel). In that service, terminals are located in Canadian embassies. Another example is the Faxtel Information System of Toronto provided by Marketfax Systems. This is a closed-user application which offered news items and stock market information, updated daily for all Toronto, Vancouver, Amex and New York listed stocks.

Two government operated public information systems are also functioning. One is the federal government's task force on service to the public, known as Cantel. This service offered access to the public for government information and included such things as the employment job bank, as well as information about immigration and services, etc. The second government service is the Province of Ontario's Ministry of Industry and Tourism -- Teleguide's tourism service. This provides tourism information over standalone Videotex terminals located in several shopping malls in Toronto.

To assist content development during the trial period, the government committed $10.5 million for the IISP (Industry Investment Stimulation Program). This was designed to help achieve a critical mass of database content, to help reduce the price of Videotex terminals through volume production, to improve price competitiveness of Videotex in foreign markets, to stimulate new private sector expenditures in the Videotex industry, and to stimulate the development of Videotex services in Canada, recognizing special and social needs as well as cultural and regional differences.

On the international scene, Telidon-based Videotex was also successful in the operation of trial systems in Australia, Venezuela and Switzerland. The Japanese also purchased Videotex terminals and licenced NAPL PS software.

EXHIBIT 3.10

IP Activity
(Five Selected Field Trials)

	No. of Sub-IPs	Major Types of Sub-IPs	IP Companies
BC Tel	130	Tourism Retail Government Business Entertainment Hotels/Restaurants Education	Dominion Information Services Canada Videotex Systems Videolink
Elie	104	Agriculture Retail Financial Education Community Travel	Infomart Videographex
Vista	100 (English & French)	Retail Tourism Education Banking Entertainment Government Community Groups	
AGT	2 major IPs	Education Library	Tayson Information Technology
Mercury	30	Community Groups Government Tourism	L.M. Berry

EXHIBIT 3.11

Page Creation Companies Operating in Canada
1981-1983

Province	No. of Companies
B.C.	4
Alberta	1
Manitoba	1
Ontario	16
Quebec	6
New Brunswick	2
Nova Scotia	1
	—
	31

Estimated Telidon Field Trial Page Creation Activities
(to October 1982)

Company	Estimated Pages
Cantel	53,000
Vista	32,000
MTS Elie	14,000
B.C. Tel	7,000
AGT	5,000
Teleguide	10,000
Videotron	20,000
N.B. Tel	10,000
MTT	1,000
Grassroots	10,000
Pathfinder	5,000
	167,000

Investment and Revenues

In reviewing the expenditures on Videotex services over the past 2-1/2 years, it is estimated that for every $1 spent by the government on Videotex, $3-$4 was spent by private industry. Exhibit 3.12 provides these estimates for government and industry.

EXHIBIT 3.12
Estimated Financing

	($ million)	
	Expenditures by Canadian Government	Estimated Expenditures by Private Sector*
1979	$ 5	$ 14
1980	8	20
1981	20	60
1982	13	40
	$ 46	$ 134

* Wescom estimates based on industry interviews.

It is difficult to estimate the exact amount of revenue generated by these companies during the field trial phase; however, an overview of activity indicates that upwards of $6 million was generated simply in the page creation phase of the trials but that much of this amount involved government subsidies.

A brief overview of the Videotex terminal manufacturing sector also shows that companies such as Microtel, Norpak, Electrohome and Northern Telecom, which produced units for placement in the field trials, have, if one assumes an average price of $2,000 per terminal, generated revenues of approximately $11 million from hardware manufacturing alone, i.e. for user terminals, but that again, most of this amount is accounted for by government purchases during the field trials.

Perceived Impact in Transferring Technology

A fundamental goal of the Canadian field trial experiments was the encouragement of the transfer of Videotex technology from government laboratories into private industry. This goal was to some extent achieved as commercial operations emerged and became self-supporting. In a survey conducted during the field trial phase in Canada, representatives from each of the industry sectors were asked to provide their views and opinions about the effectiveness of the trials in stimulating the industry and in encouraging the transfer of this technology.[39]

Telephone company representatives agreed that the field trials were effective in accomplishing this transfer goal. The field trials were considered as the only economical way to bring people and the technology together. This approach minimized the need to make large investments and greater risks when introducing the technology into the market as a consumer product. The trials were considered necessary since the technology was new and there was no way to gauge what the potential response would be without testing it in some format.

In the cable industry, most representatives did not think the field trials were an effective method for transferring technology. Typical of this view was the belief that the technology could best be described as being "dumped" onto the market.

Summary

This chapter has assessed the impact of the field trials on a potential Videotex industry from the perspective of the federal government, service providers, hardware manufacturers and information providers. The results indicate:

1. The way trials were implemented introduced significant restrictions on the interpretation of user responses and the estimation of potential demand for future services.

2. The trials enabled the technical capabilities of equipment and various modes of service delivery to be evaluated. This aided in the development of commercial grade equipment.

3. The response of system operators indicated important questions still remain about the target market for new services and potential which exists in various residential and business markets.

4. The trials have, in most cases, been conducted by established communication carriers with limited results available to assess alternate service configurations. This was particularly the case for smaller scale and non-commercial operations.

5. Very little activity in the trials had been directed toward evaluating the competitive environment for Videotex services and the range of new technologies in the telecommunications and computer fields.

6. More efforts needed to be placed in the development of serviceware, software and content and specialized applications such as transactions, banking and transit information systems.

7. Targeted applications which emerged and were likely to offer potential were:

   - agriculture
   - tourism
   - banking
   - retailing
   - specialized users, i.e. stock brokers
   - transit information systems.

8. There has to date been a penetration of less than 5,000 terminals in the Canadian market. While this has stimulated some manufacturing sectors, terminals are still expensive ($2,000) and are restricted to retrieval and display. The terminal penetration was significantly less than originally estimated for 1983 (40,000).

9. The private sector expressed a significant amount of caution in assessing the prospects for Videotex, supported by a feeling among most industry represen-

tatives that the trials had not been as effective as expected in specifying opportunities, future prospects and potential target segments.

10. While caution was expressed, industry statistics indicated over $100 million had been invested by private industry, with at least 55 companies directly involved. Government to private industry investment ratios were estimated at 1:3.

11. The trials encouraged some development in content, but this was limited and focused more on technical improvements than on applications.

    The trials conducted in Canada and the US demonstrated industry willingness to investigate new ventures. These were more evident and diverse in the US, where numerous banking and transaction services using Videotex and, in many cases, Telidon, (NAPLPS) were underway.

12. On the international scene, the trials helped establish Telidon as an international standard. As well, opportunities emerged in the US market, particularly with respect to the ATT standard and the expansion of US activity. The original alphageometric approach was adopted as an international standard by CCITT.

13. Equipment enhancements were tested, including: the inclusion of macro-PDIs, colour enhancements in display, look-up procedures for page creation terminals, and the evolution of the Videotex decoders -- Mark I to Mark III. Keypad designs were altered and terminal displays enhanced.

14. Public awareness was increased through media coverage, trial participation, and interaction with public terminals. Between 3,000 and 7,000 individuals were estimated to be interacting with Videotex systems on a weekly basis during the trial period.

32. Tyler, M., "User Research and Demand Research, What's the Use?" Evaluating New Telecommunications Services, Martin J. Elton, W. Lucas, eds., Plenum Press, New York, 1978.

33. Hough, R. and Associates, "A Study to Forecast the Demand for Telidon Services Over the Next Ten Years."

34. Hickling Johnson, "Field Marketing Trial Strategy for Telidon," February 1979.

35. Feeley, J., "Interactive Telidon in Canada," Online Conference, Paper Presentation, October 6-8, 1981, London, England.

36. Department of Communications, Press Releases 1981-1983.

37. CSP Ltd., "Report Four, Market Analysis: The Canadian Videotex Experience," Volume 1, p.1., September 1981.

38. Tydeman, J. et al., "Teletext and Videotex in the US," McGraw Hill, New York, 1981.

39. Booth, P.J. et al., "Telidon Economic and Marketing Assessment Study, Volume I," Department of Communications, Ottawa, 1983.

CHAPTER 4
Future Market Developments

Introduction

This chapter provides an overview of areas which are likely to influence the growth of Videotex/Teletext services in Canada over the next decade. It concentrates on a number of complementary technologies and illustrates how Videotex and Teletext service may be affected by their development and growth.

One of the most important lessons of the field trial experiences in Canada was the realization that it is fallacious to think that consumers have a need for information that may not be obtained with equal facility from cheaper sources. It was clear there was not really a significant amount of information provided on the Videotex systems that the average consumer could not obtain from other more direct and less costly sources. As one author has noted, "A newspaper would have to cost at least $10 before a person would consider converting to an electronic medium for the same information."[40] Even if terminals were low priced, instead of the current price of around $2,000, virtually all computerized information services cost too much for the average consumer to utilize in the home.

The field trial results and general market experience suggested that Videotex and Teletext would face a significant amount of competition in the market for providing information retrieval services. The experiences show that information content must be highly directional and must offer distinct utility to users. Videotex service operators also must provide linkages to a wide variety of databases, utilizing, when necessary, gateway procedures for facilitating access to a diversity of information.

The growth of more versatile presentation and transmission technologies will no doubt impact Videotex and Teletext services. For example, the growth of personal computers with sophisticated graphic enhancements have been estimated at 38%-75% annually. Their diffusion, along with the emergence of new enhanced cable services, has required a significant change in the way Videotex and Teletext are presented to the marketplace. Indeed there are many reasons to consider a mass market for standalone Videotex to be realized only in the minds of enthusiastic salesmen and industry promoters.

Integrating Videotex into existing office equipment offers one of the most likely future scenarios, since it is well-suited to being bundled into integrated office equipment, and such a cumulative approach to Videotex fits in well with the current trends in integrated office applications. Network providers and systems operators now realize they must examine the full spectrum of hardware and software available for accessing any database or providing transaction capabilities. Personal computers, management workstations and such all have varying levels of penetration in business/residential markets, and most have far greater penetration than Videotex or Teletext.

Two-way capabilities, display graphics, transactions, messaging, education and training are all potential applications for Videotex and Teletext. Although all of these applications benefit from computerized display and transmission means, whether or not Videotex offers a relative advantage is critical to understanding its possible success in the marketplace.

The following sections are presented as part of an overview of the industry and market characteristics, and provide a review of selected competing and complementary technologies for Videotex and Teletext. Included are, artificial intelligence, transaction services using personal computers, office automation, cable, and computer-based learning.

Artificial Intelligence and Videotex

One of the new technologies of relevance to Videotex is artificial intelligence -- the branch of computer science which attempts to induce computers to respond as if they were intelligent. Artificial intelligence (AI) programming processes ideas and facts rather than only numbers. Many AI programs use inference rules of normal programming, but as applied to concepts; for example, "If an animal has tusks, then it is not a cat" -- while other systems relate large networks of empirical facts which tell a computer how individual parts of information are related. Utilizing such a network, a computer may "know" that only mastedons and elephants have tusks but that elephants are not extinct.

In solving problems, AI software manipulates this body of empirical knowledge in ways analogous to human reasoning; i.e. while sorting through a body of knowledge, AI programs have the ability to decide on their own sequence of steps rather than following precise decision rules.

One aspect of AI research most immediately applicable to future developments of Videotex technology is that of non-procedural query languages. During the 1970s, many of the AI researchers not involved in the development of expert systems programs were trying to induce computers to communicate in natural languages such as English and French. They reached approximately the same conclusions of the experts systems researchers, that one may induce a program to converse intelligently about a specific domain of knowledge only if that domain is restricted enough -- such as restricted business databases. Software which utilizes a natural language to search a corporate database is called a non-procedural query language, and these are now undergoing significant commercial development. One such language developed by the Artificial Intelligence Corporation of Massachusetts is called Intellect, and by 1983, Intellect has been sold to more than 300 firms in the United States.

By using Intellect, a manager may ask typed questions of the firm's database without using a computer programmer to translate these commands into a code which the computer understands. Most business databases are normally used by less than five to eight persons at any installation (who are normally computer experts), but Intellect-like systems typically have around 50 users in any firm, most of whom are computer naive. Intellect-like natural query languages will render the tree structure search capabilities of most Videotex systems and simple key word searches obsolete.

Even more recent developments with AI and Videotex have seen the development of natural query languages in conjunction with Videotex display technologies and laser discs as a storage technology. The use of a natural query language facilitates the search procedure through the host database and replaces the need for slow and tedious tree structures.

Transactional Services

In the United States, a main thrust by Videotex systems operators as noted, now involves the use of Videotex's two-way capability as a vehicle for providing banking and related transactional services. Many analysts believe that transactional capabilities will be the main catalyst for the commercial success of Videotex applications. Almost all of these transactional trials and services use personal computers rather than videotex terminals.

The Canadian movement toward home banking has been sluggish, but the American experience serves as an indication of the popularity and demand which exists for transactional services. In the banking context, any ability to provide transaction services necessitates that a systems operator provide an adequate technical/network support to the user base. The basic requirement, therefore, is the ability to process an extremely large number of transactions in a mainframe processing computer.

A related factor increasing the market growth of banking transaction services is the growth of shared networks for automated teller machines, or multi-branch banking systems. It may be ultimately that such networks are accessible from the home, thus facilitating direct funds transfer and on-line purchases of goods and services.

A related transactional service involves home shopping. Similarly, the development of transactional ticketing for travel has been often raised as a possible transaction service for Videotex.

Transactions applications for Videotex, then, which are emerging at the present time include teleshopping, remote reservations, home banking and bill-paying services. All of these have experienced significant growth in the United States. Exhibit 4.1 presents a breakdown of expenditures connected with bill-paying and banking for a variety of transaction services. Fees included comprise services such as overdrafts, safety deposits and cheque writing. Such considerable expenditures reinforce the potential productivity gains which might result with the application of Videotex or Teletext services to electronic banking.

In Canada, the annual costs of cheque processing have been estimated to be in the order of $1 billion annually and $8 billion in the US in 1980. Non-store retail sales in the US exceeded $100 billion in 1981.[41] Of this amount, $36 billion was spent on products which were sold through all forms of direct mail marketing. Equivalent estimates for Canada range between $10 and $13 billion, respectively.

EXHIBIT 4.1

Transaction Expenditures
(Based on US Data)

	Total 1980 Expenditures ($ billions)	Average Household Expenditures Per Month	Percent Estimated Annual Growth 1980-1990
Banking and Bill Paying:			
- Banking fees	1.95	2.05	3.6
- Postage for payment of bills	1.20	1.25	2.8
Teleshopping:			
- Direct marketing sales	36.00*	37.50	10.0
Services Requiring Reservations:			
- Airline travel	6.60*	6.90	3.9
- Vacation lodging	4.95*	5.15	3.8
- Entertainment admissions	14.65*	15.25	3.7

* These figures represent the total values of goods and services purchased.

All figures are for US banks in US dollars.

Source: Teletext and Videotex in the US, Tydeman et al., McGraw Hill, 1982.

It is likely that the penetration of home banking and financial services and other related transactional services can be assumed to follow the diffusion rate of home computers in North American and Canadian homes, and will offer significant opportunities to the Videotex industry. The impetus toward North American home banking is mainly dependent now on how rapidly personal computers diffuse to the home in North America, and it is no longer thought that banks as systems operators will seed the North American market with dedicated banking terminals.

It is quite natural that the banks and the financial community in general are one of the first to enter the electronic marketplace. In this context, money is literally information, and major productivity and cost savings may be achieved in this industry by a wide range of electronic means and effects, i.e. the reduction of transit time for money and the accompanying interest savings. It is not surprising, therefore, that there are, according to a recent International Resource Development Inc. study, between 200,000 and 300,000 microcomputers in use in the US financial industry.[42]

In summary Videotex developments and the emergence of computer/communications systems have facilitated the processing of very large numbers of transactions via systems which pass users through gateways into a mainframe computer. If customer account information is stored in a computer in a Videotex-compatible format, extensive services may be provided to bank users over home personal computers.

Banking Networking

One of the main ways banking networks are building in North America involves shared automated teller machines (ATM), which allow a banking or retail user in one part of the country to use an ATM of a bank participating in a regional network to perform operations on his or her account from other regions.

Switching customers from bank to bank on the network is sometimes performed by financial service bureau firms (i.e. as in the ADP trial) or by bank processing companies (frequently subsidiaries of banks). Such shared networks can also connect home banking users to home shopping facilities, and electronic banking and shopping systems are now merging.

However, in a number of trials home electronic banking has evolved as an alternative to a shared ATM network. Many analysts are very pessimistic about shared ATM networks and feel that home banking on personal computers makes more sense, with the ATM's eventually being used only for cash withdrawal. As William Cornford at the Chemical Bank has said, "Home banking can increase the customer base without the expense of more branches, and also facilitates bill paying to a wide range of merchants. There is also a growing base of interactive intelligent terminals for home banking to use. The short term economics involve questions such as how rapidly will installed bases develop and whether the banks will have to pay for terminals in the meantime. Also, neither pricing strategies, capital costs or means of ammortization have been determined in any of the trials yet."[43]

Possible pricing strategies involve those sensitive to volume, to the value of transactions or to switching between accounts. Pricing may also involve combinations of these and may evolve analogously to that of telephone bill paying. (In the US over 400 banks offer telephone bill paying, and more than 2½ million transactions are completed monthly for banking plus bill payments.)

Automatic Teller Machines

By June 1983 there were more than 32,000 ATM's installed in the United States.[44] Also, there are now more than 90 million US users who have either credit or debit cards which activate ATM's. It is expected that the number of these machines will gradually increase to around 90,000 over the next decade. (Such a prediction may actually be much higher given the possibility that ATM's are widely installed within fast food and department stores.)

In Canada there were 2,600[45] ATM's installed up to mid 1984 with nearly half in Ontario. These were provided by the five largest chartered banks, the Royal Bank, CIBC, Toronto Dominion, Bank of Montreal and Bank of Nova Scotia. The trust companies are also installing ATM's with close to 200 expected by the end of 1985.

A 1982 (private)[46] study conducted by Citibank revealed that human labour is approximately twice as expensive as ATM's, and their additional advantages include these features:

1. They increase the availability of financial services without the necessity of constructing additional offices.

2. They directly reduce the need for human tellers.

3. They function as marketing tools to direct customers into retail stores.

As of January 1983, less than 30% of all US bank customers still actually used ATM's.[47] A study by the Bank Marketing Association of Chicago, "Pace III", also pointed out that the diffusion of home computers for transactional services will destroy the specialty banking terminal industry. It was also found that less than 15% of respondents in this survey actually used ATM's, although they were aware of them.

As of April 1984, approximately 69 banks in North America were either testing or planning to introduce home banking.[48] With technology based on user operated terminals (usually a personal computer in the home which can access a bank's computer data base for data entry or retrieval), most present services include account status, bill paying, transfers, loan information and investment services. In Canada at the present time, only the Bank of Montreal offers in-home service. The 2,000 Grassroots participants have the ability, if using the Bank of Montreal, to check the status of bank accounts and do transfers over the Videotex network.

In 1983, home banking revenues in the United States were approximately $1 million, with 5% of all homes having a microcomputer.[49] Assuming that by the end of the decade a little over 50% of North American homes have personal computers, home banking revenues will exceed $800 million.

One critical function which home banking over personal computers cannot carry out is paying out cash. It is thus expected that there will be considerable co-ordination in the development of both home banking systems and ATM's. Since an ATM is mainly a withdrawal and deposit instrument, operating in a complementary fashion home banking on personal computers and ATM's offer a full range of financial/banking services. This complementary operation bodes poorly for the future development of banking branch offices, since it will be several orders of magnitude cheaper for banks to develop home banking/ATM systems instead of building new offices.

Industrial Merging

The electronic financial services industry, of which home banking is merely one component, includes the mutual savings banks, commercial banks, savings and loans institutions and credit unions; this group also includes organizations devoted to financial management such as Merrill Lynch, which have electronically expanded beyond brokerage operations to credit account chequing and other electronic services.

Another group now providing banking services comprises credit card firms such as Mastercard and American Express, and large U.S. retailers such as Sears and J.C. Penney, which have expanded operations into those traditionally done by banks.

Depository institutions, investment banks and brokerage houses, in other words, are all invading each others traditionally defined turfs. For example, cash management accounts (CMA's) of the brokerage houses can also function as bank chequing accounts. By mid-1983, in fact, there were more than a million CMA's in the US, and Merrill Lynch had over 70% of these.[50]

Some banks, on the other hand, are now beginning to offer brokerage services at a considerable discount. Typical of such developments are the Pacific National Bank, Citizens Bank and Southern National Bank in the United States, which are all moving into brokerage areas. In this movement the banks have circumvented the Glass- Steagall Act by noting that the Act does not prevent a bank from merely executing a buy and sell order. The regulators, in other words, are giving the banks a fighting chance. Also, the Depository Institution Deregulation and Monetary Control Act, passed in the United States in March 1980, will gradually eliminate interest ceilings on all deposits by 1986 and will put control of all financial institutions under the Federal Reserve. Tydeman et al.[51] have noted that this act will most likely reduce the number of US financial institutions, which in 1982 numbered 14,700 banks with 39,700 branches, 4,700 savings and loans associations and 22,000 credit unions.[52]

Other new entrants in videotex financial services have arisen from outside the traditional financial community, e.g. Sears Roebuck, Prudential Insurance and JC Penney. Sears, for example, owns both a major brokerage firm and a Californian savings and loan firm, and

Prudential recently acquired Bache Halsey Stewart. Some typical home banking services and trials are listed in Exhibit 4.2.

Shawmut Test

The Shawmut Bank of Boston in November 1982 began a small test of home banking with 100 families accessing banking services over the Compuserve network. This pilot began in homes which already had personal computers -- an Apple II, Atari or Radio Shack personal computer. In this six month trial, customers did not pay to take part, and Shawmut's electronic banking services included bill paying to merchants, account balancing and information about banking services. (The Shawmut Bank is merely one part of a twelve bank holding company, and is predominantly a business bank.)

Anacomp

In another trial Anacomp, a transactions processing company, introduced its Videoserve home banking service in mid-1983 in the Baltimore area. Using Videoserve over home computers, users could perform both bill paying and home banking, and expanded services will eventually include teleshopping and information retrieval.

CBS/AT&T Trial

Toward the end of 1982, CBS and AT&T began a (now ended) test of Videotex services including transactions in Ridgewood, New Jersey with 100 households initially taking part in the trial. The trial included home banking, teleshopping, games and downloading of software. In this trial, about half of the homes had Videotex decoders and the others used TV sets plus add-on keypad receivers. Home shopping has been featured with more than 90 advertisers presenting material. One interesting new teleshopping feature in this trial was the ability to make supermarket food purchases.

EXHIBIT 4.2
Home Banking Services and Trials, 1983

System Operator	Project	# of On-Line Users	Area
ADP Telephone Computing Service	HBI	2,000	Seattle, WA
CBS Venture One	Venture	300	New Jersey
Chemical Bank	Pronto	500	California, New York, Florida
Compuserve, Inc.	–	30,000	All of US
Continental Telecom	Contelvision	100 households	Manassas, Virginia
Financial Interstate Services Corp	Bank-At-Home	500	Knoxville, Memphis, Boston
First Interstate	Day and Night Video Banking	200	Los Angeles
Indax-Cox Cable	Indax	600	San Diego
Infomart	Grassroots	300	Western Canada
JC Penney	Firsthand	200	N. Dakota
Keycom Electronic Publishing	Keycom Videotex Service	3,000	Chicago
Macrotel, Inc.	–	218	US
Shawmut	–	100	Boston

EXHIBIT 4.2

(continued)

System Operator	Project	# of On-Line Users	Area
The Shuttle Corp.	Shuttle Information Service	-	Redmond, WA
Source Telecomputing Corp.	The Source	36,000	US and Overseas
Times/Mirror Videotex Service	Gateway	1,000	Misson Viego, Palos Verdes, CA
The Treasurer, Inc.	Venture One	100	Ridgewood, NJ
Tymshare	-	-	International
Videofinancial Services	Viewtron	3,500	South Florida
Bank of America	-	7,000	N. California S. California
IBM/CBS/Sears	Trinitex	-	-
Delphi Videotex System	Delphi Network	-	Banking interchange Network
Madison National Bank	Hometeller	500	Madison Wisc.

ADP Trial (Home Banking Interchange)

In January 1983, Automatic Data Processing Inc. of New Jersey, utilizing its Seattle subsidiary ADP Telephone Computing Services Inc., began its home banking interchange project in Princeton, New Jersey. (ADP Telephone Computing Services Inc. is an early pioneer of telephone bill paying technology for banks and currently is providing banks with voice/touch-tone telephone-based services nation-wide.)

ADP had considerable experiences with the weaknesses of telephone bill paying in its present form -- there is no rapid access to details of account and telephone bill paying activities. In other words, a user must always maintain records of telephone bill paying and correlate these with printed monthly bank statements. Videotex, first of all, eliminated this problem and also expanded the range of home banking activities into related financial services. Using a home banking interface allows banks to enter electronic banking with much less risk than that involved in becoming an entire Videotex system operator, such as First Bank Systems of Minneapolis.

ADP designs and operates the shared Videotex service. Other banks provide 30 to 200 users in each of the customer bases and interface with ADP's computers.

Although ADP retained "all ownership and other rights to any and all software and hardware" emerging from the project, it has allowed for a price of approximately $100,000 to all participating banks in order to licence software resulting from this project. Initial services included:

1. bill paying
2. funds transfer between various bank accounts
3. account balance information
4. statement services including information on cleared cheques and chequing and savings accounts transaction history
5. interest accrual information
6. stock payment capabilities
7. interest rate information
8. other non-financial Videotex services provided by Videotex America and other third parties.[53]

This year-long $7.5 million project involves 17 U.S. banks, the Bank of Montreal, American Bell Inc. and various other concerns. Two thousand homes in the US and Canada are being supplied with keyboard computer terminals attached to the TV set and telephone. In addition to home banking services, the Videotex system being used will provide other two-way services such as home shopping, news, sports and weather. Supported mainly by advertising, cost to consumers averages $7 to $10 per month. The computer terminals will be provided by American Bell, the recently formed communication unit of AT&T. (The customer base of this trial, it must be noted, is already ten times as large as the home banking trial by the New York Chemical Bank.)

Homebase

Citibank's home banking system, Homebase, has been operating for almost four years. In the early phases of the trial, Citibank provided users with free computers plus free interconnect with the bank's computer system and charged nothing for usage.

Issues facing banks and other organizations instigating home banking systems examined first in the Citibank service are:

1.   How much consumers will pay when home banking by computer is not free?

2.   How rapidly will personal computers diffuse throughout the American household?

3.   How many persons will actually want to bank by computer?

4.   Which will be the preferable communication linkages -- cable or telephone?

A user of Citibank services might first look at cheques which have cleared that day and, if there was a low balance, transfer money from a savings account. Facilities are also available to call up the list of bills pending, by typing in appropriate numbers on the home personal computer, one may fill in blanks for an electronic cheque or payment. A paper cheque is then subsequently printed out by the bank and mailed to the appropriate recipient. Citibank's offerings also include news and stock quotes through an arrangement

with Dow Jones, and bankers involved in home banking now anticipate offering an entire integrated package of services over computer in addition to home banking, including home shopping, information retrieval, stock and bonds transactions and insurance. Senior Vice-President of the Citibank, John A. Farnsworth, states that, "Banks and electronic shopping will profit not merely by banking services themselves but also from fees which are paid for ordering non-bank merchandise and for information retrieval."[54]

Videofinancial

Although some banks are attempting to manage interconnect between the home personal computers and merchants, other banks are leaving the offering and marketing of such services to other institutions. For example, Videofinancial services -- a joint venture between the Southeast Banking Corp., The Banc 1 Corp., The Security Pacific Corp. and others -- is planning to offer home banking services through a separately owned Videotex service called Viewtron (itself a joint venture of Knight-Ridder Newspapers and AT&T). In other words, Viewtron markets this system as an add-on feature for consumers along with its normal offering of advertising home merchandise and news. Thus just as home shopping services are being added onto banking systems, the reverse is also the case.

Viewtron subscribers use the home banking gateway, Applause, which will ultimately include the Southeast bank, Bank of Coral Gables, Coconut Grove Bank, County National Bank of South Florida and Dadeland Bank. Subscriber fees are $3 above the standard service charge for 25 bill payments, with an additional 20 cents charged for each payment over $25.

The monthly price for Viewtron services is $39.95 per month and for this customers receive a service package that includes the use of a Sceptre terminal and up to 10 hours of Viewtron use. The initial three month subscription is $119.85 plus tax and a $150 deposit.

Pronto

It was announced in mid-1983 that Pronto, a home Videotex information and banking system of New York's Chemical Bank, was going public. When the Chemical Bank was

first getting involved in home banking, they decided not to build a system that would package together services such as home banking and home shopping, but begin with a type of system architecture that could incorporate these services as they arose. The Chemical Bank is currently negotiating with various U.S. banks across the country to licence Pronto. In this way they hope to develop a national system.

When first introduced, Pronto worked only on Atari personal computers hooked up to the phone and using the TV as a display screen. Enhancements currently under refinement will enable it to work with every major microcomputer available.

Chemical claims they have 5,000 fee-paying users in mid-1984, and initial services include bill paying, electronic mail and home banking. Spokespersons for Chemical have noted, "While corporate users are willing to pay significant amounts to have computerized sales, home users will not pay $500 per month. Chemical decided to take a national approach to the product, therefore the economics of scale were critical in keeping the costs down. We could go either of two ways: directly market to the customer or licence the software to other banks; we decided on the latter."[55]

Chemical already has a telephone bill paying service with a number of business firms and can use this service as a base for firms, such as electrical companies, to receive payment from customers.

One interesting feature of the two-way Pronto system is that it asks and answers questions in plain English, and the user does not have to have any real knowledge of a computer language. Secondly, with respect to privacy, a number of security features have been incorporated. Each household is assigned a specific and unique identification number and each member authorized in the household to access the system also has a personal ID number and code name. New applications include economic and business briefs, tax guides articles from Consumer reports magazine, a guide to bank services interest rates, and information about Pronto.

Bank of Montreal/Infomart

In 1983, the subscribers to Grassroots -- a Videotex-based agricultural information service of Infomart -- were offered a home banking service with the Bank of Montreal. Using a gateway, Infomart subscribers can access the Bank of Montreal's home banking services. These include transfers from one account to another, review of account statements and the ability to balance accounts. To be added in the near future are services such as bill paying, Master Card activities, and some limited loans -- all by using the Videotex terminal in the home. The Grassroots service is located in Winnipeg, Manitoba and serves agricultural communities throughout Manitoba, Saskatchewan, Alberta and Ontario. Subscribers can also access the Greenshields stock exchange service, the Winnipeg Commodity Exchange, the Chicago Mercantile Exchange, the Mid-America Exchange and the Chicago Board of Trade. More recently, Grassroots America, a joint venture of Infomart, Times Mirror Co. of LA and three US agricultural co-operations, announced plans to expand the agricultural Videotex service by early summer 1984 into Maryland, Delaware and Pennsylvania. All of the information content of Grassroots America will be Canadian, and services will include messaging, teleshopping and telebanking.[56]

Home Banking on Compuserve

Home banking services are now being offered on what were initially predominantly information retrieval systems. For example, the Financial Interstate Services Corp. has been using a value-added communications network of Compuserve, the Compuserve Network Services, to make available banking facilities to customers in either the home or small businesses. This demonstration utilizes Radio Shack's TRS 80 personal computer, leasing terminals to the largest customers and recommending purchase to home customers. Customers can get both certificate and deposit interest rates in current banking statements and also have access to Compuserve's information retrieval network and wire service stock market and financial information.

Home Banking Franchises

A number of U.S. banks have begun to franchise electronic banking services, e.g. in mid-

1982 the First Interstate Bancorp, a bank holding company in Los Angeles which has been experimenting with home banking, announced plans to establish franchises in which other banks can use both its name and services. Regional electronic banking seems to be growing by such franchising movements.

Teleservices Summary

The electronic transactional industry in North America is an amalgam of old and new players with traditional intra and inter industrial barriers rapidly falling. Exhibit 4.3[57] reports the April 1983 number of users of Videotex/Teletext worldwide. (85% of these Videotex trials and services include home banking and 80% of these include home shopping.)

By November 1984 there were 71 financial institutions involved in Videotex/home banking in the United States. The majority of the 15 new services in the past year have evolved from ventures which are part of the Home Banking interchange.

EXHIBIT 4.3
Videotex/Teletext Tests and Services, 1983

UNITED STATES

The Source	33,000
CompuServe	44,000
Dow Jones	65,000
CBS-American Bell Videotex (New Jersey)	100
Con TelVision (Virginia)	100
Pronto (Chemical Bank, New York)	450
HomeBase (Citibank, NY)	100
Shawmut Bank of Boston	100
Paymatic (Chase Manhattan Bank, New York)	Fall 1983
GeneSystem (MacroTel, Inc./Empire Bank, Buffalo)	206
BankShare (Huntington Bank, Columbus)	Not Available
FirstHand (J.C. Penney/First Bank Systems, Minneapolis)	250
Bank-at-Home (Financial Interstate, Knoxville)	200
INDAX (Cox Cable), San Diego	500
Omaha	less than 100
StarText (Ft. Worth)	510
Electronic Editions (Spokane, WA)	200
Harris Electronic News (Hutchinson, KS)	142
AgVision (Elanco, Indianapolis)	1,100
Louisville Courier-Journal (Louisville)	45
A-T Videotex (Tiffin Advertiser-Tribune, Tiffin, OH)	75
Time Video Information Services (San Diego and Orlando)	400
Keyfax National Teletext	300
WET-TV (Washington)	10
WKRC-TV (Cincinnati)	40
KIRO-TV (Seattle)	15

UNITED STATES (Cont.)

WGBH-TV (Boston)	20
KSL-TV (Salt Lake City)	5
San Francisco State University	47,000
Vicom Information Service	50
National Captioning Institute/Sears	70,000
Delphi (General Videotex Corporation)	215

BRAZIL

Telesp (Sao Paul) (Videotex)	1,800

CANADA

VISTA (Bell Canada)	491
Videotron (Montreal)	250
Grassroots (Manitoba)	150
Teleguide (Ontario)	270
Inet	425
Novatex (International)	67
Cantel	100
British Columbia Tel	200
Project AGT - Telidon (Alberta)	30
Pathfinder (Saskatchewan)	125
ELIE (Manitoba)	150
AGORA (Montreal)	188
Marketfax/Cableshare	25
RIDS (NORAD Base)	32
IRIS (CBC Teletext)	520
TV Ontario (Teletext)	100
Universital (Videotex)	50

AUSTRALIA

Seventel (Brisbane)	4,000

DENMARK

Teledata	20(

FRANCE

Electronic Directory (Ille et Vilaine)	5,50(
Teletel 3V (Velizy)	3,00(
GRETEL (Alsace, Lorraine)	approx. 5
CLAVECIN (business, professional)	10(
CLOTAIR (agricultural)	10(
Todel (banking, classified ads)	40(

GERMANY

Budschirmtext (videotex)	8,70(

GREECE

Bank of Thessalla (Teletel)	4,50(

JAPAN

CAPTAIN	2,00

KUWAIT

PTT (videotex)	1,3(

NORWAY

Teledata	1!

UNITED KINGDOM

Prestel	34,0(
Teletext	800,0(

Electronic Home Shopping Trials and Services

Basically there are two types of home electronic shopping services. One necessitates graphics and text only, and the other blends moving visual images with text and graphics. Both include a delivery means: two-way cable, TV, phone lines, etc. From the producer's and information providers' side, home electronic shopping services must also contain facilities to monitor the availability of stock, maintain individual transaction records and monitor account systems.

Teleshopping is normally considered to have two components: shopping product information and home shopping capabilities. The latter involves a system in which consumers browse or select specific information. They view alternative products and actually make a purchase by entering a typed instruction, either using a credit card or personal identification number. Shopping and product information is now widely used as a promotional tool for building traffic in stores, and many retailers use a Videotex-based system to advertise products and services as well as prices and locations where products could be purchased. Videopress, for example, now offers electronic advertising services in the Toronto Eaton's Centre. Shopping information is presented on large television screens using a continuous cycle of advertisements. Shoppers are able to utilize terminals equipped with touch sensitive screens to obtain specific merchandise information.

The size of the non-traditional shopping market and direct marketing activities in North America are difficult to gauge. However, it is worth noting that in 1982 total sales arising from direct marketing in the US were in excess of $120 billion and $13 billion in Canada. The US based Yankee Group[58] has predicted that US teleshopping sales will exceed $5 billion by 1985 and may reach $20 billion by 1990. Early teleshopping developments have been lead by retailers who often view teleshopping, i.e. cable shopping channels, as an integral part of their marketing efforts. It is thought that as commercial services come on line and trial activities increase, teleshopping is likely to have an excellent opportunity for the future. A number of technologies are being used in addition to the standard 800 telephone number credit card type purchasing. These include Videotex and Teletext, addressable cable TV converters, computerized voice synthesis systems and optical video disc players. All of these allow direct market retailers to communicate greater quantities and more detailed information to the potential consumer.

Stothers (1983)[59] has examined the possibilities for electronic in-home shopping in North America and suggests that the movement to in-home electronic shopping will be evolutionary rather than revolutionary:

> "The pattern of consumer acceptance of the new electronic media to date strongly suggests that the role of Videotex shopping is deeply rooted in both economic and social patterns ... changes will occur when it proves profitable for retailers to provide new outlets to meet changing consumer demand." (19) (p.28)

In summary, two roles for Videotex are identified in terms of meeting the objectives of consumers and retailers. These are:[60]

1. To provide an efficient substitute for catalogues offered by direct marketers. Videotex provides cost advantages and some graphic enhancement possibilities.

2. Videotex is a supplement or adjunct to the printed media by providing faster and more economical means of placing orders.

Teleshopping services are also being operated as adjuncts to video cataloguing services and a variety of video-based retail operations have recently emerged in the US. Some of these include:

1. The New England Telephone Company's 1983 operation with Quazon Corp. of a pay phone computer Videotex terminal which could be used at airports. Consumers would be able to utilize telephone credit cards to access a variety of financial information on electronic messaging systems.

2. Byvideo Inc. has developed an automated merchandising system and is setting up a marketing self-service video kiosk in the US. Using touch sensitive screens, consumers are able to utilize a credit card to receive full video information concerning tentative purchases and to order products and give instructions. These will be placed in convenience stores, hotel lobbies, airports, supermarkets and a variety of other public locations.

3. Sears Department Stores have started a video interactive merchandising service and are now moving into commercial operations. They are building a series of "stores of the future" which are designed to use transactional kiosks in non-store locations in connection with their regular operations.

4. Catalogia is creating a chain of electronic catalogue centres in both the US and Japan. The system allows consumers to select and order merchandise in hundreds of printed catalogues.

5. PC Telemart Inc. is marketing and developing a data support system to distribute microcomputer software. Similarly, Compuvision, a California firm, has developed point of purchase kiosks to sell microcomputer software.

6. Cableshare's Videopress, a Canadian company, uses interactive NAPLPS as a Videotex-based system for advertising and shopping information in shopping malls. This is being operated in four Canadian malls and has recently been installed in Davenport, Iowa; San Antonio, Texas; Minneapolis, Minnesota; and at the Detroit Metropolitan Airport in Michigan. Canadian centres are Toronto, Westmount and Whiteoaks Malls in London, Ontario as well as Montreal.

The system uses microcomputers and computer-based graphics advertising continuously cycled over a television and/or touch screens. Related to these developments is a product which involves the incorporation of touch screen terminals into a local area network using coaxial cable. Designed mainly for large department stores and shopping malls, the cost of this system using ten terminals and ten video disc players is around $100,000. Shoppers can access mall directories, sales and in-store specials, compare prices, availability, and obtain new products. Another division of Cableshare, called Electronic Marketing, is planning several new applications through point of sale interactive video systems including closed circuit hotel systems, interactive systems for corporate training, home and other point of purchase installations, and automated kiosks for auto dealers.

A number of services have also emerged which utilize the cable TV networks:

7. Compuserve had one of the first trials involving computers and electronic home shopping. This was an amalgamation of Warner Amax Cable, Atari and Compuserve. Utilizing a tree structure menu, Compuserve subscribers could use Compucard's 30,000 item data base and access services by using a password code and personal ID.

8. Viewmart joined with Cox Cable in 1980 to conduct a test of home shopping and banking services. Viewmart provided two basic shopping services: one video shopping channel and a Videotex directory. In addition, "force tuning" allowed subscribers to switch back and forth between Videotex and video for additional information on product features, prices, etc. The directory was offered on a separate tier and contained listings of participating vendors, products and bargain items. One particular feature of these services was the utilization of coaxial cable instead of the public telephone network for the transmission of signals from the home terminals. The protocol was a proprietary product of Cox Cable. Cox has also joined in a venture with Chase Manhattan Bank to provide a two way interactive cable service with terminals developed by Cox and the Jerrold Division of General Instrument Corporation.

9. In Mission Viejo, California, a 200 home trial is being conducted. Canada's Infomart is supplying the software and using the Times Mirror cable system and telephone lines. Utilizing Compucard, shop at home services and shopping information have been offered.

10. Viewtron, in association with Keycom Publishers, are operating a full commercial service in southern Florida. This offers health, food and entertainment information, games, shopping as well as banking services. Currently more than 150 retailers and advertisers are signed on the the system. As well, Viewtron has recently announced that it has agreements with 18 major newspapers to establish a commercial Videotex service across America.

11. Times Mirror and Videotex America recently announced the expansion of its trial services to 20 major cities in the US. This will offer 50,000 pages of information and services including news, educational programs, home banking, electronic shopping, messaging and interactive games. In the Times Mirror Videotex service trial, four basic components of a commercially successful Videotex system were identified: Home banking, electronic shopping, interactive games and news. It was also announced that 87% of the users in the trial were not concerned about issues such as privacy when making transactions. Home banking was considered essential by 71% of the users. As well, there was considerable usage of home shopping, with 53% of the households involved in the trial placing electronic orders. However, and perhaps most importantly, it was noted that 33% of the participating households thought that it was preferable to purchase merchandise over Videotex than through a printed catalogue.[61] This organization has recently announced an agreement with more than 50 companies to provide advertising information for its Gateway service.

Other Interactive Shopping and Trial Services

In mid-1983 the Dow Jones News Service started its own on-line transactional service called Compustore, in association with Compucard. The service offers access to around 50,000 items and the Compustore data base. It is available to home users who pay $25 per year for the privilege of buying products. The agreement between Compucard and Dow Jones represents the first time the service has been gatewayed into Compuserve's computers. Dow Jones' customers, using the home shopping service, are automatically shuttled to the Compuserve facilities for teleshoppers. Separately, Compucard offers teleshopping via Compuserve, The Source and the Times Mirror Videotex test.

JC Penney, the third largest retailer in the US, announced in 1983 that it had bought the First-Hand Videotex system and the First Bank system in Minneapolis. This provides JC Penney with its own national Videotex system.

Another major development is the recent announcement by IBM, Sears and CBS to offer an electronic marketing company under the name Trintex, that will provide product

information and order-taking services to home computer owners. For Sears the venture is seen as a way to market its merchandise catalogue and other insurance, real estate and financial services electronically. Initially plans also suggest marketing of IBM computers and products through the service. A notable feature of the announcement is that the service will support all popular home computers and not just IBM computers.[62]

Smart Cards

Related to transactional services and on-line systems, there is one other technology which has emerged in the last few years and which may offer both complementary and competitive opportunities to more well known Videotex/Teletext network services. This technological development has been referred to as the Smart Card. The basic purpose of the Smart Card is to incorporate computer processing power into the card itself rather than into a terminal, thus minimizing terminal costs. In many countries such as the United Kingdom, point of sales and Videotex technologies are regarded as separate. However, the Smart Card Project, initially introduced by the French government in 1982, is trying to guarantee that terminals manufactured in France for interactive video, point of sales, yellow pages or whatever are all compatible. The idea of the French system was to have a card reader interface which can be plugged into either a Videotex terminal or point of sales terminal.

Smart Cards have the capacity to record and play back on a screen a history of its own past transactions. Savings banks in France now use Smart Cards as a way of "leap frogging" both retail banks and paper-based cheques. Retail banks in turn have realized that Smart Cards can hold all pertinent information about an owner's account. As well, it can be used for funds transfer and may render day to day banking transactions unnecessary. It is widely thought that large North American retailers, such as JC Penney and Sears, will soon offer their own Smart Cards.

Smart Cards contain microchips which give them both memory and intelligence. Each time the card is used, new transaction data can be added. The card involves personal computerized records which are portable and consequently facilitate new levels of efficiency and security.

Honeywell Inc. has recently instituted a Smart Card test in the US. This project involves the Chase Manhattan Bank of New York and the First Bank System of Minneapolis.

Tests of smart cards are being undertaken by Master Card, American Express, and American Airlines. In France the post, telegraph and telecommunications ministry (PTT) has ordered 2 million cards plus 6,000 special pay phones that will accept both bank and PTT cards. The North American market will see the emergence of these cards through established card companies such as American Express, Mastercard and Visa.

Interactive Shopping in Canada

A review of the various field trials conducted in Canada and between 1981 and 1983 revealed that the majority offered only information retrieval services to residents and the business market. In no case was a fully interactive shopping or banking service offered, although some provided limited shopping services. Retailers such as the Bay and Eatons and banks such as the Royal Bank, Bank of Montreal, Bank of BC and various credit unions and trust companies provided pages of product and service information. As well, in each of the local markets, specialty suppliers such as stereo and consumer electronics retailers were quite active in putting up sales information. Limited teleshopping services were provided only in the Pathfinder Saskatchewan Telephone trial, Project Elie in Manitoba and to a limited extent Vista in Toronto.

Of most significance at the present time is Infomart's Grassroots service operating in southern Manitoba, Saskatchewan and Ontario. In this service the Bay and the Bank of Montreal provide product and shopping information, as well as banking transaction services.

Convergence of Videotex and Personal Computers

One of the most significant trends in transactional services is for Videotex capabilities to be incorporated into personal computers. By September 1979, the British Post Office allowed a personal computer manufacturer to place modules which would allow users to access the Prestel services. In Canada and the US, Apple II users can access Dow Jones industrial averages and information services such as The Source and Compuserve. Norpak,

one of the Canadian manufacturers of Videotex terminals, has manufactured Videotex interface cards for Apple computers which enable them to function as Videotex terminals. There are other instances of Canadian firms manufacturing Videotex-compatible features for personal computers, but these often cost half as much as the personal computer itself. IBM has been rumored to be on the verge of introducing a VLSI chip to enable all PC's to be Videotex compatible, thus bringing graphics to PC's instead of dedicated terminals. Indeed this has already been accomplished by a number of Canadian companies, such as Tayson, Microstar and Limicon, who have introduced software and firmware to adapt PC's and other micros to Videotex usage. Still other developments see Digital Corp. introducing a Videotex system for their Professional 350 series of desk top computers.

The Integrated Office and Videotex

A major trend in office automation is the integration of traditionally disparate applications. An integrated office might typically include word processing, facsimile transmission, electronic filing for storage and retrieval of documents, word processing, computer-aided messaging, and communications linkages to corporate files which are located outside the company via digital satellite systems such as IBM's packet-switch business communications satellite, the SBS-1. All of the above functions might be accessible from a single TV-like terminal or workstation sitting on a desk.

Market advances for such integrated office equipment are anticipated to involve from tens to literally hundreds of billions of dollars a year within a half decade in North America.

Sales involving standalone word processors (as opposed to personal computers) dropped by 25% during 1983, but there was a 10%-15% increase in sales of "clustered word processing stations".[63] A significant portion of the word processing market will end up with microcomputers such as the IBM P.C.

Any computer manufacturer which does not incorporate the abilities to easily process both data and text is likely to be cut out of the market, and manufacturers such as AES and Wang which made computers aimed entirely at the office automation market are remarketing them as general office automation tools which can process both text and

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data. Manufacturers who made data processing packages are quickly adding text processing capabilities.

Most of the original office equipment manufacturers which have traditionally produced only one part of such office equipment are frantically attempting to extend their products. Phone companies are diversifying into computer and data processing in addition to voice, and the computer companies are diversifying into data transmission. However, the main problem thus far with integrated office equipment is that each manufacturer has been creating word processors, executive workstations, small business computer terminals and other equipment which communicates only with their own equipment. This problem is being partially alleviated with the development of local business computer networks such as Xerox's Ethernet and other types of LANS (Local area networks).

In this marketplace for integrated office equipment, Videotex NAPLPS presents a flexible software protocol which has possible applications as a complement to several services which are already well established.

Canadian Market Overview

The Canadian market for office and computer communications equipment and software is expected to grow by 30% annually. Microcomputers are one of the fastest growing segments, with 60,000 units installed in Canada by the end of 1982. One study by the Financial Post indicated 609,000 micros had been sold in North America in 1981. That study also estimated there were approximately 1.2 million micros in North American use at the end of 1982.

Growth estimates for the microcomputer sector vary but range between 30% and 75% annually. This sector, when combined with the word processing industry, accounted for 11% of revenues generated by the Canadian computer industry in 1980. The largest growth area in office automation in Canada is in word processors. The installed Canadian base was estimated at 30,000 in 1981, and in 1982 the Canadian market for word processing generated around $200-$300 million of revenue. The projected annual market growth between 1982 and 1984 was roughly 20%-30%, with more optimistic projections resulting in a $1-$2 billion Canadian market by 1986. The top suppliers for Canadian word processors comprise: AES, Micom, IBM, Wang and Xerox.

It should be noted, however, that these are dedicated word processors.

Presently there are more than 50 firms involved in marketing word processing products.

There are a number of ways of obtaining word processing, the most commonplace of which is the purchase of a standalone word processing unit. Other systems for word processing involve:

1. Time-shared word processing.
2. Shared resource systems.
3. Over-the-counter word processing.
4. Personal computers as word processors.

One of the major developments in word processing involves so-called multi-function work stations in which diverse office functions, including word processing, are accomplished on a single piece of equipment.

Communicating word processors, of course, offer another method of electronic messaging. Although presently less than 10% of the communicating word processors sold are used for this purpose, communicating word processors have a promising future. There are considerable attempts to alleviate compatibility problems through standardization of word processing equipment and via the instigation of services such as Infotex which incorporate compatibility. Yet, in spite of these advances, it requires considerable managerial effort on the part of an organization to establish intracorporate communications.

A related major development is the use of personal computers as word processors. Users who find prices of word processing equipment (typically $6,000 to $10,000) too high are turning to the comparatively inexpensive microcomputers. Microcomputers may be applied simultaneously to word processing, data processing, messaging and so forth.

Videotex Opportunities

Videotex opportunities are suggested by the following three models for the integrated office. Firstly, when a word processing application is offered, it may drive the purchase

of in-house Videotex systems which resemble the local shared resource systems being acquired for word processing presently. Secondly, personal computers with appropriate Videotex software may accomplish word processing and other integrated office functions on a standalone basis, while Videotex access via a software packet may accomplish messaging, add-on services and information retrieval. Finally, office applications may occur through external Videotex services. This may take the form of business display graphics and even remote slide presentations for meetings and promotion activities.

The reason why word processing is important from the viewpoint of Videotex suppliers is that, primarily, it is an applications area that might drive a market. This fact has implications for suppliers of in-house Videotex systems which could compete with shared resource word processing systems, and also for suppliers of Videotex terminals which could either perform word processing on a remote time-shared basis or on a standalone basis through personal computer/Videotex terminal units. Secondly, word processing will often be the leading application in either a cluster of electronic applications or in the implementation of an integrated office system. Messaging often emerges as the second most important service or feature. Each of these are compatible with the integration of a Videotex protocol. Thus, suppliers of Videotex services should position themselves as additive service suppliers which are accessed through equipment acquired solely for word processing, messaging, or file management.

Videotex and Cable

The Canadian cable industry presently enjoys a substantial subscriber base. Its present growth areas involve pay TV delivery and promotion, expansion into the US market and non-programming services.

Since cable is a "hybrid" technology, possessing characteristics of both broadcasting (with its supply of TV programming) and of a telecommunications carrier, in its early years cable was placed into a restrictive environment, limiting its role as a redistributor of TV broadcasting signals. Recently this role has widened, and cable has now established itself as a real industry and no longer is an interloper in the domains of the telephone companies and broadcasters. This industry may accordingly be expected to strongly participate in a variety of non-programming and programming services. Although there have been some

movements toward broadcasting/cable alliances, the telephone companies and cable companies are in an adversarial role.

There is presently considerable uncertainty about the regulatory status of cable with respect to non-programming services; the CRTC has indefinitely postponed a number of regulatory decisions governing cable, and within the next couple of years split jurisdictional decisions will probably occur which shift some of the responsibility for cable to the provinces. It is even possible that eventually some provinces may nationalize cable companies to serve as public utilities.

Already the Canadian cable industry has established itself as a competitor in two-way services. Major Canadian cable firms such as Rogers are active in the US market, and the industry there has gained considerable experience in tiering of services and the solicitation of advertising and in marketing new television programming services. The regulatory environment for cable in Canada is quite dissimilar to that of the US; however, the Canadian cable industry may be encouraged by US trends to instigate new information services, and the US models may provide more liberal regulatory responses towards this industry on the part of the CRTC.

The cable industry, as noted, has instigated two types of networks: networks of residential subscribers which comprises this industry's historical base and main activity, and also institutional networks which serve non-residential locations such as businesses and public agencies. Although Canadian business networks have not been significantly developed yet, these networks comprise potentially lucrative business markets for voice, data, image and facsimile transmission. New cabling is often required for such downtown networks, and two-way capabilities and other suitable business features can be included in their design. This business market has also been targetted by suppliers of local area networks.

Cable, however, offers a broadband capacity for either business or residential markets which is thousands of times larger than the capacity of the narrowband telephone lines. Such a technical specification renders cable suitable for picture quality resolution applications, such as teleshopping, and for the downloading of software, computer learning or computer games.

The Canadian residential cable networks were established many years ago for basically one-way transmission of a small number of channels to homes. Although new US systems which are being installed have over 100 channels and two-way capabilities, Canadian systems often require upgrading to instigate such two-way services. Videotron Ltd. in Montreal, for example, has been pioneering with packet-switched technology over cable TV, and cable systems in Vancouver are in the process of being upgraded to 54 channels. Within the next six years, then, cable systems in most major markets will possess capabilities which allow two-way interactive services.

Technological changes in addressable terminals will also allow content to be sent to specific subscribers, which will facilitate pay services. Point-to-point communications may be achieved in any system with two-way capabilities plus addressable terminals; e.g. any message might be sent to a subscriber "upstream" to the cable head end, and transmitted from there "downstream" to be received at a local specific address. From a technical viewpoint, then, cable is a powerful transmission medium for both Teletext and Videotex services in the home and business markets. Such addressable systems allow content to be received by specific, authorized subscribers, and addressability which is computer controlled may facilitate automatic billing systems.

New equipment has also been developed which will support cable operators in providing text channels. Such equipment might allow for locally-inputted content, remote keyboard input and external automatic feeds. Satellite data and graphic sources utilizing Teletext-type transmission may be accommodated with decoders placed at the cable head end. Several Canadian cable companies are also exploring graphic enhancements through standard text displays. Each of these developments will facilitate the role of the cable operator as a supplier of text-based information services.

A Nordicity report[64] noted that extravagant promises by franchise applicants are leading to the installation of modern two-way cable systems in the US. These investments, it is noted, will force operators to establish new services in order to obtain the highest possible revenues for subscribers to their investment. Projected revenue increases in the US per subscriber in 1982 were $200 and $517 US for 1990 (Exhibit 4.4). The Nordicity report goes on further to state that regulatory authorization of new services in Canada will motivate cable operators to make similar investments in upgrading their cable plant, and

should these new services prove to be commercially viable in the US, there will be pressure to market them in Canada. With a greater return per subscriber, services will be extended to areas of sparser population and lower density. The advent of these new services will also mean that the projected growth of new services and the extension of services in previously unserviced areas will lead to increased demand. Thus Canadian suppliers will have a potentially strong market throughout the 1980's, particularly in the area of interactive services.

EXHIBIT 4.4
Projected Revenue/US Cable Subscriber
(actual dollars)

Year	Basic	Pay Tiers	Other*	Total
1975	$ 75/subscriber	-	-	$75
1982	$108/subscriber	$96 (one tier at $8/mo.)	-	$200
1990	$144/subscriber	$288 (two tiers at $12/mo.)	$85	$517

* Other includes advertising support services, security and pay-per-view.

Source: Projections derived from discussions with a major Canadian service provider and Nordicity Group estimates.

It is anticipated that the late 1980's and early 1990's will see a significant activity by the cable industry in the provision of interactive services. This, combined with an enhanced delivery network, will enable the providing of full video with enhanced graphics using NAPLPS.

While the economic viability and market acceptance of many non-programming services have not yet been substantiated fully, it is clear that as annual revenue per subscriber rises from the average of $100 at the present time to over $300 by 1990, strong demand for cable equipment and services will be generated. Exhibits 4.5 and 4.6 reveal the tremendous growth that is expected both in one-way Teletext and two-way interactive services. Between 1985 and 1990 Teletext growth is estimated between 25,000 and 1 million subscribers. For interactive transactional two-way services, projected growth is from 67,000 subscribers in 1985 to over 270,000 in 1990. As well, PC software and downloading of games at this stage, projected only as a one-way service, have been evaluated as growing between 75,000 users in 1985 to over 750,000 in 1990. By 1985 revenues to CATV operators for PC games are expected to total about $8 million, for Teletext $1.5 million and for interactive services $8 million. By 1990 these are expected to contribute $81 million for PC games, $60 million for Teletext services and $32 million for interactive services.[65]

An examination of Exhibit 4.7 shows the relative projected growth of cable operator revenues from new services. This reveals an overall upward trend in total revenues with other services, including personal computers, Teletext, Videotex and related interactive and transaction services having the greatest growth rate in the 1986 to 1990 period.

In summary, most indicators would suggest that cable has considerably greater opportunity in the provision of Teletext and Videotex services than do the telephone companies; in providing Teletext, the cable companies have a distinct advantage of limited and full channel operation. Also, Videotex services may operate on two-way cable and packet cable, while the phone companies may operate Videotex services on local telephone loops or packet-switched networks. Although, as of this writing, the telephone companies have a greater penetration and certainly more capability for Videotex services, such a competitive advantage may soon be eroded in Canada.

EXHIBIT 4.5

Projected Cable Revenues

	Current (May 83)		1985		1990	
	Gross Revenues	Revenues to CATV Operators	Gross Revenues	Revenues to CATV Operators	Gross Revenues	Revenues to CATV Operators
			($000,000)			
Basic subs @ $8.00/mo. current, $8.90 in 1985, and $9.75 in 1990	513.1	513.1	619.4	619.4	807.3	807.3
Pay-TV @ $15.95/mo. retail and $9/mo. wholesale, assuming 10% multipay	84.2	35.0	379.0	157.7	581.1	240.0
Tiered services/PPV $5 for tier 90% to CATV and $10 for PPV 50% to CATV	-	-	121.5	77.0	294.8	186.7
PC's/games @ $18/sub./mo. retail and $9/mo. wholesale	-	-	16.2	8.1	162.0	81.0
Teletext @ $10/mo. retail and $5/mo. wholesale	-	-	3.0	1.5	120.0	60.0
Security/Telemetry @ 18/mo. retail, all returned to CATV	1.1	1.1	4.1	4.1	59.0	59.0
Interactive/Transactional @ $15/mo. retail and $10/mo. wholesale	-	-	12.1	8.0	48.6	32.4
Institutional services	-	-	2.0	2.0	50.0	50.0
Total Revenues	598.4	549.2	1,157.3	887.4	2,122.4	1,516.4
Revenue/sub./annum	112.0		199.4		307.7	
Revenue/sub./mo.	9.3		16.6		125.6	

Source: Nordicity Group projections.

EXHIBIT 4.6

Subscriber Projections

	Current (Mid-1983)	1985	1990
		(000)	
Basic Services			
Basic cable subs.	5,345	5,800	6,900
20 plus channel subs.	3,200	3,900	5,200
Subs with converters.	2,100	2,400	4,400
New Television Services			
Pay-TV households	400	1,800	2,760
Addressable scrambling systems	124 (41%)	900 (50%)	1,820 (65%)
Non addressable scrambling systems	266 (59%)	900 (50%)	980 (35%)
Tiered service and pay-per-view households	-	675 (75% of address-able)	1,638 (90% of address-able)
Non-programming Services			
PC software/games (one-way)	-	75	750
Teletext (one-way)	-	25	1,000
Security/telemetry (two-way)	5	19 (7.5% of two-way)	75 (7.5% of two-way)
Interactive/transactional (two-way)	-	67 (7.5% of address-able)	273 (15% of address-able)
Institutional Services	minimal	some applications	some market penetration of data/ video networks in in major urban areas

Source: Estimates prepared by Nordicity Group Ltd.

EXHIBIT 4.7

Projected Cable Operator Revenues from New Services
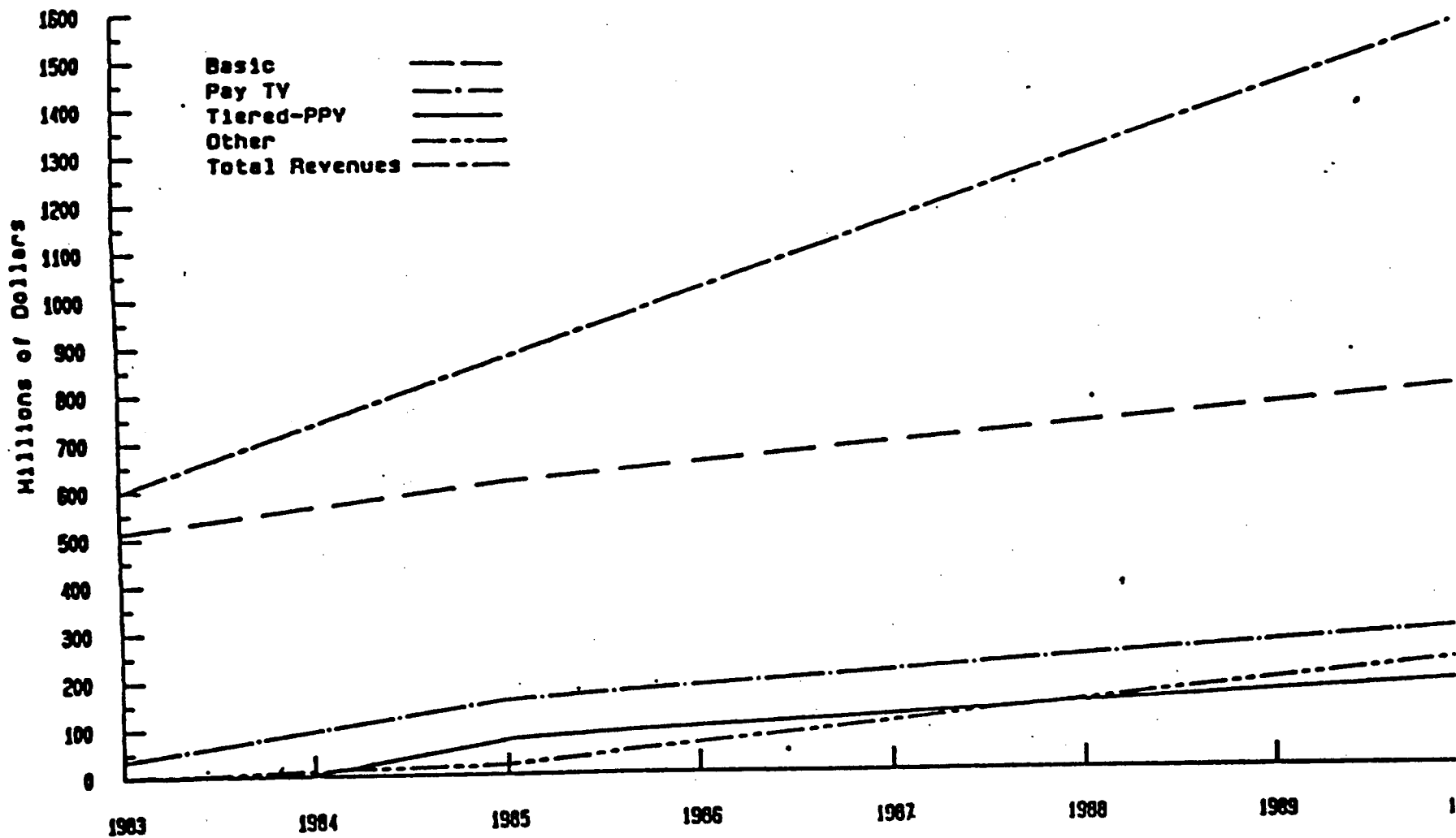
Note: Other services include personal computers, games, Teletext and Video-tex, security and telemetry, and interactive and transactional services.

Source: Nordicity Group projections.

Computer Learning and Videotex

This section focuses on computer learning as a specialized form of interactive information retrieval. It examines the implications of Videotex for formal education, the independent instruction market and the industrial training market.

Education has provided a nurturing marketplace for computer learning, establishing an R&D base in universities and facilitating a lean but sustained use through weak early years of computer learning.

Annual education spending in Canada comprises approximately 8% of the gross national product, with more than $28 billion spent on education in 1982. Approximately two-thirds of this amount went to elementary and secondary schools, with $7 billion being spent on college and universities.

School Personal Computers

By the middle of 1982 there were more than 10,000 personal computers in Canadian schools, which represented a total hardware investment of more than $20 million. Most of these purchases have been made during the last few years. As Exhibit 4.8 shows, the total number of personal computer units increased at rates of between 30%-115% in a single six-month period across Canada.

A recent US survey found computer learning in over 50% of all US educational institutions. Such an increase was due predominantly to a diffusion of personal computers. Another study predicts the use of personal computers in more than 95% of US schools within five years.[66] A third study has predicted that the personal computer school market will exceed 250,000 by 1985, and by that time a total of 1 million units will be in place.[67]

EXHIBIT 4.8

Education Statistics
(Elementary/Secondary and Post-Secondary)

Province	Elementary/Secondary					Post-Secondary				
	No. of Schools	Enroll-ment	No. of Micro-computers (estimate)*	Ratio: Students/ Micros·	% Growth In Six Month Period	No. of Colleges & Insti-tutes	Enroll-ment Full Time***	No. of Uni-versities	Enrollments Full Time	Part Time
B.C.	1,890	537,000	1,050	500/1	75	19	18,160	6	31,890	15,430
Alberta	1,465	451,000	1,000	450/1	33	18	18,080	5	31,500	13,630
Saskatchewan	1,050	210,000	600	350/1	115	3	2,440	3	14,740	9,040
Manitoba	825	217,400	500	450/1	na	8	3,630	7	16,590	11,860
Ontario	5,020	1,882,700	5,500	350/1	30	30	81,400	21	161,800	89,800
Quebec	2,840	1,189,300	250	4,700/1	na	83	133,600	7	91,700	100,700
New Brunswick	487	151,700	300	500/1	na	9	2,000	4	11,520	4,100
Nova Scotia	614	184,200	500	375/1	43	14	3,000	10	18,570	6,280
P.E.I.	74	26,400	100**	265/1	200	2	780	1	1,300	700
Newfoundland	661	146,000	50	3,000/1	na	6	2,330	1	7,420	3,680
Total	15,027	5,017,300	9,850			192	265,420	65	387,030	255,720

* March 1982, Fischer, Linda and Brown, F., "Science Education and Computers In Canadian Schools", a report prepared for a Science Council Workshop (Toronto: EHL Research and Evaluation Group, March 1982).

** Ministere de l'education du Quebec, 1982.
*** Part-time enrollment figures not available.

Other Sources: Statistics Canada Catalogue 81-220, Advance Statistics in Education 1981-82, Tables 1, 3, 7 and 8. 1980-1982 figures.

Unfortunately most marketing information available concerning computer learning in schools pertains to hardware sales and not software, for which there is little data available. However, it is known that software costs now average around $375 per personal computer as compared to average hardware costs of $1,600 (US).[68] Also, the proportion of hardware to software costs has been steadily rising, since hardware costs are rapidly falling. Most educational package software is of poor quality, and there is a real demand for package software by teachers who have personal computers but don't want to write their own programs.

Within computer learning, the personal computer has become essentially a vehicle for content, and software for computer learning is now a main part of the educational computing market. Major purchase decisions are now swayed by the availability of tolerable software for a specific personal computer, and contents suppliers face severe problems including the facility with which teachers may copy diskettes and the incompatibilities which sever the market. The school market for computer learning in Canada, then, is not extremely attractive in spite of this rapid diffusion of personal computers.

Applicability of Telidon

Videotex and Teletext might be used to deliver pages for computer learning for virtually any application, and there have been a number of Canadian experiments using Telidon in education. The Ontario Educational Communications Authority, for example, in co-operation with the Department of Communications, initiated the Telidon in Education Project in 1979.

Related early work has also examined the incorporation of Telidon into existing computer learning systems. At the most basic level, Telidon has been used as a delivery mechanism for computer learning. However, Telidon terminals will have to be extremely cheap to gain any significant degree of penetration. Other linkages between Telidon and computer learning -- e.g. involving the use of an entire Videotex network as an on-line delivery mechanism for computer learning, or the downloading of Videotex software for local execution -- have yet to be explored.[69]

A major problem here, however, involves the fact that any computer learning program is usually much more complex than the majority of present Videotex applications.

Also, the menu approach in Telidon is particularly limiting, and most Telidon units do not have keyboards which allow any degree of flexibility in student responses.

Although Videotex might provide a widespread distribution network for computer learning material, its educational uses remain uncertain. Although Videotex was initially conceived of as a mass market product, the nascent computer learning industry has already restrategized its marketing focus to the area of private in-house systems within large business organizations.

Teletext, in the meantime, is more technically limited than Videotex -- with the size of a Teletext database being restricted to about 200 pages using the vertical blanking interval in a television signal or about 4,000 pages using a full channel on cable. Also, Teletext has been essentially oriented toward television technology, using a TV for display plus a keypad without alphanumeric characters for input. However, the 4,000 pages available on any cable channel could certainly allow a substantial program, and hybrid systems may combine one-way Teletext with phone connections back to a central computer.

In summary, despite an intense Canadian policy interest in their development, both Videotex and Teletext as a content delivery means apparently offers little now to the mass market for computer learning. Software downloading appears more promising, and downloading could be accomplished through either Videotex or Teletext. Also, Videotex terminals have been developed with some processing capability (similarly for a number of in-house Videotex systems), and both of these are more in accord with trends in computer learning than the notion of the network connection to a distant content source. The use of Telidon in computer learning may occur in response to future market needs, but the precise nature of this use can be neither easily predicted nor imposed. An overview of some of the more probable educational opportunities for Videotex is provided in Exhibit 4.9.

EXHIBIT 4.9

The Education and Training Market and Videotex

Application	1) Market Size/Type	2) Competitive Technology	3) Opportunities	4) Threats
1. Education - Formal in School	Large in the elementary schools, Medium in college and university	Microcomputers, Computer learning software and and courseware, Knowledge networks	Distance education, Linkage to micro's, Development of unique education programs, A clearing house function serving a variety of institutions	Lack of courseware, Micro software, Financial constraints, Expensive production
2. Education - Informal Self Taught	Residence market, Long term quite large, Aging population using re-education extensively	Existing part-time services, Micros, Extension courses, TV, Radio, Cassettes, Discs	Linkage with existing technology, Hybrid systems, Delivery mechanism	Growth of broadcast cable, Micro software, Video discs and machines, Transmission costs
3. Industry Training	Large corporations of all types, Sales force training, Retail organizations	Standalone systems, Existing computer services, Cable casting, Traditional training packages	Generic courseware sales to corporations, Training through industry associations and trade unions, Home training, Language training	Lack of investment in training, Need very specific courseware, High expense for development
4. Independent Instruction	Short term minor home market, Medium and long term large home market with high potential for use	Microcomputers, Video discs, Print and hobbyist trends, TV, Radio	Linkage through micros, TV, FM radio, Growing demand for instructional courseware, Courseware sharing, Locally produced material	Telecommunication costs, Access ports availability, Telidon Videotex terminals

NAPLPS Software

This section examines NAPLPS software, one of the most important of the market developments which are likely to have major impacts on the way Videotex and Teletext evolve within all of the application areas outlined in the previous sections. A wide variety of microcomputer-based software and hardware products using the NAPLPS standard are now on the market, and the software industry is showing a significant amount of confidence in the growth and potential for Videotex services.

Telidon NAPLPS decoding software packages are available for a number of widely available personal computers including the Commodore 64, Apple II, IBM PC and other compatible machines. Exhibits 4.10 and 4.11 provide a detailed list of the features for the decoder packages.

A number of microcomputer-based NAPLPS page creation and data base systems are also available. Software packages for NAPLPS page creation using microcomputers are being produced by Cableshare, Tayson, Limicon, Formic, Asyne, Microtaur and TV Ontario, as outlined in Exhibit 4.12. These systems require the use of an NAPLPS decoder for display of the pages on a monitor. Chang has also reported on the availability of microcomputer-based mini data base systems. These are presented in Exhibit 4.13. These, he noted, open up the possibilty of developing medium or large scale Videotex systems without using a mainframe data base computer. Such systems are particularly suited for public access or local area network oriented applications.

The technical developments documented by Chang[70] for the Canadian Department of Communications emphasize the convergent trend of technologies in the Videotex industry. Standalone terminals are becoming more sophisticated while microcomputers can now emulate Videotex decoders, page creation services and even be linked in a data base system.

Microcomputers now can be used to receive and provide various Videotex services through the use of software and firmware. Microcomputers, office work stations, etc., offering full functional Videotex services, can be considered as attractive complements to the first generation Videotex service offerings.

EXHIBIT 4.10
Microcomputer-Based Telidon/NAPLPS Decoders

Company	Base Micro-Computer	Memory Required	Operating System	Language	Display Resolution	Simulta-neous Colors	Extra Hardware Required	Remarks
AVCOR	Commodore 64	64K	C64 Kernal	Assembly	320 x 200	2/ch.cell 16 palette	No	Cartridge based
ASHORE	Commodore 64	64K	C64 Kernal 3.2 or 3.3	C and Basic	320 x 200	8 colours or 8 grays	No	
	Apple II, II+, IIe	48K	Apple DOS	C and Basic	180 x 140	6 colours or 8 grays	No	
NORPAK/APPLE	Apple II, II+, IIe	48K	DOS 3.3	Pascal	128 x 96	15	Telidon interface card	
MICROTAURE	IBM PC,XT	128K	PC DOS	Machine	256 x 200	16/512	Real Colour colour card	Features inc. downloading, slide show printing
MICROSTAR	IBM PC,XT	192K	PC DOS	Basic & Assembly	320 x 200	16	Plantronics colour card	Also available for Hyperion, Compaq, Columbia, etc.
FEN	IBM PC,XT,PCjr	128K	PC DOS 1.1 or 2.1	Forth	320 x 200	16	Techmar or Plantronics colour card	
MICROPDOEL	IBM PC,XT	NIL	PC DOS 2.0	Machine	256 x 200 x4 planes	16 out of 16 million	EUT 100-based Board	Full SRM 16K Telesoftware, 8K Macro Composite video output
MANITOBA TELEPHONE SYSTEM	Commodore 64	64K	C64 Kernal	Machine	160 x 200	13 + 3	No	3 out of 13 colours and 3 gray scales per ch. cell
FORMIC	Apple IIe	64K	DOS 3.3	Machine	256 x 190	16	Taxan card	Also requires a 64K, 80 col. card

Source: Chang, 1984.

EXHIBIT 4.11

Features of Microcomputer-Based Telidon/NAPLPS Decoders

A. SRM FUNCTIONS		AVCOR	ASH-DONE	NORPAK APPLE	MICRO-TAURE	MICRO-STAR	FEN	MICRO-PIXEL	M.T.S.	FORMIC
CHARACTER SET	Primary	F	F	F	F	F	F	F	F	F
	Suppl.	N	N	P	F	F	F	F	P	N
PDI's	Basic	F	F	F	F	F	F	F	F	F
	Inc.	P	F	N	F	P	F	F	N	F
PDI ATTRIBUTES	Domain	P	P	P	F	F	F	F	P	F
	Text	P	P	P	F	F	P	F	P	P
	Texture	P	F	P	F	P	P	F	P	P
	Colour	P	P	P	F	P	P	F	P	P
	Blink	P	N	P	P	N	N	F	N	N
	Wait	F	F	F	F	F	F	F	F	F
	Reset	F	F	F	F	F	F	F	F	F
MOSAIC		N	N	N	N	N	N	F	N	N
MACRO		N	N	N	F	F	F	F	N	F
DRCS		N	N	N	F	N	N	F	N	F
C0 CONTROL SET		F	F	F	F	F	F	F	F	F
C1 CONTROL SET		P	P	P	P	P	P	F	P	P
B. ADDITIONAL FEATURES		1,3 4,5	1,2 4	1	1,2 3,4	1,2, 3,4,5	1,2	1,3	1,4 5	1,2

Legend:

F: Fully Implemented
P: Partially Implemented
N: Not or Not-Yet Implemented

1: Communications Module
2: Slide Show Module
3: Downloading
4: Printing
5: ASCII Emulation

Source: Chang, 1984.

EXHIBIT 4.12

Microcomputer-Based Page Creation Systems

Company	Base Micro-Computer	Memory Required	Operating System	Language	Display Resolution	Extra Hardware Required	Remarks
CABLESHARE Picture Painter	IBM PC, XT DEC Rainbow	128K 256K	PC-DOS CP/M 86/80	C C and Basic	256 x 200 256 x 200	NAPLPS Decoder, Graphics Tablet	16 text fonts; XFER software ava. for direct transfer to database
TATSON Vast	IBM PC, XT	128K	CP/M MS-DOS	C and Basic	256 x 200	NAPLPS Decoder, Dual Drive or Hard Disk	
LINICON Prodrav	Sony SMC-70	64K	CP/M	C	256 x 200	NAPLPS Decoder, Graphics Tablet	File transfer pkg an cycle software available as extra
FORMIC	Apple II	48K	DOS 3.3	Machine	256 x 200	NAPLPS Decoder Formic (ROM) Card	Communications pkg. available
ASTRC Videographic System	Apple II IBM PC,XT	64K 128K	P. System UCSD P. System UCSD	Pascal Pascal	256 x 200 256 x 200	NAPLPS Decoder NAPLPS Decoder, QuickKpel card	NAPLPS to NTSC interface available Scrip for file manag ment
TV ONTARIO Createx C	IBM PC,XT	128K	MS-DOS	C	256 x 200	NAPLPS Decoder, Quickpel card	Features inc. Page compression, Auto-sh ding, cont. scaling.
NORPAK/ APPLE Telidon Graphic System	Apple II	48K	DOS 3.3	Pascal	128 x 96	Telidon Interface card	Not yet NAPLPS compatible
MICROTAURE M.P.C.	IBM PC, XT	256K	PC-DOS	Assembly & C	256 x 200	1 extra screen	Built-in Software Decoder, SCRIBE ava. for DRCS creation.

Source: Chang 1984

EXHIBIT 4.13
Microcomputer-Based Host Database Systems

Company (System)	Base Micro-Computer	Memory Required	Operating System	Language	I/O Ports Supported	Extra Hardware Required	Remarks
ALPHATEL Telidon Service Software	IBM PC,XT	256K	QNX	C	8	Hard Disk 8-port board	Action pages key feature
GENESYS CVS/PRO V1.0	DEC PRO-350	256K or 512K	P/DOS V1.7	Fortran/ Assembly	1 (local Database & Terminal)	Hard Disk Ext-Bit-Map Board	Has built-in software decoder
PDI	Spectrix NCR Tower 1632	256K to 750K	UNIX	C	24-Spectrix 16-NCR	No	Runs on any UNIX machine; protocol independent; handle both session layer prot.
TAYSON VAST	IBM PC,XT	128K	MS-DOS	Basic and C	8 (local Database & Terminal)	Decoder	Can be served by a central database with a super micro
FORMIC	APPLE II	48K	DOS 3.3	Machine	10	Formic ROM Card Floppy or Hard Disk	
CABLESHARE MICROTEX	IBM PC,XT	128K	CP/M (8085 A)	C	2	Floppy or Hard Disk	Interactive Touch Sensitive screen ava.

Source: Chang, 1984.

Dedicated Videotex terminals are also becoming more and more powerful since they use the same microprocessors as those found in any microcomputer and combine these with high resolution colour display. With expanded memory and the addition of appropriate operating systems and peripherals such as disc drives, the new and future Videotex terminals can be modified and enhanced to serve as personal computers. These developments open up a number of new opportunities for Videotex, mainly in the established and growing market of microcomputer users.

Price reductions are also likely to occur with the mass production of these systems. Software packages are easy to transport and the same terminal can therefore be used for page creation or serve as a mini data base. A printer or plotter can also be attached to provide hard copy output. Upgrading can be accomplished through software and hardware enhancements, while software program downloading can also be implemented.

Summary

This chapter has emphasized and substantiated the need to provide a Videotex service which is bundled into other technologies as software or chipboards, is quick in response time, and simple in use. The configurations presented in the initial field trial phase left many users disappointed. Movement away from the advertising and marketing functions of Videotex is necessary if its perception is to shift from "an electronic catalogue" to a multi-functional software protocol which may be incorporated into a wide variety of existing business technologies.

Market forecasts to predict the degree of penetration of the mass market by Videotex have been wildly divergent. However, there is now a general consensus that:

1. If Videotex does penetrate a mass market, it will be at least a decade before this public mass market takes off.

2. Over the next half decade, the main market for Videotex will lie in business, industrial/commercial applications and in transactional services.

3. There is a definite need in Canada to develop interactive services for electronic in-house banking and in-home shopping.

40. Keith, David A., "Canada Must Seize Chance to Supply Business Services," CIPS Review, November/December 1982, p.14.

41. Cooney, John E., "With Video Shopping Services, Goods You See on the Screen can be Delivered to Your Door," Wall Street Journal, July 14, 1981, Cited in Tydeman et al., 1982.

42. International Resource Development Inc., "Financial Information Services," 1983, p.3.

43. Speech to the New York Banking Associated, cited in Teleservices Report, November 1982.

44. Wescom estimate.

45. "Bank of Montreal Plans to Join US ATM Network Complicates Picture," Globe and Mail, September 1984.

46. Citibank (private) Study, 1982.

47. "Pace III", Private study commissioned by the Bank Marketing Association, Chicago, 1983.

48. Wescom phone survey.

49. Dataplus, op. cit.

50. Phone interview, Merrill Lynch, Toronto.

51. Tydeman et al., "Teletext and Videotex in the US," McGraw-Hill, New York, 1982, p.239.

52. US Bureau of the Census, 1980.

53. Videoprint, Vol. 3, No. 24, December 22, 1982, p.6.

54. The New York Times, Tuesday, March 29, 1983, p.D2.

55. Viewtext, April 1983, p.5.

56. Teleservices Report, November 1982, p.7.

57. International Videotex/Teletext News, April 1983.

58. The Yankee Group.

59. Stothers, Videotex Canada, Fall 1983, Vol. 2, No. 2, p.8.

60. Stothers, Videotex Canada, Fall 1983, p.24.

61. International Videotex/Teletext News, April 1983, p.6.

62. Videotex News, April/May 1984, Vol. 1, No. 2, Infomart, Toronto.

63. Wescom report, private client study, 1982.

64. Nordicity report for the Economic and Marketing Division, Department of Communications, Suppliers of Equipment and Services to the Canadian Television Industry in Canada, October 1983.

65. Nordicity, 1983, p.10.

66. Nordicity, 1983, pp.17-19.

67. Creative Strategies International, Cited in Greg Kearsley and Beverly Hunter, "Electronic Education," (in prep., 1982).

68. Financial Post, February 27, 1982.

69. Brayham, J.W. and D. Godfrey, "A Marriage of Convenience: Videotex and Computer-Aided Learning," Computers and Education, Vol. 6, 1982.

70. Chang, op. cit.

CHAPTER 5
Behavioural Research on Telidon[*]

Behavioural research began in the early days of Telidon development in an attempt to assist designers of the technical and content aspects of the Telidon system to make them effective for users. Behavioural research addressed the dialogue between user and technology by studying information retrieval and the use of graphics on Telidon. It addressed the physical interface between user and technology by studying the design of visual displays and data input methods, and it addressed effective design of content by developing a method for assessment of Videotex pages.

These behavioural research studies bring together ideas from many social science disciplines toward finding solutions to Telidon design that are optimal for users. The results of these studies are not the final word on Videotex design, but they provide much helpful advice for designers as well as pointing out what questions remain to be investigated.

Information Search and Retrieval

Information search and retrieval is one of the most important aspects of user dialogue with Videotex. Whether the user can find information quickly and easily is probably basic to satisfaction with the system and to whether use will continue. The user must know the language of interaction with the machine in order to search efficiently. There are many such languages, called query languages by computer and library scientists, for interacting with computers. In the initial stages of Telidon Videotex development, only one query language was used, a hierarchical or menu based index where users chose an item from a menu which brought up the next menu. The next phase of development brought the potential for keyword indexes where users type a keyword to retrieve information. Videotex seldom used a complete keyword system but combined it with the menu-based index so that users who typed a keyword would then receive a menu at a lower level of the menu hierarchy and continue the search using the menu.

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[*] This chapter was authored by D.A. Phillips, Director, Behavioural Research, Dept. of Communications, Ottawa.

Some idea of what issues concerned users was provided in the work of library and information scientists (a bibliography of relevant work was prepared by Kozak[71]), but little help in creating Videotex indexes was to be found there. Classification schemes such as the Dewey Decimal system, Library of Congress Classification and the Universal Decimal Classification were explored for relevance. While these could prove useful for finding terms for Videotex, they were designed to order library material which covered all knowledge, whereas Videotex data bases covered a much more restricted domain. Various thesauri and indexes too were explored. The UNESCO Thesaurus, the New York Times Information Bank Thesaurus, the Canadian Newspaper Index and others cover a broad range of topics. Thesauri and indexes, like classifications, can be a source of terms but are unlikely to cover the same topics as a Videotex data base, and in fact were found to have too few levels to be directly useful for Videotex.

Number of Alternatives on an Index Page

Behavioural research examined several questions about how to design retrieval systems so that users could find information easily and quickly on Telidon Videotex and Teletext data bases. One of the first questions was how many alternatives to display on a menu index page for Telidon Videotex or Teletext. A mathematical model was designed[72] to predict the optimum number of alternatives per menu page for each of Videotex and telextext. Assuming that total search time would be inversely correlated with satisfaction, Lee reasoned that increasing the number of alternatives displayed on each page would decrease the number of index pages that must be accessed to reach a target document. However, increasing the alternatives on each page would increase the time required for reading each page. The model of total search time thus included a) time to read the alternatives on each page, b) time to locate and press the required keys and c) time for the computer to respond. Using a range of variation in reading speed and system response time, the mathematical analysis yielded the following results: for Videotex (using telephone for contact with the computer), the optimum number of alternatives on an index page is less than 10 for a wide range of possible conditions. In most conditions 4-8 alternatives on a page was optimal. Less than 2 alternatives leads to very long search times predicted by the model.

For broadcast Telidon (Teletext) using the vertical blanking and and, assuming a small number of pages in the total data base (about 100), 7-13 alternatives are possible and more than 10 is best. For larger bases of 300 pages, 15-20 alternatives are possible. Using 2-3 alternatives on a page would lead to much longer search times. For full channel transmission broadcast Videotex, 6-10 alternatives is optimal. Too few or too many alternatives on a page could lead to excessively long search times[73].

The Human Factors of Query Languages

To further explore how to design retrieval systems to make them easy for users, a study of the design of currently available query languages was conducted, focusing on how well they match human requirements for querying. Lochovsky and Tsichritzis[74] proposed that the query process by which a user asks questions of a data base, should be considered in three parts: 1) request or forming of the question by the user, 2) reply or computer response to the user's actions and 3) dynamics or the speed and other processes of the interaction. By dividing the query process this way, it is possible to study each part separately and to identify the characteristics that suit users best. Lochovsky and Tsichritzis identified characteristics within each of the three parts of the query process that serve as measure of acceptability to users. The 16 characteristics are defined in Exhibit 5.1. The authors then rated the seven types of query languages (defined in Exhibit 5.2 on the characteristics as shown in Exhibit 5.3.

In designing a query language it may not be possible to meet all of the criteria outlined in Exhibit 5.1. Some requirements conflict with each other, for example, if many protocols or means of interacting are supplied, then simplicity and a small number of commands may have to be sacrificed.

According to the rating of the 7 types of query languages[75] the top ranking is multi-media language which uses many different ways of interacting with the system. Requests can be formulated by pointing, by typing statements, by selecting from menus, by specifying keywords and in other ways. Because of this flexibility, there is some danger of selecting irrelevant data or not finding data that is there. Replies to requests can be in text, graphics, pictures and other modes. The user has control over how and at what rate the reply is displayed. Dynamics of the interaction are excellent from the user's viewpoint except that the amount of different technology used may result in slow response times from the system. An example cited by the authors is the spatial data management system developed at MIT and CCA in Boston[76].

EXHIBIT 5.1

CRITERIA FOR JUDGING ACCEPTABILITY OF QUERY LANGUAGES TO USERS
(Adapted from Lochovsky & Tsichritzis, 1982)

Name	Definition	Positive rating	Negative rating
Request			
Keystrokes	Number of characters to be typed	Minimized	Many keystrokes required
Commands	Number of commands available to user	Small number and simple	Large number and complex
Formulation	Can the user make a mistake in formulating a request in spelling or punctuation or in language.	Difficult or impossible to make mistakes	Easy to make mistakes
Selectivity	Can the user specify precisely what is wanted?	User gets only required data	Irrelevant output returned
Uniformity	Can the query language be used for many data bases structured differently and for many applications.	Uniform for many data bases and applications	Not uniform
Customizing	Are the form of query language and the application matched	Well matched	Not matched
Reply			
Presentation	Complexity or simplicity of presentation	User understands information quickly	User takes time to understand
Multi-Media Presentation	Can the user direct the output to any of several media: paper, spoken, text and graphics, animation	More than one medium available	Only one medium available
Customizing	Is the reply form determined by environmental factors such as type of information presented, level of user, time of day.	Form of presentation can customized	Reply presentation is fixed
Dynamic Control	Can the user control the pace of reply presentation	User can control speed and form of presentation	User has no control
Reusability	Can the reply be saved for later use?	Reply can be saved and used as input or for other processing	No saving possible

EXHIBIT 5.1 (Continued)

Dynamics

Bandwidth	Can the user and the system interact quickly?	User input is easy and output is quick	User input takes time and output is slow
Gamesmanship	Is the interaction interesting for the user?	Level of difficulty is optimal and user enjoys it.	Level of difficulty is too high or too low
Protocol	Can the user specify the protocol (means of interacting with the system)	User can specify protocol for different tasks	Interaction means are fixed
Responsiveness	Does the system response time match the user's expectations in each task?	Difficulty in formulating a request is correlated with length of response	No relation between difficulty in formulating a request and length of response
Control	Does the user feel in control?	User feels in control	User feels machine is directing the process.

EXHIBIT 5.2

Rating of Query Language Types According to Criteria Developed by Lochovsky and Tsichritzis (1982)

(Adapted from Lochovsky and Tsichritzis, 1982)

	Keyword	By Example	Natural Language	Menu	Graphic	Multi-Media	Computer Games
Request							
Keystrokes	−	+	−	+	−	+	−
Commands	−	+	−	+	+	+	+
Formulation	−	+	−	+	+	−	+
Selectivity	+	+	−	+	+	+	+
Uniformity	−	+	+	+	+	+	−
Customizing	+	−	+	+	+	+	+
Reply							
Presentation	+	+	−	+	+	+	+
Multi-Media Presentation	−	−	+	−	−	+	+
Customizing	−	−	+	+	−	+	+
Dynamic Control	−	−	+	+	−	+	+
Reusability	+	+	−	+	+	+	−
Dynamics							
Bandwidth	−	−	−	+	−	+	+
Gamesmanship	−	+	+	+	+	+	+
Protocol	−	−	+	+	−	+	+
Responsiveness	−	−	+	−	−	−	+
Control	−	−	+	−	−	+	+
Total Positive	4	8	9	13	8	14	13

Both menu based and computer games query languages rank next highest according to the rating scheme. Menu based languages are particularly easy for users to formulate requests. Computer games languages are enjoyable and score high on dynamics. Natural language query systems, often thought to be ideal, fall short by this rating partly because they depend on the user having a clear idea of what to look for and how to formulate a request, and there are many ways to do that badly.

Improving Menu Index Search Systems

The menu or hierarchical query language was the first one used by Telidon Videotex and the most common in Videotex systems although keyword and keyword-menu hybrid systems are also in use. When Telidon Videotex first developed, behavioural research was conducted to investigate whether users could find information easily in the menu system. The initial study was conducted using experimental Videotex data base index then developed for demonstration within the Department of Communications[77]. The data base contained 900 items. Sixteen of these were randomly chosen as information that would be the goal of search. People acting as information searchers chose menu items from successive menus presented on cards. Each time the searcher chose the wrong item, the choice was made again until the choice was correct. An error was defined as the searcher making a choice that would not lead most directly to the information. The results indicated that the participants made a total of 167 errors on 790 menu pages, an error rate of 14%. They made errors on 50% of search problems, 53% of these errors occurred on the top 2 levels of the 5 level hierarchy.

When searchers chose the wrong item it was considered an indication of poor index design. There seemed to be two kinds of index problems that caused errors: 1) classification errors in which information appeared in the data base under the wrong category, for example, some business information appeared under General Interest where the searchers did not expect it, and 2) labelling errors in which an inappropriate term was used to label a category of information, for example, the term "Market Place" was used but searchers would have understood if "Shopping" had replaced it.

With this evidence that there are some problems in building indexes for Videotex that will suit the needs of general audience, research continued to find means of improving them.

First, people from the general public reclassified or renamed those parts of the original menu index where problems had occurred. Testing the index again in this modified index showed a 40% reduction in the number of errors[78]. One principle of improving indexes was thus defined. When classification errors were deliberately introduced into the data base, it was almost impossible for searchers to find information which did exist in the data base[79]. When labelling errors were introduced into the data base, error rates were 45%, a substantial jump over the 14% without labelling errors as reported above.

The root or top page of the menu hierarchy was found to create most errors (22%)[80]. The top page is used frequently by everyone. It is also the most general level of labelling and thus prone to classification or labelling errors. A method of testing the first page is described in Exhibit 5.3. Adding descriptors to menu items on the first page resulted in reduced error rate and users preferred the descriptors to pages without them[81].
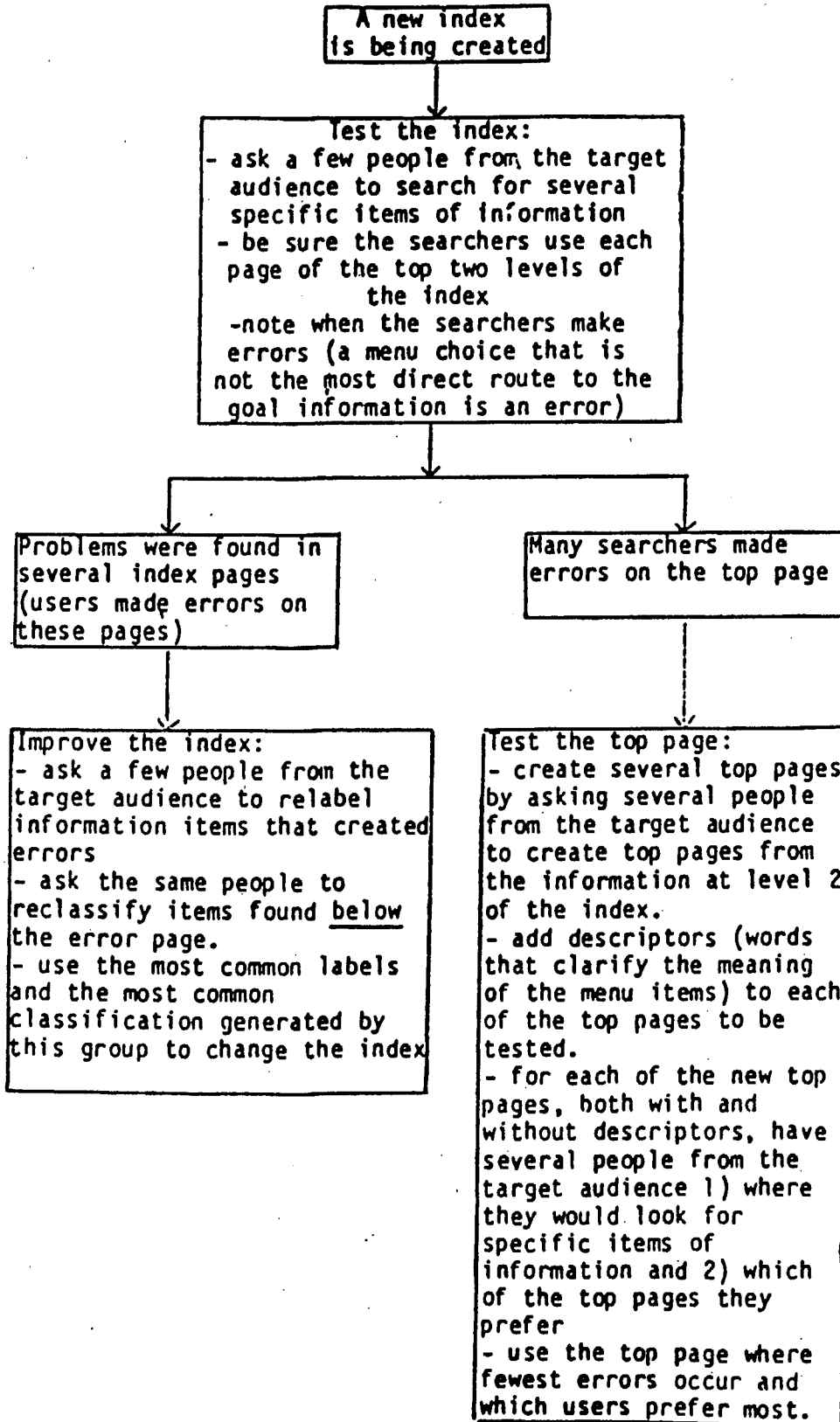
Exhibit 5.3 describes a set of procedures for improving all indexes based on the evidence gathered in these studies. Simple tests can be made by data base designers by asking a small number of persons from the expected target audience to try to find specific information in the data base. Where the searchers make errors, a different group can be asked to reclassify and relabel. If a data base designer tests at least the top 2 levels of the tree index with this strategy, the data base should prove to be easy for users to find information quickly.

Keyword-menu Hybrid Search Systems

Keyword-menu hybrid search systems which have been designed for Videotex present a different set of behavioural issues. In the keyword-menu hybrid, typing in a keyword puts the searcher at some level of the menu index and searching by menu can continue from there. A study in which searchers used keywords to enter into a menu index for a directed search, indicated that searchers were at least as successful in finding information as those using the menu only, that the keyword-menu hybrid users retrieved fewer pages in finding the information and that searchers tended to use keywords that occurred at level 3 or 4 of the menu, thus entering at the third or fourth level of a 7 level hierarchy[82]. This latter

EXHIBIT 5.3

TESTING A MENU INDEX

```
              ┌─────────────────┐
              │ A new index     │
              │ is being created│
              └────────┬────────┘
                       │
                       ▼
    ┌──────────────────────────────────────┐
    │        Test the index:               │
    │ - ask a few people from the target   │
    │   audience to search for several     │
    │   specific items of information      │
    │ - be sure the searchers use each     │
    │   page of the top two levels of      │
    │              the index               │
    │  -note when the searchers make       │
    │  errors (a menu choice that is       │
    │ not the most direct route to the     │
    │  goal information is an error)       │
    └──────────────────────────────────────┘
```

```
┌────────────────────────┐          ┌─────────────────────────┐
│Problems were found in  │          │Many searchers made      │
│several index pages     │          │errors on the top page   │
│(users made errors on   │          │                         │
│these pages)            │          └─────────────────────────┘
└────────────────────────┘
```

```
┌─────────────────────────────┐   ┌──────────────────────────────┐
│Improve the index:           │   │Test the top page:            │
│- ask a few people from the  │   │- create several top pages    │
│target audience to relabel   │   │by asking several people      │
│information items that created│  │from the target audience      │
│errors                       │   │to create top pages from      │
│- ask the same people to     │   │the information at level 2    │
│reclassify items found below │   │of the index.                 │
│the error page.              │   │- add descriptors (words      │
│- use the most common labels │   │that clarify the meaning      │
│and the most common          │   │of the menu items) to each    │
│classification generated by  │   │of the top pages to be        │
│this group to change the index│  │tested.                       │
└─────────────────────────────┘   │- for each of the new top     │
                                   │pages, both with and          │
                                   │without descriptors, have     │
                                   │several people from the       │
                                   │target audience 1) where      │
                                   │they would look for           │
                                   │specific items of             │
                                   │information and 2) which      │
                                   │of the top pages they         │
                                   │prefer                        │
                                   │- use the top page where      │
                                   │fewest errors occur and       │
                                   │which users prefer most.      │
                                   └──────────────────────────────┘
```

finding suggests that users generate keywords at the specific level required to retrieve documents of information at the bottom of the tree. A subsequent study confirmed that using a menu leads to retrieving more pages than using keywords to retrieve the same information[83] in a keyword-menu hybrid; however, it did not lead to shorter search time. In this study searchers also made more errors using the menu than the keyword-menu hybrid system (an error was defined as any choice which would not directly lead the user toward the required information). This is logical in view of the previous studies that showed the most errors were made at the top two levels of the menu and that keywords put users at levels 3 and 4 of the menu index.

Browsing in Data Bases

Behavioural research studies in the laboratory indicated that given an opportunity, people would browse through the data base rather than always looking for something specific. A study was launched to try to understand how people browse and how data base indexes might be designed to assist browsing. The first step was to see what had been done before, and surprisingly, there was very little. In searching both the psychology and the library science literatures Grusec[84] found reference to only a few relevant articles.

Grusec noted that libraries are designed for browsing despite some feeling that browsing is not as valuable an activity as directed search. Browsing can be valuable in bringing new ideas because someone finds something he has been vaguely looking for. It is likely that people will want to browse on Videotex.

Grusec noted that it is not possible to distinguish browsing behaviour from directed search by observing the searcher. It is the searcher's cognitive intentions from moment to moment that distinguish the two modes of search. The searcher may be looking for something specific one moment but diverge to look at something interesting another moment. The key to understanding browsing is the searcher's cognitive intentions. A methodology that can be adapted to the study of cognitive intentions has been designed[85] which shows how to use verbal reports to yield valid data about cognitive processes. The method involves asking persons who are browsing to verbalize their thoughts about the process as they browse. Studies of browsing have just begun at DOC. Early reports showed that first time users of Telidon Videotex tended to browse in order to learn the various functions of the system.

Behavioural Research in the Use of Graphics on Telidon

Behavioural research has focused on how to use the extensive facilities of graphics that are available on Telidon to best advantage for viewers. How can images be designed so that viewers will easily identify them, understand their meaning, and find them attractive and useful? Behavioural research has not focused on the techniques of using colour and form on the new medium because there were, from the beginning of Telidon development, experienced graphic artists who were applying their expertise to this topic. Behavioural research focused instead on the human response to images, on what is known and what is not known about how humans understand and use pictures. This information was expected to enhance the work of graphic artists and page designers.

Previous work in understanding human response to images was found in psychology and in art theory[86] (Gopnik 1980). Several questions emerged from this work that affected thinking about human response to images on Telidon. To a large extent these are still questions rather than answers because the investigations which took place both before and during Telidon development, have not yet lead to firm conclusions. However, considering the questions has alerted information designers to the issues they must ask themselves when designing information on Telidon.

The Role of Images or Pictures in a Presentation of Information on Telidon

An image can serve[87] as a picture, a sign or a symbol. When the image functions as a picture, it refers to something less abstract than itself. For example, a simple triangle can refer to a mountain which is a concrete object. An image functions as a symbol when it refers to something more abstract than itself, for example when the triangle refers to the idea of a hierarchy. An image functions as a sign when the link between itself and its referent is arbitrary, for example, when a triangle is used to refer to danger.

When the information provider's intention is to represent concrete objects, a question arises about whether it is better to describe objects using text or to present a drawing in graphics. Will the audience for whom the information is intended understand it more easily and quickly and will they prefer the presentation if it is in text or in graphics?

Mills suggested that pictures and text serve complementary functions and often cannot be used alone. While a picture can serve to represent concrete objects, there is sometimes more to the information that is being presented than the object itself. For example, suppose the desire is to show that a certain class of objects, say furniture, is available for viewing prior to an auction that will be held a week from now. A picture alone would not be able to express this idea. The picture could show a table and chair but it would not be clear that the more abstract word, furniture, is referred to. The picture would not show the conditional fact that the furniture is available for viewing only before the sale, nor would it show the date of the sale wihtout using text. Pictures can express a great deal, but without language or a context in which to interpret them, it is not clear what is meant.

Mills used the work of psychologists[88] to describe a theory of perception of pictures which helps to understand the relation of pictures and text. According to this theory, when perceiving a picture, the viewer's conceptual system engages in a type of problem solving and attempts to explain the visual pattern of stimuli by forming a theory or description of it based on underlying patterns or schemes that are familiar. Humans have creative and flexible cognitive systems which can generate several alternative descriptions to the same pattern of visual information. The patterns of stimuli presented as a picture can thus be accounted for by different competing hypotheses. Which one will be accepted will depend on the context in which the viewer is operating. The context may be provided by other pictures, words, or many other features of the environment.

Thus Mills concluded that while a picture may be worth 1000 words, the viewer may not be sure which ones arise from the picture itself. A verbal description can guide the viewer to derive the meaning that was intended from a picture. Verbal descriptions can also function 1) to direct the observer to focus on a single item in a picture (look at the house with the red tile roof), 2) to highlight common structural features (notice how the two bedrooms in the floor plan are both diamond shaped), 3) to point out spatial relations (the water level of pitcher A is higher than that of pitcher B), 4) to provide explanations for depicted actions (the man in black is smiling because he just won the lottery), 5) to help one perceive formal structural relations as in art (the two embracing figures form a rectangularly shaped block).

While images used to serve a pictorial function have some limits in their descriptive capacity as discussed above, they can serve to illustrate text, to provide information about appearance, shape, texture and spatial relations that enhance verbal descriptions. Pictures also appear to make the meaning of words clearer. Muter[89] suggested that graphics appearing on Telidon index pages would make category labels (menu items) more understandable and lead to faster searching in an information data base. An experiment demonstrated that while the expected effect of faster searching with graphics was not present, the addition of graphics to illustrate the verbal menu items on a Telidon index page cut the searcher's error rate in half. Apparently the graphics helped viewers to understand the meaning of the words used in the index.

The Effect of Using Outline Drawings vs Photographs to Present Images

People of all cultures appear to understand pictures when they are used to convey real objects, so simple photographs of objects should be easily understood. While line drawings do not provide all of the detail of photographs, they can convey many of the basic elements. However, line drawings sometimes employ conventions for depicting abstract concepts, for example, using streaked lines to indicate a motion path. These conventions are learned by a particular group and will not be universally understood.

The ease and rapidity of interpreting a picture is not necessarily directly related to its degree of photographic realism. Dwyer[90] found that use of photographs in medical texts did not necessarily aid later identifications of objects more than line drawings, although colour was found to be helpful in both cases. He also found that people expect photographs to be more informative than line drawings. Some evidence has been found[91] to show that cartoons are more easily recognized than detailed line drawings. Cartoons appear to work well because they omit detailed information and because they mirror the internal organizing tendencies of the mind (the schemas suggested in the theory discussed above) better than do photographs. At present the evidence is not conclusive that either line drawings or cartoons are superior to photographs.

Telidon can portray both line drawings and photographs. Is it better, then, to use one or the other in depicting an object or set of objects? An additional complicating variable is that photographs on the Telidon system, when telephone lines are used for transmission,

take time to display. To some extent the problem is relieved when dedicated cable is used for transmission and the advent of fibre optics will make the delay negligible. However, with telephone lines, the delay can be up to 90 seconds or more depending on the size of the photograph. Thus the decision about whether to use line drawings or photographs also depends on the viewer's feelings about the delay.

To test whether viewers would identify Telidon images more easily if they were presented as line drawings or as photographs, Hearty & Mills[92] briefly presented images of familiar objects to several persons. The images were either high or low in internal structural detail, either photographs or line drawings, and either in colour or black and white. Viewers' accuracy of object identification was greatest both with high detail colour photographs and with low detail black and white line drawings. This suggested that information providers can use simple graphic images without losing communicative value. However, it did not differentiate between the effectiveness of photographs and line drawings.

A subsequent study[93] tested a teleshopping situation in which both identification and viewer preferences were tested. Low detail black and white images were compared with high detail colour photographs. Time for the images to appear was varied for both types of images (0, 45 and 90 seconds). All images were considered by viewers to be easy to identify. Only colour photographs with no delay were considered highly useful by the majority for teleshopping. The slow buildup (45 and 90 seconds) was considered highly annoying by 65% of viewers. These results suggest that viewers will prefer high detail colour photographs for teleshopping but that slow image build up time must be reduced by technical means, or it may be that enhancing graphic images over the black and white used in the experiment will make them acceptable. There is not yet enough evidence to draw firm conclusions.

Can Images Be Used For Thinking and Learning?

When functioning as symbols, graphic images portray abstract concepts or ideas. Graphic images give visible shape to complex ideas. They can portray structural features and relations not directly observable in the original phenomenon. Such graphic representations can serve as aids to thinking and learning[94]. For example, graphics can be used to

portray abstract properties and relations that change over time such as flow and resistance in an electric circuit[95]. It is well to remember that while these graphics may be simple, the underlying ideas may be complex and require training to comprehend. Most of us have learned to read road maps, but specialized maps require learning of the language of signs used to depict certain objects or concepts.

Mills also suggested that sequences can be used to denote change over time. It is not necessary to perceive continuous motion to understand a cartoon strip, for instance. The concept of using sequences of still images to convey complex or abstract concepts could be used on Telidon.

There is some evidence that static graphics can enhance learning[96]. Graphics serve to attract attention, to explain or demonstrate, and to facilitate learning and retention. While there is contradictory evidence for the role of graphics in facilitating learning and retention, the weight of evidence suggests that graphics do play a facilitating role. It is also apparent that developments in computer graphics will make it possible to present more complex dynamic graphics to express abstract concepts. So far, there is little evidence about the effects of dynamic graphics on learning or on how, specifically, to design them to enhance learning.

Behavioural Research in the Design of Visual Displays

Behavioural research focused on three main aspects of visual displays, character design, character spacing and reading from visual displays.

Character Design

Characters, including letters, numbers and other symbols, were redesigned especially for Telidon by typographers (H.P. Bronsard and M. Cartier). The improved character set for the 5 x 7 matrix is shown in Exhibit 5.4 as it appears on a television screen and in Exhibit 5.5 in detailed design. Other typographers judged that reading was improved with the new character sets over the original sets which were not specially designed for readability. Several different character sets were designed including double size characters and the international character set G2 which contains characters used in other European languages[97].

EXHIBIT 5.4

0122 All natural cheese should be kept
refrigerated. Soft unripened cheeses, such
as cottage, cream or Neufchatel, are
perishable and should be used within a few
days after purchase. Ripened or cured
cheeses keep well in the refrigerator for
several weeks if protected from mold
contamination and drying out. The original
wrapper or covering should be left on the
cheese. The cut surface of cheese should
be covered with wax paper, foil, or plastic
wrapping material to protect the surface
from drying. If large pieces are to be
stored for any extended length of time,
the cut surface may be dipped in hot
paraffin. Small pieces may be completely
rewrapped. Mold which may develop on
natural cheeses is not harmful, and it is

EXHIBIT 5.4   Text using the 5 x 7 character set designed by H.P. Bronsard
Photograph from Treurniet (1981)

EXHIBIT 5.5
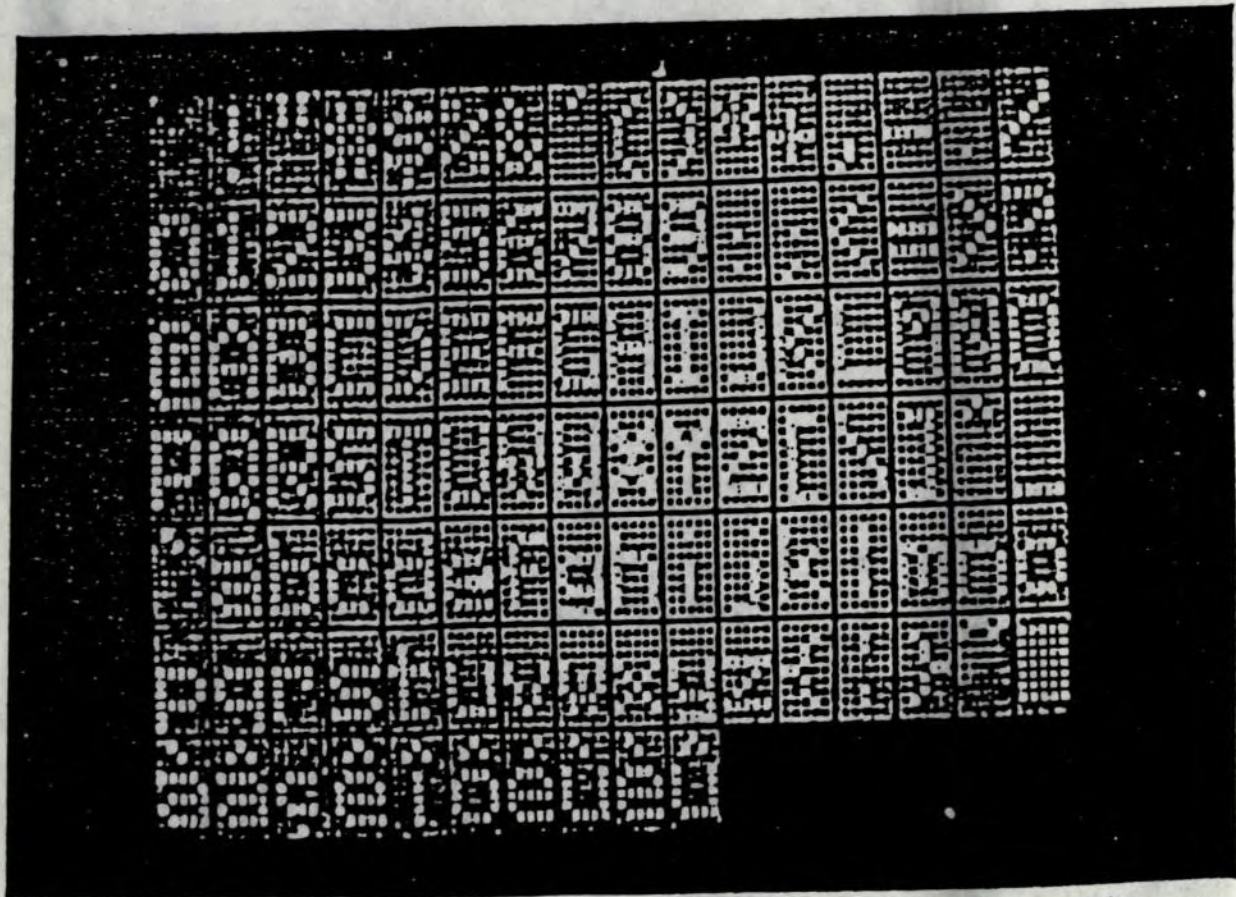
EXHIBIT 5.5   Detailed design of the 5 x 7 character set designed by H.P. Bronsard Photograph from Treurniet (1981)

Character Spacing

The spacing of characters in the horizontal and vertical dimensions was found to influence legibility or the ability of viewers to distinguish between characters. Studies of the 5 x 7 character set varied the horizontal and vertical spacing 1, 2 or 3 pixels. Descenders on letters such as 'g' were either 0, 1 or 2 pixels. Subjects viewed a screen full of letters. Their task was to locate a target row indicated by a plus sign, then locate the second instance of the first letter in the row and say the name of the next letter. If they missed the target letter they were asked to say the name of the last letter in the row. Dependent measures were scanning time per letter and frequency with which the letter at the end of the row was reported indicating a miss of the target letter.

Results showed that scanning rate was fastest when vertical spacing was 1 pixel and horizontal spacing was at least 3 pixels and when descenders extended at least 1 pixel below the line of text. Miss frequency was greatest with one space between letters but reduced significantly with 2 or 3 pixel spacing. These results suggested that minimum spacing should be 3 pixels between rows and 2 pixels between letters. Added to the 5 x 7 matrix this means that a 7 x 10 matrix is required for ideal spacing to enhance user legibility. For technical reasons, the 240 x 320 pixels available on NTSC standard television (North American Television Standard) cannot all be used to display letters, thus allowing for a reduction at the edges 20 characters in the row and 40 rows of text is the maximum that can be displayed on a television screen using the 5 x 7 character set. For the 7 x 11 character set, a similar procedure led to the conclusion that the maximum numbers are 18 rows of 28 characters. Characters with no descenders are not recommended[98].

Studies were also conducted to test user preference for placement of accents on both upper and lower case letters in the French language which is required in Quebec. Results showed that lower case letters should not be reduced in size in order to make room for accents. A better solution is to place accents in the inter row space for upper case and 1 pixel above the letter for lower case. This requires an interrow spacing of 2 pixels if only lower case letters are to be accented and 3 pixel for accenting upper case as well.

Proportional spacing which leaves less space for the smaller letters such as 'i' and 'l' is recommended to improve reading performance. Such spacing is normally used in the print medium. The space between words is recommended to be 6 pixels rather than a whole matrix in both the 5 x 7 and 7 x 11 character sets[99].

Reading from Videotex

Reading from Videotex was investigated to determine whether it was any different from reading from print. No differences were found in headaches or other physical manifestations of fatigue between reading from television display using Telidon coding and reading from a book, both for 2 hours. However, television viewers read 28.5% less material than those reading from a book[100]. A subsequent study[101] designed to test the effects which various aspects of display have on reading speed, showed that smaller interline spacing lead to slower reading and that fewer characters per line (40 characters versus 80 or 120) also lead to slower reading. These data suggest that information providers should try to allow more than the standard number of pixels between lines and that reading will improve when 80 characters or more per line is possible technically.

Behavioural Research in the Design of Data Input

The user interacts with Telidon data bases by using a keypad containing number and symbol keys or by using a keyboard containing keys for the full alphabet including the letters and symbols. These devices can thus influence the ease of interaction with the data bases. In 1982 the keypads and keyboards were being redesigned by the manufacturing companies. Hearty[102] argued that design of manual data-entry devices for Videotex should take account of three classes of user characteristics: size and mobility of the hand, perceptual-motor abilities, and cognitive processing abilities. Information about these characteristics was found in the anthropometric, perceptual-motor and cognitive processing literatures. Some of the main points of advice for keypad designers are described below.

Anthropometric measures of the size of the hand and the axis of movement of the thumb suggest that keypads for one handed use should not be larger than 2.5 inches (6.35 cm) in width if it is to be held between thumb and fingers. Keys used most frequently should be

above the keypad's centre of gravity and within 2 inches (5 cm) of the edge so that they are accessible by the thumb.
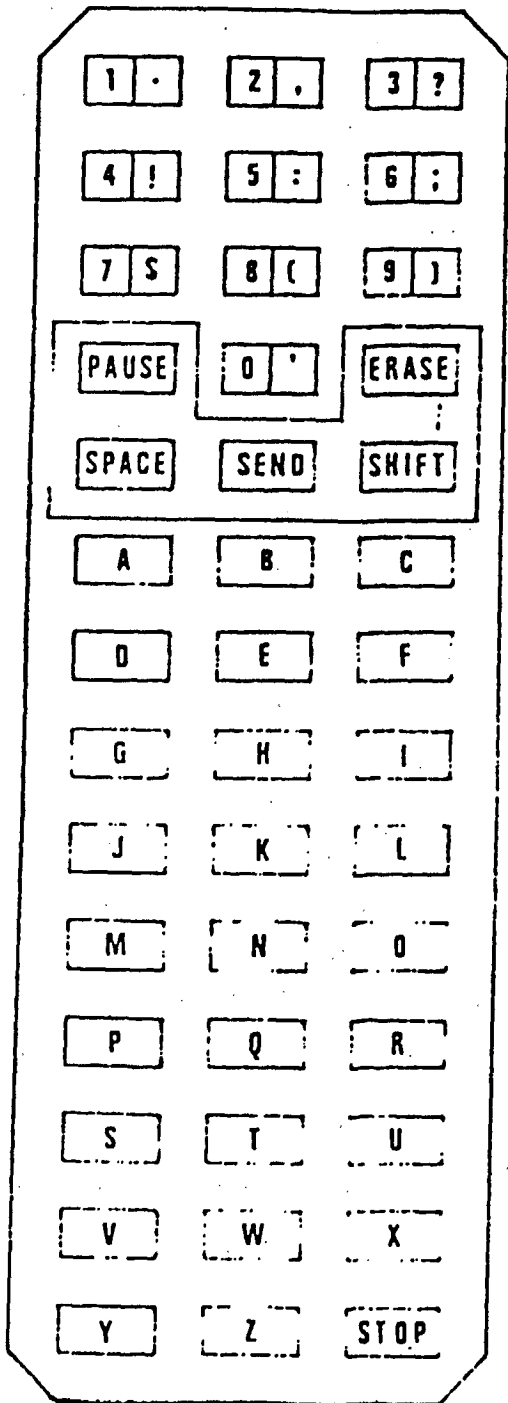
Perceptual-motor evidence suggested that letters on keys should be 0.10 to 0.15 inches (0.25 to 0.38 cm) for ease of viewing at the normal distance of 28 inches (71 cm). The ratio of width to height of letters should be 3:5. The evidence also suggests that keys be rectangular and about 0.50 inches by 0.25 inches (1.31 x 0.64 cm) with at least 0.25 inches (.64 cm) between keys. Users should experience a resistance of about 6 ounces (170 gm) and a key displacement when pressed of about 0.13 inches (0.32 cm). The user requires feedback when keying; this can be provided by kinesthetic cues such as key resistance or snap-action of keys, or by audible click of keys and visual echo on the screen. Since the user is not likely to be able to key at a rate faster than one tap per 232 msec, the effect of mistaken multiple keypresses can be eliminated if a delay of 50 to 70 msec is anticipated by the device.

Cognitive processing evidence suggested that labels for keys for functions other than the alphabetic or numeric characters should avoid the use of arbitrary symbols as labels and should use either well known or easily learned symbols or short words. Searching for keys will be facilitated if keys are grouped by function and if the expected arrangements are used within groups. A keypad design incorporating this advice is shown in Exhibit 5.6.

The ease of data input is also affected by what is required of the user. In most menu based Videotex retrieval systems, users must key in one or two digits. For direct page access in these systems, a much longer number must be keyed in. As the Videotex index increases in size, this number increases. Studies of long distance telephone numbers were used to suggest a solution[103]. Wherever the page number is written, whether in a paper directory, on the Videotex page, or as visual feedback which appears on the screen, the format of presentation will influence the user's accuracy in keying. Based on these studies, it was recommended that digits in Videotex page numbers should be grouped in triplets (grouping by 4s is also acceptable). These groups of digits should be separated by a blank space.

EXHIBIT 5.6

Keypad

```
[1 .]   [2 ,]   [3 ?]

[4 !]   [5 :]   [6 ;]

[7 $]   [8 (]   [9 )]

[PAUSE] [0 ']  [ERASE]

[SPACE] [SEND] [SHIFT]

[A]     [B]     [C]

[D]     [E]     [F]

[G]     [H]     [I]

[J]     [K]     [L]

[M]     [N]     [O]

[P]     [Q]     [R]

[S]     [T]     [U]

[V]     [W]     [X]

[Y]     [Z]    [STOP]
```

LABELS

PAUSE   – halt display until SEND is pressed

ERASE   – delete previous character -- SEND excepted

SPACE   – insert one blank space

SEND   – accept line of text or execute operation

SHIFT   – next entry in upper case; used for capitals and punctuation

STOP   – clear screen, abort current operation

A keypad with full alphabet designed by P. Hearty

Assessing Videotex Content

As more information is designed for Videotex, it becomes more important to assess the usefulness of this content to the users. There are two parts to an assessment of usefulness. First, the information must be what the user wants. Second, the information must be designed in a way that is easily accessible to the user, that is, easy to read and understand and pleasing to the eye. The assessment method described below addresses the second aspect of assessment, how to test the design of Videotex information for its ease of understanding and acceptability to users.

A model of content assessment[104] allows fairly simple testing procedures to determine the acceptability of Videotex pages. For each of four areas: 1) readability of text, 2) graphics, 3) colour and 4) visual display features, several variables are identified which can be measured by information providers. A level for each variable is suggested, above which it can be rated acceptable. Scoring is thus either 1 (acceptable) or 0 (unacceptable) for each variable. An average score for each of the four areas and for the whole test can then be calculated for each Videotex page or for a set of pages. Information providers can use a portion of the test variables to test their pages if they consider that only some of the variables are appropriate to their content.

This model makes use of the extensive literature on content analysis and on the human factors of visual display features. The suggested level of acceptability as well as the variables themselves are drawn from that literature. Some of the methods can be done automatically with computer software, especially to measure readability. Some measures require human judgement but could be done rapidly with trained observers. The overall model has not yet been tested. Testing should be done to determine whether any one of these variables contributes more than others to an overall judgement of acceptability to users. Weighting factors could then be assigned to the variables.

The variables and acceptability ratings are noted briefly in Exhibit 5.7. Full explanation of these variables may be obtained in Pressman and Pressman (in press). A brief explanation follows.

EXHIBIT 5.7 The Content Assessment Scoring Technique (CAST)

VARIABLE	ACCEPTABLE SCORE 1	UNACCEPTABLE SCORE 0
READABILITY		
Flesch Reading Ease Score	reading ease score $\leq$ 60	reading score $>$ 60
ARI Score	grade level $\leq$ 8	grade level $>$ 8
Kincaid	grade level $\leq$ 8	grade level $>$ 8
Human Interest Score	human interest score $>$ 30;	human interest score $\leq$ 30
GRAPHICS		
Focus attention with graphics	use of reference graphics in text; meaningful graphics (not solely decorative)	decorative or unrelated graphics
Reduce ambiguity	use of captions with graphics; clear relationship of graphic to content to be conveyed	any possible ambiguity, rationale for use of graphic not evident
Realistic drawings	bright, vivid, graphics with limited detail	abstract graphics; very detailed graphics
Animation or dynamic graphics	graphics have movement or are representations of action	no movement and no action in graphic representation
Appropriate size and placement of graphics	juxtaposed graphics of differing sizes; or use of graphic before text to orient; or use of graphic at end of text	no identifiable juxtaposition or placement of graphics for orientation

EXHIBIT 5.7 (Continued)

The Content Assessment Scoring Technique (continued)

VARIABLE	ACCEPTABLE SCORE 1	UNACCEPTABLE SCORE 0
VISUAL DISPLAY FEATURES		
Segmentation and identation cues	segmentation used to chunk information and facilitate reading	no segmentation to facilitate encoding
Typographics1 cues	use of special fonts, bold face or underlining to increase comprehension of text	no bold face or other typographical cues used to improve comprehension of text
Spacing	space within text and end text corresponds to logical break in information	violation of either of these features in the text
Line length and text justification	less than 49 characters per line; and no right justification	49 or more characters per line, or right justification
COLOUR		
Legibility	background and foreground do not come from the same range: Dark range (black, blue, red, magenta); light range (green, cyan, yellow, white)	insufficient distinction of foreground and background
Emphasis	use of colour to emphasize important content on page	no identifiable use of colour to provide emphasis
Distribution of colour and subject utilization	use of colour distribution to clarify organization of content or hierarchical relationships and to establish agreement with message	no use of colour to clarify organization of content or to be consistent with content itself
Colour variety	appropriate colour variety with no more than four main colours for text in foreground	jarring use of 5 or more competing colours for text in foreground

Readability

Measurement of readability has been done by counting features of text that can easily be determined, for example, the number of words per sentence or syllables per word. Several measures have been devised and are available in computer software. Flesch Reading Ease Score is available in a program called "The Writer's Workbench"[105]. The Automated Readability Index (ARI) is also available in Writer's Workbench as is the Kincaid Formula. The level of readability required depends on the target audience. A level of grade 8 is suggested for material that is to address the population in general.

Human interest score measures the number of personal pronouns or personal references in text. It has been found that readers attend more to articles about other people than abstract events. The following steps yield the Human Interest (HI) Score[106]: select samples of 100 words and 100 sentences from the text, determine the number of personal words per 100 words (PW), count the number of personal sentences per 100 sentences (PS), apply the formula HI - 3.635 PW plus .314 PS.

Graphics

Graphics can be meaningful to explain the text or they can be simply decorative. Meaningful graphics that are integrated with text by references to them in the text are rated higher than those that are simply decorative.

Captions have been identified as one of the most important features to reduce ambiguity in interpretation of pictures. Realistic drawings are generally preferred by both adults and children over abstract representations in art. However, complexity in pictures leads to lack of interest and in Videotex also leads to slow build up time which is negative for users. People look longer and respond more readily to pictures that show dynamic action, either with animation or by representing a dynamic situation with still pictures. Placement of graphics near the related text, juxtaposing graphics of different sizes, and placing a graphic at the end of text as a review have been shown to enhance retention of information.

Visual Display Features

Several features of the presentation of text have been shown to enhance reading rate of paper text and electronic display of text on Teletext. These features are suggested for Videotex as well. Segmenting text into units and indicating the segmentation by indentation can be important. Typographical cues can be used to increase comprehension. Features such as special fonts, bold face, capital letters are common. Generous spacing is easier to read. Each page of Videotex should be self contained. Each paragraph should be between three and six lines, separated by a line space. Optimal line length is related to ease of reading of text. A line length of 40 characters is suitable for easy (Grade 4), while more difficult text is easier to read with longer lines. Right justification creates increasing spaces between words or between letters which is more difficult to read for less able readers.

Colour

Colour can be used to enhance legibility, retention and subjective response. Legibility of text is enhanced by adequate contrast between foreground and background. Dark characters on a light background were found more effective than the reverse with the exception of cyan on blue and yellow on black. Green on white, both light colours, is also acceptable. Some other combinations have been rated acceptable for reading if adequate contrast is maintained.

Colour can be used for emphasis in text. The brightest colours relative to the background provide the most emphasis. Colour use should relate to the organization of content. Illogical use of colour can impair clarity of the message. The use of more than three or four colours on a page has been shown to fragment rather than assist in the integration of information.

The Content Assessment Scoring Technique (CAST) described above provides a systematic method of determining specific strengths and weaknesses of content for Videotex. The method can be used simply and quickly during production of Videotex information. Because each variable is derived from previous studies, use of this approach is likely to significantly enhance the acceptability of Videotex information. However, further testing

remains to be done to confirm that each variable contributes significantly to the overall rating.

Summary

This chapter has provided a review of behavioural research on Telidon which leads to advice for designers about how to make the system "user friendly".

Behavioural research addressed the design of dialogues between users and computers by studying how users react to various methods of information search and retrieval. Information retrieval studies began by investigating menu based indexes since that was the only system available in the early stages of technical development.

The number of alternative index choices (menu items) placed on an index page can influence users ease and speed of search. The optimum number of alternatives for Videotex (telephone based communication) is 4 to 8 over a wide range of conditions including variations in system response time. For Teletext broadcast (using the vertical blanking interval) 10 - 13 alternatives per page is best for a data base of 100 pages and 15 - 20 for a data base of 300 pages. For full channel transmission broadcast Videotex, 6 - 10 alternatives is optimal.

Menu based retrieval systems ranked high on an assessment of how well various computer retrieval methods (or query languages) meet user needs. The assessment showed many retrieval methods, including natural language query systems, to be poorly adapted to users' requirements.

Menu indexes can be tested and improved. Various kinds of errors can be eliminated with simple tests. The first two levels of the index create the most problems for users. Keyword-menu hybrid systems, when use of a keyword puts the user into a menu index at a lower level, are very useful. Users make fewer errors by avoiding the top levels with this method.

Most Videotex systems do not yet provide means for users to browse in the data bases, yet browsing is an important human activity.

Explorations of the dialogue between users and Videotex continued with studies of the use of graphics on Telidon. Images, whether photographs or line drawings, can serve a pictorial function, that is, they can describe concrete objects, or they can serve symbol or sign functions in which they refer to something abstract such as a hierarchy or danger. Many pictures, even when serving a pictorial function, need the addition of words to ensure that their message is interpreted correctly. Line drawings may be more helpful than full photographs but for some tasks, users prefer photographs. When images serve as symbols they can be aids to thinking and learning. Animated images, or static images that portray motion, should be particularly attractive to users.

Behavioural research also focused on the design of visual display characteristics. The design of characters is important to provide text that is legible and aesthetically pleasing. Character spacing affects reading speed and legibility of characters. Reading is slower on Telidon viewed on a NTSC television screen than reading from print. More space between lines and longer lines should improve reading from visual display terminals.

Using a keypad or keyboard, the user can interact with Videotex. Design of these devices should take account of size and mobility of the hands, perceptual-motor abilities and cognitive processing abilities of humans. When the user must type in a large number in order to access a specific page, it is helpful if the number is presented in groups of 3 with a blank space between. This applies to writing the number in paper manuals as well as to providing feedback to the user on the visual display screen.

Videotex content can be tested for acceptability to users. A method of assessment was devised which tests the readability, effect of graphics, use of visual display features and use of colour. The method can be applied to any page or to sets of pages and may be modified to be suitable for various types of content. The method does not address whether the message is relevant to the user but does address how content can be best be designed to deliver its message.

Footnotes – Chapter 5

71. Kozak, E.L. "Results of a Literature Search on Subject Access Requirements in Videotex (Telidon)". (Contract No. OSU78-00357). Ottawa: Department of Communications. 1979.

72. Lee, E. "The Optimum Number of Alternatives to dieplay on an Index Page in an Interactive Telidon Data Base". In <u>Telidon Behavioural Research 1.</u> Ottawa: Department of Communications. 1980.

73. Lee, E. "Broadcast Telidon: The Optimum Number of Alternatives per Index Page". In <u>Telidon Behavioural Research 1.</u> Ottawa: Department of Communications. 1980.

74. Lochovsky, F.H. & Tsichritzis, D.C. "Interactive Query Languages for External Data Bases". <u>Telidon Behavioural Research 5.</u> Ottawa: Department of Communications. 1982.

75. Lochovsky, F.H. & Tsichritzis, D.C. "Interactive Query Languages for External Data Bases". <u>Telidon Behavioural Research 5.</u> Ottawa: Department of Communications. 1982.

76. Herot, C.F. "Spatial Management of Data". ACM TODS5 pp. 493-513. 1980.

77. Lee, E. & Latremouille, S. "Evaluation of Tree Structured Organization of Information on Telidon". Unpublished Manuscript. Ottawa: Department of Communications. 1979.

78. McEwen, S.A., Lee, E. & Whalen, T. "Ease of Use in Information Retrieval on Telidon and Other Videotex Systems". Presented to Canadian Psychological Association. 1981.

79. Whalen, T.E. & Mayson, C. "The Use of Tree Structured Index Which Contains Three Types of Design Defects". In <u>Telidon Behavioural Research 2.</u> Ottawa: Department of Communications. 1981.

80. Lee, E. & Latremouille, S. 1980. op.cit. and Whalen, T.E. & Latremouille, S. "The Effectiveness of a Tree Structured Index When the Existence of Information is Uncertain". In <u>Telidon Behavioural Research 2.</u> Ottawa: Department of Communications. 1981.

81. Latremouille, S. & Lee, E. "The Design of Videotex Tree Indexes: The Use of Descriptors and the Enhancement of Single Index Pages". In <u>Telidon Behavioural Research 2.</u> Ottawa: Department of Communications. 1981.

82. MacGregor, J. & Lam, N. "Alternative Index Systems for Telidon: Recommendations Based on Behavioural Considerations". Ottawa: Department of Communications, in press.

83. Chao, G. "The Use of Keywords on Videotex Systems" and "Keyword Generation for Self-formulated and Nonself-formulated Search Questions by Videotex-naive Users". Ottawa: Department of Communications, in press.

84. Grusec, T. "Theory and Methodology for Research into Browsing with Special Reference to Videotex Data Bases". (Contract No. OER81-05075). Ottawa: Department of Communications. 1982.

85. Ericsson, K.A. & Simon, H.A. "Verbal Reports as Data". Psychological Review, 87, 215-251.

86. Mills, M.I. "A Study of the Human Response to Pictorial Representations on Telidon" and Gopnik, A. "An Introduction to the Psychology of Picture Perception". In Telidon Behavioural Reseach 3. Ottawa: Department of Communications. 1980.

87. Arnheim, R. "Art and Visual Perception" Berkeley: University of California Press. 1964. and Arnheim, R. "Visual Thinking", Berkeley: University of California Press. 1969.

88. Bregman, A.S. "Perception and Behaviour as Compositions of Ideals". Cognitive Psychology, 1977, 9, 250-292, and Bregman, A.S. "Asking the What For Question in Auditory Perception". In Kubovy, M. & Pomerantz, J.R. (Eds) Perceptual Organizations. Hillsdale, New Jersey: Lawrence Erlbaum, 198??

89. Muter, P. "The Role of Graphics in Learning on Videotex: Evidence From Other Media". Unpublished manuscript. Ottawa: Department of Communications. 1980.

90. Dwyer, F.M. "A Guide for Improving Visualized Instruction" State College, Pa: Learning Services. 1972. and Dwyer, F.M. "Strategies for Improving Visual Learning". State College, Pa.: Learning Services. 1978.

91. Ryan, T.A. & Schwartz, C.B. "Speed of Perception as a Function of Mode of Representation". American Journal of Psychology, 1956, 69, 60-69.

92. Hearty, P. & Mills, M.I. 1984.

93. Mills, M.I. & Hearty, P.J. "User Evaluations of a Simulated Teleshopping System: Effects of Image Complexity and Image Completion Time". Manuscript submitted for publication.

94. Mills, M.I. 1980 op.cit.

95. Huggins, W.H. & Entwistle, D.R. "Iconic Communication: An Annotated Bibliography". Baltimore: Johns Hopkins Press. 1974. Discuss making and testing a film using graphics to portray the properties of an electric circuit.

96. Muter, P. 1980. op. cit.

97. Pictures of these character sets can be found in Treurniet, W.C. "Display of Text on Television". CRC Technical Note No. 705E. Ottawa: Department of Communications. 1981.

98. Treurniet. 1981. op. cit.

99. Treurniet. 1981. op. cit.

100. Muter, P., Latremouille, S.A. & Treurniet, W.C. "Extended Reading of Continuous Text on Television Screens". Human Factors, 24(5), 501-508.

101. Kruk, R. & Muter, P. "Reading of Continuous Text of Video Screens". Human Factors, in press.

102. Hearty, P.J. "Human Factors and Telidon Keypads: A New Design and an Examination of the Current Models". In Telidon Behavioural Research 4. Ottawa: Department of Communications. 1982.

103. Lee, E. "The problem of User Errors caused by Long Videotex Page Numbers". In Telidon Behavioural Research 4. Ottawa: Department of Communications. 1982.

104. Pressman, D.E. & Pressman, I.S. "Content Assessment: A Measurement Model for Videotex". Ottawa: Department of Communications, in press.

105. MacDonald, N.H., Frase, L.T., Ginrich, P.S. & Keenan, S.A. "The Writers Workbench: Computer Aids for Text Analysis". IEEE Trans. Comm. 1982. 30(1), 105-110.

106. Flesch, R.A. "A New Readability Yardstick". Journal of Applied Psychology, 1948, 32, 221-233.

CHAPTER SIX
Content and Services

This chapter focuses on the practical experience gained in three Telidon field trials held across Canada in 1981/1982; the B.C. Tel field trial, the fibre optics trial in Elie, Manitoba, and the Vista project in Ontario and Quebec. Information on additional trials was also drawn upon, to a lesser extent. (These included Cantel, a federal government database; TV Ontario's educational database, and the WETA teletext trial in the U.S.).

Three Major Trials

In the field trial conducted by the B.C. Telephone Company, 150 terminals were placed in businesses and public locations in Victoria and Vancouver from January to August 1982. Most of the content was organized by Dominion Directories, a subsidiary of B.C. Tel that produces telephone directories. During the course of the trial, over 4000 pages of content were created by 125 IP's.[*] In addition, users had gateway access to at least three external databases: Cantel, Grassroots, and the Vista content.

The Elie, Manitoba trial placed 145 terminals in residential settings, where Telidon was only one of a number of entertainment and information services offered with experimental fibre optics technology. Manitoba Telephone Systems (MTS) provided terminals and equipment. Users had access to Cybershare, an educational computing service, and to Grassroots, Infomart's commercial database of agricultural information. Elie, however, is a semi-rural as opposed to an agricultural community. The appeal of Grassroots was widened by adding "Lifestyle" IP's with consumer information, travel, teleshopping and other services. Appendix A lists the IP's in all three trials.

The Vista field trial placed approximately 400 terminals in Toronto and in Cap Rouge, Quebec. Bell Canada provided the network and technical support, while day-to-day management was carried out by Infomart. Although Vista operated mainly as a residential trial, a small number of terminals were also placed in public locations in Montreal and Ottawa. A database with over 80 IP's and 45,000 pages were created, two-thirds in English and one-third in French.

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[*] Numbers of pages and IP's are approximate, as changes occurred throughout the trials.

Sources of Information about the Trials

The main source of quantitative information about the field trials was the computer based tracking data that automatically recorded how the system was used by counting the pages accessed in the database, length of search, and so on. This data was abundantly generated during the trials but was of limited usefulness. For example, in the Vista trial, the counts of pages accessed could not be analyzed according to content type, nor did the data indicate how many pages were in each IP's page set.[107] Futhermore, as each trial used a different reporting format, comparisons were difficult to make. Also, since the tracking data in each field trial was proprietary, content could only be discussed in generic categories (such as "tourism information"), resulting in a lack of detail.

In addition to the tracking data, qualitative research about users' response was undertaken by system operators and by certain major videotex companies. Typically in these user evaluations, interviews with users investigated which types of information had been accessed, how Telidon compared with other sources of information, and so on. Once again, however, the usefulness of these evaluations proved limited.[108] The categories used to classify information were often broad and ambiguous (such as "general knowledge"). The definitions of certain terms (such as "community information") varied widely as well.

To supplement the research conducted by field trial managers, the authors arranged interviews with fifteen videotex service companies, (approximately 50% of all such companies in Canada), and with thirteen information providers.

The Information Providers

The companies participating in the field trials fell into three main categories:

1. System operators (i.e. the telephone companies that provided the communications network, installed equipment, and offered technical support);
2. Videotex service companies, which design and create pages and maintain databases on a client basis (such as Canada Videotex Systems, Tele-Direct and Dominion Directories);
3. Actual information providers (IP's) who provide the pages that users access.

IP's are commonly companies for whom videotex is not a primary activity. The Bay department store, the Consumers' Association of Canada, the Greater Vancouver Visitors and Convention Bureau, and various government departments are sample IP's who were interested in testing the potential of Telidon for disseminating information or as a promotional tool.

IP's often did not maintain independent databases but rather relied on videotex service companies to create and manage their "page sets" within larger databases. At the same time, however, certain videotex companies not only managed pages for client IP's but acted as information providers themselves.

Generally, information providers saw the field trials as an opportunity to experiment with Telidon, and perhaps to "get in on the ground floor" with a new information medium. For most IP's, costs were low and the risk of participation was minimal. Typically, a videotex company or system operator changed IP's minimal prices for page creation and stored new pages at no cost. Often IP's were invited to participate. Many IP's used existing material (such as print brochures) as a basis for their Telidon pages and in some cases simply passed print material on to the videotex company which formatted pages.

For the few IP's who incurred substantial start-up costs, expenses varied widely, from $7,000 to $250,000. Usually a company's expenses were $50 to $150 a page for page creation plus internal staff time. Public service organizations were able to participate at no cost in the Vista trial, due to a federal grant to Infomart to encourage non-commercial content.

Videotex service companies tended to have been previously involved in some form of communications. Of 15 companies interviewed, five were production or audio-visual companies that had added Telidon as a new visual medium, and two were publishers of yellow pages directories. The background of other companies included computer systems consulting, advertising, journalism, and electronic communications.

In addition to offering page creation, videotex companies variously engaged in consulting, software design, training, hardware sales or rental, and database management. Some firms targetted a particular market segment, such as the travel or banking industries.

Videotex service companies were also influential in recruiting information providers for the field trial. Dominion Directories, for example, frequently recruited IP's by approaching companies with ideas for applications, as did Infomart.

The success of a field trial depends to a large extent on the ability of the system operator, videotex company, and various IP's to cooperate effectively. Overall, most IP's tended to be satisfied with the services they received from videotex companies. However, placement of terminals and control of the database were contentious issues at times. Control of the database particularly becomes a sensitive matter when a videotex company managing page sets for client IP's is also an information provider; a tendency to route users towards its own IP pages may arise.

Types of Content and IP's

Because of limitations in the available tracking data, only the B.C. Tel database can be analyzed to show the proportions of different content types (Exhibit 6-1). In this trial, IP's were classified into a number of categories; because most IP's offered relatively small page sets with only one type of information, it is possible therefore to extrapolate the proportions of content in the database. In the Vista trial, on the other hand, often a single IP offered several different types of information. (One publisher, for instance, offered games, news, sports, food specials and personal greetings). Exhibit 6-2 classifies the types of IP's in the Vista trial, but it is not possible to list the number of pages per IP, or to extrapolate what types of content the IP's supplied.

The B.C. Tel trial was originally designed as a business trial, but in fact Business Services made up only 6.5% of the database. As the trial progressed and terminals in public locations received far more use than those in office settings, the number of public terminals was increased and the trial became less and less business oriented.

Tourism/transportation information accounted for 14.4% of the total database, second only to government information. Dominion Directories, which recruited most of the IP's in the trial, made a particular effort to attract participants in this category. Also, portions of the entertainment, sports and attractions category could be considered a type of tourism information as well.

EXHIBIT 6-1
Content of B.C. Tel Data Base (October 1982)
(Using B.C. Tel's Taxonomy)

IP Type*	Number of IP's	% of Total Numbers	Number of Pages	% of Total Data Base
Retail/Merchandise	29	27.5	254	7.4
Tourism/Transportation	20	15.5	492	14.4
Hotels/Restaurants	15	11.6	221	6.4
Entertainment/ Sports/Attractions	17	13.2	338	9.9
Government	13	10.0	505	14.8
Business Services	11	8.5	222	6.5
Education/Libraries	8	6.2	452	13.2
Public Service	7	5.4	91	2.7
Financial Institutions	6	3.9	269	7.9
Financial Services	3	2.3	21	0.6
Miscellaneous	1	0.8	58	1.7
System Pages (Menus, indexes, and "help" information offered by the system operator	1		391	11.5
			3,314	

* Appendix A provides the names of individual IP's by category.

EXHIBIT 6-2
Vista IP's by Type

IP Type	Number	Percentage
Videotex Services	13	15.7
Travel/Tourism	10	12
Retail	9	11
Publishers	8	9.6
Government	6	7.2
Product Companies/Manufacturers	5	6
Business Services	5	6
Community/Public Service Organizations	5	6
Banks, Trust Companies	4	4.8
Insurance Companies	4	4.8
Sports	2	2.4
Education	2	2.4
Miscellaneous	2	2.4
Telecommunications Companies	2	2.4
Financial/Investment	1	1.2
Film/Theatre	1	1.2
Automotive	1	1.2
Telephone Directory Companies	1	1.2
Religious Organizations	1	1.2

Thirteen government IP's at both provincial and municipal levels provided 14.8% of the database pages and in October 1982, there were 17 terminals located in government offices.

The category with the greatest number of IP's was retail and merchandising; however, the 29 IP's in this category accounted for only 7.4% of the pages in the database. The financial services category made up only 2.3% of the database, but this figure is misleading since only the first page of the application is included in page counts recorded by the tracking data. The education/libraries category contributed 13.2% of the pages in the database, with 19 terminals placed in educational or library settings. Content, however, was not purely "educational" in the sense of computer-aided learning, but rather offered lists of courses and programs, campus locations, and so on.

In the Vista trial, videotex service companies were the most numerous participants though at times they functioned mainly as conduits to the pages of their client IP's. When videotex companies offered pages of their own, in some cases they created actual content applications (such as games or children's stories, entertainment listings, etc.), while in other instances they advertised or demonstrated their page creation services. The telephone directory company, (i.e. Tele-Direct, Bell Canada's subsidiary) also functioned like a videotex service company in that it included the pages of many smaller IP's in its electronic yellow pages.

The number of travel/tourism IP's on Vista was small compared to the B.C. Tel trial. However, in Toronto Infomart also operates the Teleguide service (a Telidon database of about-town listings available through special public access terminals, and through the Vista trial as well). The low representation of tourism/travel IP's on Vista probably resulted from, the complementary emphasis on Teleguide.

While in the B.C. Tel trial, retail/merchandise IP's tended to have small page sets, Vista tended to have a smaller number of IP's who maintained a much larger number of pages. Dominion stores, for example, had over three hundred pages of content — more than the entire retail category in the B.C. Tel trial.

Finally, the "publishers" category in the Vista database included newspapers, encyclopedia publishers, and magazine publishers. It is extremely difficult to make assumptions about what type of content these IP's chose to create. Generally, information in the Vista trial was of a wide-appeal, general-interest variety, especially geared towards younger users. Much of the content in the database could be considered advertising or promotional.

For the Elie database, little information about content was available. The database was divided into three major sections: the Grassroots agricultural database; "lifestyle" information; and the Cybershare educational database. Participants made only moderate use of the agricultural information with the lifestyle section designed to be more appropriate for the Elie residents. The types of lifestyle information providers are listed in Exhibit 6-3 though, as with Vista, no page counts for each IP are available (Appendix A gives the names of individual IP's). Generally, there was less commercial information in the Elie trial than in either the B.C. Tel or the Vista databases. The seven educational IP's in the lifestyle database do not include Cybershare's computer-aided learning applications; however no statistics were available for this component of the trial.

In all videotex services, in addition to content pages, databases include a number of "system pages" supplied by the videotex system operator or database manager. These pages act as interfaces with the user, (sign-on pages, menus, indexes, help information, etc.) and can make up a substantial proportion of the database. B.C. Tel, for example, offered 391 such pages, or 11.5% of the overall database. Furthermore, system pages are accessed with a very high frequency. In one week in the B.C. Tel trial, over 68% of pages retrieved were system pages — 90,486 page accesses out of a total of 131,555.

Over the months in which each trial operated, their databases changed constantly and the Exhibits shown here only give snapshots of the types of IP's participating during a particular window of time. The size of the B.C. Tel trial peaked in August 1982 (with 140 IP's contributing 4,644 pages) and then decreased, especially in the government and financial services categories. One explanation for this change is that after September B.C. Tel levied storage charges when the field trial ended and a market trial phase began.

In the Vista trial, the number of IP's increased steadily from May to November. At the same time, the number of videotex service companies in Canada also grew. At the start of the trial, only four or five such companies were involved in Vista, but that number soon expanded to over twenty, many of whom were new enterprises formed in 1982.

EXHIBIT 6-3
Elie "Lifestyle" IP's

Content Category	Number	Percentage
Education	7	13.5
Cultural	6	11.5
Health/Fitness	5	10
Travel	4	7.7
News/Weather	4	7.7
Consumer Information	3	5.8
Community Information	3	5.8
Sports	3	5.8
Government Information	3	5.8
Banks	2	4
Wildlife Organizations	2	4
Telecommunications	2	4
Hotel/Accommodation	2	4
Retail	1	2
Religious	1	2
Energy	1	2
Insurance	1	2
Law	1	2
Classified Advertising	1	2
Crafts	1	2
Children's Stories	1	2
Lotteries	1	2
Business Services	1	2
Entertainment Listings	1	2
Games	1	2

Content Structure

In all trials, users voiced certain criticisms about Telidon, and one of the major shortcomings was cumbersome search procedures. Improving Telidon's efficiency means more than faster transmision or streamlined graphics; the organization and indexing of the database is critical as well. Often, the indexes and menus intended to help users caused frustration instead.

Major problems in search procedures included: ambiguity in the categories of information offered, and the use of extremely broad categories such as "general knowledge"; the slowness and length of the search activity, and lack of clarity about what is in the database (causing frustration when users wasted time looking for information that was not there). Two suggestions proposed during the B.C. Tel trial were shortcuts to bypass hierarchical levels in the searches, and the use of keyword search procedures. In the Vista trial, users were, ironically, equipped with a print directory to help find information, and to give users an overview of what types of information the database held.

The Cantel trial received particular attention because of difficulties in indexing of pages. This index design had to be overhauled a number of times through the trial period. Similarly, respondents in the TV Ontario trial also found its index to be a major impediment to reaching and motivating users to access videotex services. Major redesign of this component was undertaken after the trial stage was completed.

In all trials, regardless of the size or content of the database, users found the process of searching for a piece of information too slow, and indexing was a major cause of frustration. The importance of alleviating these problems cannot be over emphasized, as improvements in the quality and depth of content will be of little value if users cannot locate information easily and quickly. Users will also benefit if search procedures can be made similar when gateways to different databases are used.

A further issue related to content structure is how the placement of information in the database affects useage. In particular, are users more likely to choose information from the first one or two listings that appear on an index to the detriment of listings that appear further down? All the IP's interviewed agreed that location in the index affected

useage. Thus control of the database, and especially the control of choice positions on menus and indexes, becomes an important question.

As one graphic example, an IP in the B.C. Tel trial was initially the only source of entertainment information and consistently had one of the most popular page sets. Later on, however, the videotex company managing the trial's main database also developed entertainment pages, listing its own content at the top of the entertainment index and bumping the IP further down; the result was that access to the IP's pages dropped significantly.

Control Over the Database

Most information providers in the field trial had little input in determining the structure of the database. Rather, control rested with the system operator, or with the videotex companies which maintained page sets for client IP's. In the B.C. Tel trial, for example, one videotex company contributed 90% of the database by attracting smaller IP's. Similarly in the Vista trial, responsibility for the database rested not with the system operator but with a videotex company, Infomart, that also provided information itself. These videotex companies had a competitive edge over other IP's because they could decide where to physically place their own information and that of their clients. Control over the database has the potential to be a contentious issue, though problems can be reduced through consultations between IP's and the database managers.

Tracking Usage

Two sorts of quantitative measures of users' reactions to videotex were provided by tracking data; pages selected, and the length of sessions from sign-on to end. In addition, interviews with users asked their opinion about the content they accessed, their reasons for using the system, and so on.

In the B.C. Tel trial, the tracking data showed that entertainment-oriented information was a popular category throughout the trial (Exhibit 6-4). Extensive use was also made of the external or "third-party" databases available. Other popular content areas were games and quizzes. Seasonal information also had a place in this field trial: in August, pages of information about a large fair held in late summer were a popular choice.

In each week of the trial, the top five IP's received over 20% of all access to content pages. Users gravitated towards a selected set of IP's and particularly tended towards the entertainment, education and the third-party databases. Tracking data also revealed that in many cases, users accessed only the first three or four pages of an IP set.

In the Vista trial, much information remains confidential, and the tracking data was more limited as well. One observation in this trial is that, consistently, more than 75% of the top IP's offered games or quizzes. Generally, a high proportion of the Vista database was oriented to this type of content, and detailed analysis shows that games and quizzes were the most frequently accessed types of information in the database.

In interviews with IP companies, five of thirteen firms indicated they had provided quizzes or games, often under the impression that games would lead users further into their page sets to view other content. IP's also hoped that games would increase user awareness of their company, like a form of advertising. However, tracking data indicates that users did not view other content areas within the page sets in addition to games. Also, in a qualitative study during the Vista trial, users were seldom able to identify the source of the games they played. The IP's hopes that games would lead users to more serious pages, or at least promote their company profile, appear unfulfilled. IP's who did not offer games, meanwhile, were often critical of the attention given to games and quizzes, suggesting that this was not a valid way to test the Telidon medium.

Tracking data statistics on content accessed were not available in the Elie trial.

EXHIBIT 6-4
B.C. Tel Users' Response to Content

July 18-24, 1928
n = 60,946[1] (content pages viewed)

IP	% of Access Content Pages	Average Accesses Per Page[2]
Restaurant	6.3	54.9
Education	4.9	8.5
Entertainment	4.2	234.6
3rd Party[3]	4.2	1,288
Entertainment	3.2	26
Driver Education	3.1	47.7
Science Information	2.5	13.7
3rd Party[3]	2.2	1,368
Sports Team	2	46
Energy Information	1.4	42
Hotel	1.3	32
Electronic	1.3	40.5
Museum	1.1	17.9
Municipal Government	1.1	13.5
Provincial Tourism	1	5.1

August 22-28, 1982
n = 110,084 (content pages viewed)

IP	% of Access Content Pages	Average Accesses Per Page[2]
Entertainment	23.6	185.3
Driver Education	4.4	119
Restaurant	3.8	70.3
3rd Party[3]	3	3,350
Government Quiz	2.7	8.6
Entertainment	2.7	38.9
Science Information	2.5	20.1
Sports Team	2.1	76.2
Exhibit/Fair	1.9	534
3rd Party[3]	1.7	1,871
Electronic	1.7	91.6
Education	1.6	6.1
Bank	1.4	11.1
Sports Team	1.4	128.6
Provincial Government	1.2	215.3

Measures: 1) Total Number of Accesses per IP Set (as a % of all accesses to content pages)
             2) Average Number of Accesses per Page

1.   Calculated as 40% of all pages accessed. It was consistently found that about 40% of all
      accesses to the B.C. Tel data base were to content pages, while the remainder were to
      system pages such as sign-ons, menus, help, etc. B.C. Tel's tracking data recorded a total

EXHIBIT 6-4 (Continued)

September, 12-18, 1982
n = 58,665[1] (content pages viewed)

IP	% of Access Content Pages	Average Accesses Per Page[2]
3rd Party[3]	4.5	2,647
Restaurant	4.3	42.3
Bank	3.2	10.2
Federal Government	2.9	8.2
Entertainment	2.5	17.9
Science Information	2.1	9.2
3rd Party[3]	2	1,198
3rd Party[3]	2	1,196
Provincial Government	1.8	172.8
Entertainment	1.7	15.5
Electronic	1.7	49.1
Sports Team	1.6	80.1
Department Store	1.5	20.5
Sports Team	1.4	27.6

October 17-23, 1982
n = 52,622 (content pages viewed)

	% of Access Content Pages	Average Accesses Per Page
Federal Government	6.2	14.4
Entertainment	5.3	34.6
Government Quiz	5.2	13.9
3rd Party[3]	3.7	1,923
Restaurant	3.3	28.3
Investment	3	81.8
3rd Party[3]	2.8	1,499
3rd Party[3]	2.2	1,155
Science Information	1.7	6.7
Airline	1.6	24.2
Bank	1.6	5.1
Driver Education	1.5	19
Electronic	1.5	38.9
Exhibition	1.4	190.3

Measures: 1) Total Number of Accesses per IP Set (as a % of all accesses to content pages)
2) Average Number of Accesses per Page

1. Calculated as 40% of all pages assessed. It was consistently found that about 40% of all accesses to the B.C. Tel data base were to content pages, while the remainder were to system pages such as sign-ons, menus, help, etc. B.C. Tel's tracking data recorded a total of 98,926 page accesses to the system in the week of May 2-8, 1982.
2. Total accesses per page set/no. of pages in set.
3. "3rd Party" refers to gateway access to the Vista, Cantel or Grassroots databases. Counts are available only for accesses to the first page.

User's Evaluation of Telidon Content

Qualitative user evaluations of content were generally gathered through in-person interviews. The B.C. Tel trial also placed user diaries in offices and at public locations where Telidon terminals were available.

In the B.C. Tel trial, terminals were placed in three types of locations: private offices (i.e. business settings, such as a stock-brockers' office); public locations (libraries, shopping malls, airports, etc.); and quasi-public settings such as hotels and banks. Interviews were held with members of the public, with Telidon managers, (i.e. people designated within participating companies to manage the Telidon project), and with staff in the offices where terminals were placed.

In the private office settings, many participants were also IP's in the trial and frequently accessed their own pages in the databases to check accuracy or compare their pages with those of other IP's. Apart from this, private office participants were primarily interested in business information related to defined work-day needs, and often sought only two or three types of content. In brokerages offices, for example, use was highly concentrated on the Marketfax stock index database. In such cases, Telidon was treated as a highly specific business tool.

In contrast, users in public locations were most interested in entertainment, tourism, education, and job bank information (offered through the Cantel database). Males' preferences ranged from sports to tourist attractions, entertainment and education, while females chose entertainment, job banks, education and general interest.

In public locations, "general interest", and "curiosity" were the most frequent reasons cited for using the system, though in some cases specific information was sought. For example, users accessed the job bank because they were looking for jobs, or used Telidon to look up transit information since they wanted to ride a bus.

In all locations, users related most of the information positively, finding it was enjoyable, informative, well-presented, or unique. However, there was often concerns that not enough information was offered, and disappointment if information was not up-to-date. A

pre-trial measurement study had indicated high levels of expectancy about Telidon, which may have contributed to a sense of disappointment with the actual database.

In the Elie trial, in most households the most frequent users of Telidon were children. Not surprisingly, games were the most popular type of content. "Community Information" was the second strongest content category; however in the evaluation research, this category included weather and news. The third most popular category was Entertainment/lifestyle -- also a nebulous finding, since the database was divided into two broad sections, agricultural and lifestyle, and it is unclear what was meant by the "Entertainment/ Lifestyle" category.

The main reasons cited for using Telidon were curiousity, entertaining friends or family, and relaxation. Only 8% of Elie respondents said that obtaining information was a reason for using Telidon, and even fewer used Telidon for business purposes. Data on the Vista trial, meanwhile, remains confidential.

User evaluations are also available for Cantel, the federal government's 50,000 page Telidon database. Cantel was available in several settings: in a number of Canada Service Bureaux across the country, in terminals in shopping malls and libraries, and through terminals in other field trials. Content consisted mainly of directory type of information on government programs, plus updated content such as the national job bank and weather information.

Some 78% of Cantel users interviewed[109] said that they were mainly interested in experimenting with the technology, and were "just browsing" or "playing" with the system. Terminals in libraries had the highest useage, while those in the Canada Service Bureaux were used least. Users were predominantly male, over 40 and well educated, a profile that agrees with the results from users diaries in the B.C. Tel trial. The most popular topics were the national job bank, statistics, facts, quizzes and weather. Professionals were interested in finance, economics and business more often than other users. Government information was little utilized; only 5% of the users' time was spent accessing pages about government programs.

In the TV Ontario trial, where educators at all levels were exposed to Telidon, participants were interested in the technology but disappointed with the size of the database and the available software. As a medium for computer-aided learning (CAL), Telidon did not compare favourably with other more sophisticated systems. Games were a popular content choice, but educators rated games as a low priority compared with CAL.

Location of Terminals

Location of terminals affects both the type of audience that will use the system and also the users' expectations of what information they will find in the system. Brief, casual use of the equipment is likely in shopping malls, for example, where a younger audience can also be anticipated. In libraries, more serious use is likely; and in research libraries, users familiar with computer-based retrieval may have high expectations of what the system should do.

Not surprisingly, locations were correlated with the type of information sought: users in malls tended to seek retail information; users in post offices tended to use government pages. Terminals in public locations might have been more effectively used if they were clearly labelled as to what type of information the user could expect to find.

Experiences in the B.C. Tel trial also suggested that in certain settings only a narrow range of content was applicable. For example, in private office settings in investment firms, users had little need for information other than investment/financial material. Participants would have been best served by closely-related types of information that complemented Marketfax and Marketscan stock index databases.

It is more difficult to assess which applications would be suitable for residential users. The databases aimed at the residential marketplace were broadly consumer-oriented, with an assortment of information not directed to any predefined need. Some decisions will have to be made by IP's about their goals in offering databases of broad "universal" appeal. Satisfying all the needs and interests of demographically diverse audiences requires not tens of thousands of pages but hundreds of thousands. Even in the B.C. Tel trial, where uses had access to the local database plus the 50,000 page Cantel database, the 16,000 page Grassroots database and 45,000 pages of Vista, users still felt that the quantity of information was not enough.

Length of Sessions and Pages Viewed

Length of session and number of pages viewed have important implications for estimating potential revenues from commercial services and for making pricing decisions (such as whether to charge on a per-minute basis versus a rate per page). In the B.C. Tel trial, average session length was 11.24 minutes, and the average number of pages accessed ranged between 17 and 36 (in different weeks). For the trial as a whole, the average number of pages viewed per session was 26, and users spent an average of 28 seconds per page. In the Elie trial, the average session length was 19.7 minutes; users viewed an average of 25.4 pages, spending an average of 46.5 seconds each. With Vista, users viewed an average of 21 pages per session. Comparisons between trials, however, are limited by the different software used to track useage, different definitions of "session", and different transmission speeds.

Comparing Telidon to Other Sources of Information

In the field trial settings, it was difficult for users to compare Telidon to other sources of information because they were considering the new technology in terms of its potential rather than on the basis of its current offerings. In the Vista trial users had positive evaluations, based on the understanding that the trial was a very limited demonstration of what the technology could do. For example, despite the fact that the current database was often disappointing, it was envisioned that Telidon could potentially be a replacement for newspapers, catalogues and direct mail flyers. The category where users evaluated Telidon on the basis of its here-and-now services was games. Here the primary users were children, who found the Telidon games fun but not competitive with more sophisticated computer game systems with which they were familiar.

The Cantel database was evaluated both by users and government information providers, and both groups felt that Cantel did not offer clear advantages over other sources of information. The process of finding information was too time-consuming, and the information was not detailed enough. The government departments interviewed pointed out that existing computer systems or printed documents offered more complete and useful information.

In the B.C. Tel trial, once again most of the information on Telidon was also available through other sources, but Telidon was felt to have certain advantages in its graphics and colour presentation. Again, however, many participants found the search process too slow, and this negative factor tended to overide whatever positive assessments were made.

Generally, the visual appeal and novelty of Telidon were considered advantages, but the novelty effect soon fades if the visual aspects are over-emphasized and the content is superficial or hard to get at. In the B.C. Tel trial, greater exposure to Telidon correlated with a more critical appraisal of its capacities. For example, 71% of the casual, public users agreed that Telidon provided a clear saving in time for obtaining information, where only 38% of those managing the operation of the terminals held this point of view.

Future Content and New Services

Telidon services in the field trials consisted only of page-by-page information retrieval using a tedious menu selection approach. In the future, technical enhancements will enable transactional services, computation, messaging, and software distribution. Links to text-editors and hard-copy printouts will also be possible.

The opinion that business applications will lead the short-term videotex market has received growing acceptance. The business community values information more highly than the home market and is willing to pay for information such as stock services, rates of exchange, market and trade information, and so on. The strategy of marketing Telidon as a source of specialized business content has been reinforced by the growth of Closed User Groups and private videotex systems. However, many business information services are already offered by a variety of sophisticated means, including specialized terminal systems or online databases, with which Telidon will have to compete.

It is already apparent that in the business context Telidon is unlikely to be accepted as an independent configuration of software and hardware. Instead, Telidon, as discussed in previous chapters, will be one of several protocols used to accomplish specific tasks with multifunctional equipment. Rather than buying a separate Telidon terminal, businesses will use Telidon integrated into other equipment. At the same time, Telidon services can

be enhanced to include computation, transactions and messaging. Linkages to multi-functional equipment already in place will be critical, including microcomputers, communicating word processors, telex, computer graphic terminals and executive work-stations. Telidon will spread not as a primary application of equipment but as an enhancement, incorporated as a software protocol or as firmware.

Links to word processing equipment are especially important, as word processing is becoming ubiquitious in all office settings. Telidon's display and graphics capabilities could be used as enhancements of existing text editors. Furthermore, when Telidon is integrated with other office equipment, hardcopies of content will be available. In the B.C. Tel trial, 77.4% of respondents saw hard copy output as a desirable feature (see Exhibit 6-5). 74.2% considered links to word processors important as well.

However, the videotex industry has concentrated on the need for a very low-priced videotex terminal as the igniting spark for rapid growth. Projecting high demand for services on the basis of low cost terminals may be a justified approach for some technology products; but it is probably a misleading strategy in the case of videotex. At present, content development has emerged and remains as the most critical single factor influencing user response.

While low-priced hardware may excite service providers, there is little reason to believe that users will be stimulated to purchase with the same enthusiasm. A major effort in enhancing content will be required to spur the acquisition of terminals, and to avoid market "churn", i.e. subscribers' rejection of the service once they have signed up. (In the early years of pay-tv in Canada, for instance, subscriber rejection has been much higher than anticipated).

Another critical consideration for future services is pricing. A detailed examination of the way consumers will respond to different price configurations is required. Services could be priced in a variety of ways: flat fees or usage-sensitive pricing, charges per page, charges according to connect time, tiered levels of services, and so on. In only one trial were theoretical prices presented to users; (Research suggested that monthly prices for services would have to be below $30 to attract the interest of 60% of an initial target group).

EXHIBIT 6-5

Importance of Enhancements to Telidon
(% Very Important/Important)

I	Most Important	Total
	Quicker Access to the System	85.5
	Two-Way Interactive Capabilities	83.9
	Hard-Copy Output	77.4
II	**Medium Importance**	
	Linkage to Word Processors or Typewriters	74.2
	Simplified Operations	66.1
III	**Low Importance**	
	Voice Recognition for Input Commands	56.4
	Audio Sound with Graphics	51.6
	Larger Screen Size	45.1
	Larger Text	25.8

(Results based on survey data of users collected by the author during the trial evaluations).

Generally, major efforts must be made to explain the concept of Telidon beyond its obvious display and cataloguing functions. In the B.C. Tel trial, respondents were asked to rate Telidon on a similarity scale as being "most like", "somewhat like", or "least like", a number of other technologies. Most respondents perceived Telidon as "most like" technologies that displayed information, such as directories or catalogues, as Exhibit 6-6 shows. Telidon also seemed similar to mass media such as newspapers or magazines. The strongest statement of similarity compared Telidon to a video display unit -- that is, to a dumb display device with little processing abiilty. Respondents did not consider Telidon to be process-oriented, or interactive. Telidon seemed closer to entertainment media such as books and TV than to such two-way communications devices as teletype, telephones, or Fax machines. Telidon was also not strongly related to input machines such as word processors or typewriters. Many of the business participants in this trial were aware of Telidon's messaging and transactional capabilities; nonetheless, the impression of videotex as a simple retrieval device was dominant.

B.C. Tel participants were also asked about the usefulness of future applications. In office settings, electronic mail and messaging were rated as useful by 83.4% of respondents, as were ticketing/reservations capabilities. Business participants also showed strong interest in financial statistics, stock market information, company profiles, and so on. There was considerable appreciation of transaction services such as telebanking and teleshopping as well. However, business respondents showed minimal interest in games, insurance information, or inventory control.

In public locations, participants thought that directories, educational courses, community information and public announcements were useful applications, but almost no interest was shown in transactional capabilities except electronic mail (68%).

Overall, 71% of the respondents in this trial expressed interest in electronic yellow pages and special service directories. Many participants felt that new transactional applications for Telidon might be useful but also wondered how Telidon could compete with other technologies. For example, many business respondents wondered why anyone would buy a Telidon terminal when they could buy a microcomputer.

EXHIBIT 6-6

Items Perceived as Similar to Telidon
(Total Sample)

		Total (%)
I	**Most Like Telidon**	
	Video Display Terminal	77
	A Directory	76
	A Catalogue	65
	Advertising Brochure	64
	A Computer	52
	A Magazine	50
	Microcomputer	50
	Newspaper	50
II	**Somewhat Like Telidon**	
	A Book	48
	Television	44
	Word Processor	40
	Teletype	39
	Typewriter	36
	Slide Projector	35
	FAX Machine	26
III	**Least Like Telidon**	
	Telephone	24
	Calculator	22
	Film Projector	19
	Video Cassette	19
	Film	15
	Radio	14
	Intercom	7
	Photocopier	5
	Tape Recorder	2

In sum, we again emphasize Telidon capacities should be bundled into other already-useful technologies in the form of software or chipboards. The systems configurations in the field trials left many users disappointed. Over the next half-decade, the main market for videotex and Telidon will lie in business applications. Microcomputers, executive workstations, communicating word processors and large mainframe computers will increasingly contain videotex capabilities.

In addition, a movement away from simple advertising and marketing functions is needed, to shift the image of Telidon from that of an "electronic catalogue" to a multi-functional software protocol that can be incorporated into a variety of existing technologies, and that can offer a wide range of applications as well.

Summary

The trial phase of Telidon has now passed but its lessons serve as important examples for those new embarking on the tough road of commercial services and further product development.

Generally, users graded the field trial services as poor to moderate. In many cases services did not meet expectations, and technical improvements will be required, including: messaging and transactional capabilities; keyword searching; photographic transmission capabilities; and low-cost page creation terminals. Participants particularly complained of slow search processes. Also, future use must move beyond information retrieval to two-way interactive services and transactions. Furthermore, applications must keep abreast of advances in search procedures based on artifical intelligence. For example, non-procedural query language software will allow both computer experts and the computer-naive to search in a natural language. Such software will also, however, make Telidon's tree-structure searches obsolete.

The field trials suggested a number of specific points about the future of Telidon and videotex. The target applications areas indicated by the initial databases, it should again be emphasized, include agriculture, tourism, banking, retailing, specialized users (i.e. stock brokers), and transit information systems. The trials also illustrated a need for standards that go beyond technical specifications and simplify the user interface,

particularly in the areas of gateway technologies, classification schemes, search procedures and database maintenance.

In addition, the trials showed how the structure of the database, and especially the location of IP's listings on index and menu pages, can influence users' selection. To ensure fair treatment of the smaller IP's that will make for content diversity, policies should inhibit videotex companies from manipulating their databases to the advantage of their own page sets, and thus restricting competition from their client IP's.

Terminals in public locations appeared to be a market segment with certain opportunities. However, special considerations are required in the design of terminals, equipment maintenance and content development. Simple access procedures are needed in these settings. Also, content should consist of easily-identifable topic areas that are relevant to the particular location (e.g. shopping guides in shopping malls), with clear identification of what type of information the user can expect to find.

More generally, a beneficial regulatory climate is also important for future development and will affect the diversity of services available. (Regulatory aspects of videotex are considered in Chapter 8). Generally, all industries in the communications sector should be encouraged to participate in videotex services, and other industries such as banking should be provided with a regulatory environment that encourages participation as well.

The availability of foreign content is another variable that will affect future development. Even at this early stage foreign content is available for videotex, and as has been the case with preceding media, imported material is tempting because it can be acquired ready-made at low cost. The tendency to use foreign databases will increase with the use of gateways and with the growth of the U.S. videotex and teletext services. Already, online databases in Canada are heavily weighted towards U.S. sources. While access to information from all sources should be encouraged, measures should inhibit uncontrolled domination of content by foreign suppliers. Likewise, storage of content should be maintained in Canada as much as possible. However, the main effort should be not to protect Canadian companies from foreign competition but to encourage export of Canadian products and services.

107. While the B.C. Tel tracking data provided information about the number of pages in each IP's set, the Vista tracking data did not count the number of pages per IP set, nor was the name of the IP given on statistical reports.

108. Extensive qualitative research was carried out by the Alternate Media Centre for the broadcast teletext trial operated by WETA (a public radio station in Washington, D.C.). However, because the nature of teletext (with a small database of some 100 people) is so different from the videotex trials, WETA's research is not drawn upon here.

109. An interim evaluation of Cantel was carried out for the federal government by Price, Waterhouse. Price, Waterhouse, Draft Report on "Interim Evaluation of the Cantel Program", September, 1983.

Retail (9)

- Sears - products, services, teleshopping
- Dominion Stores - store services, shopping information, games
- Consumers Distributing - catalogue information, shopping information, sales, games
- Tip Top Tailors - information on clothing and fabrics, games
- Simpsons - merchandise, locations, services
- Miracle Food Mart - store locations, tips on shopping and cooking, Canada's food guide, menu planning service, product and pricing information
- Eatons - store information, products, services
- Juniors - products, store locations
- The Bay - products, specials, information on teleshopping.

Product Companies/Manufacturers (5)

- Nutri Gourmet - food information, menus
- Dominion Dairies - food information, recipes
- Nestles - product descriptions, dietary information
- Sony - product descriptions, office locations
- Croydon Furniture Systems - office products (furnishings and communications systems).

Business Services (5)

- Clark and Messenger - employment opportunities, employment statistics, job facts, games and quizzes
- A.E. LePage - real estate information, guide to buying and selling a home
- United Van Lines - moving information, moving game
- Beta - educational information, business information, art on Telidon, policy statement
- Thompson Lightstone & Co. - opinion poll on polls.

Banks, Trust Companies (4)

- Royal Bank - banking services, "minding money", interest rates, mortgage calculator
- Continental Bank - banking services, games
- Canadian Imperial Bank of Commerce - services, branches, general banking information
- Guarantee Trust - deposits, interest rates, real estate.

Financial Investment (1)

- Marketfax - stock markect information.

Insurance Companies (4)

- Manulife - insurance information services, location
- Standard Life - services, history, salute to amateur sports, financial planning
- Royal Insurance Canada - insurance services
- The Co-Operators - insurance services, drivers quiz, fire escape.

Publishers (8)

- Computerese - games, puzzles, community services, educational information, computer information
- Toronto Star - games, news, sports, food specials, personal greetings
- Encyclopedia Britannica - quizzes and tests, fascinating facts
- Readers Digest - teasers and tests, quizzes, advertising for cash sweepstakes
- Southam Inc. - information about Southam (advertising), games (videogolf)
- World Book - prime ministers of Canada, nations of the world, people who made history, facts about language, basic arithmetic, highlights of literature
- Concord Publishing - you and the law (law for non-lawyers)
- Time-Life Books - the healthy heart, caring for houseplants, coping with household emergencies.

Community/Public Interest Organizations (5)

- Community Information Centre - day care, recreation, community services, United Way fund raising activities
- St. John's Ambulance - first aid information, treatment, etc.
- Emergency Planning Canada - 11 steps to survival
- Carleton University - Telidon social impacts, information policies
- Consumers Association of Canada - product reports.

Religious Organizations (1)

- Christian Computer Based Communication - religious information.

Film Theatre (1)

- The Funnel - experimental film offerings.

Travel/Tourism (10)

- Air Canada - schedules, routes, fares, etc.
- British Tourist Authority - holidays in Britain
- Nepean Travel - cruises, tours, charters
- Holiday Inns - Canada, U.S., international
- Iberia Airlines - travel to Spain, the world
- Traveltex Ontario - Ontario tourism information
- Traveltex New York - entertainment, hotels, etc., in New York
- Traveltex Toronto - restaurants, entertainment, travel, weather
- Profile Thunder Bay - tourist information about Thunder Bay
- Canaglobe International - travel tips, time share sailing.

Sports (2)

- Sportsync - hockey information, locations, statistics, sports trivia
- Fitness - getting in shape, fitness for sports.

Videotex Companies/IP's (13)

-   Infomart - games, childrens stories
-   Telesync - Zazie the electronic doll (game)
-   Telethought - entertainment listings (cinema, theatre, music, etc.)
-   Pixel Productions - index to pages they have produced (Telesync, profile Thunder Bay, Telidon showcase)
-   Videopage - Videotex services, examples of pages, designs, etc., information on page creation, layout, etc.
-   Proulx Bros. - photographic and Telidon services, Telidon samplers, illusions, etc.
-   Infokinetics - advertising their services, client information, film world news, Jack Garson Orchestra
-   Hemton - advertising for Hemton EPS 1
-   Faxtel - advertising for their page creation services
-   Gabriel Audio Visual - sales, services, crafts
-   Picture Data Inc. - Mutual Life Insurance, computer jargon
-   Trinity Square Video - information about community Telidon, artists pages, samplers.

Government (6)

-   Department of Communications - games
-   Atmospheric Environment Service - weather
-   Agriculture Canada - pesticides, food in the home, central experiment farm
-   Ontario Ministry of Tourism - tourism services, attractions
-   Ontario Ministry of Energy - transportation, energy programs, energy quiz
-   Statistics Canada - stats quiz, economic indicators, consumer price index, today's economy, etc.

Education (2)

-   T.V. Ontario - educational information, quizzes, questionnaire
-   Vu-Nasa II - educational information, books, news, quizzes and facts, bikers journal, poetry and quotations.

Energy (1)

- Atomic Energy - nuclear fission.

Automotive (1)

- Canadian Automobile Association - driving information, used car buying guide, driving costs, etc.

Telephone Directory Companies (1)

- Tele-Direct - Electronic Yellow Pages - automotive guide, business services guide, dining guide, financial services guide, home improvements guide.

Miscellaneous (2)

- Million $ Magazine - information on lotteries, winning numbers
- McCann Models - daily biorhythms.

Telecommunications Companies (2)

- Trans Canada Telephone System - telecommunications quiz, communications systems
- Bell Canada.

Elie Field Trial:
Grassroots "Lifestyle" IP's

Travel (4)

- Air Canada
- CP Air
- Fort Garry Travel
- Regional Airlines and VIA Rail

Retail (1)

- The Bay

Banks/Financial Institutions (2)

- Bank of Montreal
- Royal Bank

Cultural (6)

- Centre Cultural Franco-Manitobain
- Manitoba Theatre Centre
- Royal Winnipeg Ballet
- St. Boniface Historical Society
- Winnipeg Art Gallery
- Winnipeg Symphony Orchestra

Education (7)

- Brandon University
- Correspondence Branch
- Department of Education
- Manitoba Educational Telidon Association

- Phoenix School
- Red River Community College
- University of Manitoba - Faculty of Agriculture

Consumer Information (3)

- Better Business Bureau
- Consumers Association of Canada'
- Home Economics Directorate

Health/Fitness (5)

- Community Task Force on Maternal and Child Health
- Health Protection Branch
- Fitness and Amateur Sport
- Nutrition for the Elderly
- St. John Ambulance

Community Information (3)

- Contact - Community Information and Referral Service
- Country Billboard
- Elie - St. Eustache Community Billboard

News/Weather (4)

- Broadcast News
- Meteorological Environment Planning
- National Oceanic and Atmospheric Administration
- Western News

Religious (1)

- Catholic Pastoral Centre

Energy (1)

- Atomic Energy of Canada Limited

Wildlife Organizations (2)

- Ducks Unlimited
- Manitoba Wildlife Federation

Sports (3)

- Manitoba Softball Association
- Winnipeg Blue Bombers
- Winnipeg Jets

Insurance (1)

- Manulife Insurance

Law (1)

- Law Society of Manitoba

Classified Advertising (1)

- Manitoba Community Newspaper Association

Government Information (3)

- Municipal Affairs
- Statistics Canada
- Agriculture Canada

Telecommunications (2)

- Manitoba Telephone System
- Trans Canada Telephone System

Hotel/Accommodation (2)

- Manitoba Farm Vacation Association
- Westin Hotel

Crafts (1)

- Hands on Magazine

Childrens Stories (1)

- Genesys

Lotteries (1)

- Western Canada Lottery Foundation

Business Services (1)

- United Van Lines

Entertainment Listings (1)

- Winnipeg Magazine

Games (1)

- Infomart

Market Reports/Futures (10)

- Broadwater Farm Service
- CanAm Commodities Corp.
- Chicago Board of Trade
- Chicago Mercantile Exchange
- Manitoba Pool Elevators
- MidAmerica Commodity Exchange
- Parrish and Heimbecker
- United Grain Growers
- Winnipeg Commodity Exchange
- Hedging and the Use of the Commodity Futures Market

Livestock Information (7)

- Animal Industry Branch
- Feedlot Profitability Analyzer
- Hog Finishing Profitability Calculator
- Manitoba Cattle Producers
- Manitoba Hog Producers Marketing Board
- Farrowing Return Calculator
- Veterinarian Infections Diseases Organization

Agricultural News, Reports and Summaries (4)

- Farm Market Network
- Farm Scene
- Manitoba Department of Agriculture
- Westex News

Crop and Grain Information (11)

- Canada Grains Council
- Canadian Grain Commission
- Canada Seed Growers Association
- Canola Council of Canada
- Cargill Grain
- Manitoba Seed Growers Association
- Northern Sales
- Pioneer Sales
- SeCan Association
- Statistics Canada Seeding Report
- Wheat Comparative Analyzer

Fertilizers/Pesticides/Herbicides (5)

- Chemagro
- Hoescht
- Monsanto
- Sprayer Calibrator
- Sprayer Cost Calculator

Banking Services/Lending Information (6)

- Bank of Montreal
- Farm Credit Corporation
- Farm Improvement Loans
- North West Trust
- Royal Bank
- Toronto Dominion Bank

Agricultural Research Information (4)

- Lethbridge Research Station
- Melfort Research Station
- Morden Research Station
- Winnipeg Research Station

Farm Equipment/Machinery (4)

- E. Bain Jackson
- Farm Machinery Board
- Gaber, J.P. and Sons Ltd.
- Prairie Agricultural Machinery Institute

Insurance Information (2)

- The Co-Operators
- Manitoba Crop Insurance Corp.

Labour/Equipment (1)

- Canada Farm Labour Pools

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Tourism and Transportation

- Air B.C.
- B.C. Ferries
- Bayshore Yacht Charters
- DOC Boating
- Great West Holidays
- Greyhound Lines of Canada
- Harbour Ferries Ltd.
- Japan Air Lines
- Jib Set
- Mexicana Airlines
- Ministry of Tourism
- P. Lawson Travel
- Pacific Coach Lines
- Rent-A-Wreck
- Sea Bus
- Sea Festival
- Sea Wing Sailing
- Tilden
- Trailways
- Whistler Resort Association

Retail/Merchandising

- Artona Studio
- Astro Guard Security
- Bathwall Industries
- Bell Tours
- Broadway Driving School
- Business Communications Centre
- California Motor Cars

- Carrying Industries
- Children of the Raven Gallery
- Dean Brothers Collision
- Formally Yours
- Gray Line Bus Tours
- Handy Chair
- Harbour Centre Mall
- Hill the Mover
- Kawasaki
- La Porte's Moving and Storage
- Liquor Distribution Branch
- Mackay Swan Florists Ltd.
- Maharlika Stereo
- Modern Day Distributors
- Olivieri's Ravioli
- Pacific Windforce Charters
- Park Royal Shopping Centre
- Royal Centre Mall
- Singer Sewing
- Sony
- West Ender Newspaper
- White Dwarf Books

Public Service Organizations

- B.C. Medical Association
- Canadian Cancer Society
- Fraser Estuary Information System
- Greater Vancouver Information and Referral Service
- Kinsmen Rehabilitation Foundation
- Museum of Anthropology
- Society Promoting Environmental Conservation

Miscellaneous

- B.C. Hydro

Hotels/Restaurants

- B.C. Hotels Association
- Delta Airport Inn
- Delta Hotels
- Delta River Inn
- Dominion Restaurant Guide
- Four Seasons Hotel
- Holiday Inn Broadway
- Holiday Inn Harbourside
- Hyatt Regency of Vancouver
- Inn at Denman Place
- International Plaza Hotel
- Miramar Hotel
- Royal Scot Motor Inn
- Sheraton Landmark
- Vancouver Supper Club

Government

- B.C. Place
- Cantel
- City of Vancouver
- Ministry of Attorney General
- Ministry of Cultural Heritage
- Ministry of Environment
- Ministry of Human Resources
- Northeast Coal Development
- Rentalsman
- Statistics Canada
- Statistics Canada-French

Financial Institutions

- Federal Business Development Bank
- Guarantee Trust
- Hong Kong Bank
- Royal Bank of Canada
- Yorkshire Trust

Entertainment/Sports/Attractions

- Arts, Science and Technology Centre
- B.C. Lions
- Butchart Gardens
- Events Calendar - Videolink
- Expo '86
- Gallery Guide/Video Press
- Greater Vancouver Convention and Visitors Bureau
- Minter Gardens
- Park and Tilford Gardens
- PNE
- Richmond Visitors and Convention Bureau
- Southwestern B.C. Tourist Association
- Vancouver Island Publicity Bureau
- Vancouver Museum
- Vancouver Public Aquarium
- Vancouver Symphony Society
- Vancouver Whitecaps

Education/Libraries

- Atomic Energy of Canada
- B.C.I.T. Library
- Douglas College
- Education Information Centre

- Open Learning Institute
- Vancouver Community College
- Vancouver Public Library

Business Services

- Canada Videotex Systems
- Distacom Communications
- Dominion Directory
- Dunhill Personnel Consulting
- Impressions Management
- Journal of Commerce
- McCann-Erickson Advertising
- Ped-X-Air
- Videolink
- Vispac
- Waymark Associates

CHAPTER SEVEN
Impacts and Social Uses of Videotex

Since the time when videotex was an untried concept, concerns have been raised about its social impacts. Partially, this reflects the fact that videotex was nurtured by government: in fostering a new technology, the Department of Communications felt a responsibility to also consider social effects. In general, a similar set of social issues has reappeared repeatedly. Exhibit 7.1 lists commonly raised social issues and Exhibit 7.2 gives examples of specific questions frequently raised about this emergent technology.

Central Issues

Access to videotex may refer to both the opportunity to be an information provider (IP access), and the availability of terminals and services to users (user access). IP access will be affected by a number of technical and commercial conditions, including the terms of operation set by system operators and by videotex companies who manage databases for smaller clients, the proliferation of PC's and low priced software for users.

User access, on the other hand, may become a social issue in the sense of privileged vs underprivileged subgroups of society. If only a select segment of educated professionals have access to videotex, for example, a class of "information disenfranchised" might arise. If public interest and government information is distributed over videotex, the problem of excluded segments of society becomes more acute.

Issues of privacy have been prominent with computer communications generally, and include the individual's "right to know" what information is being stored about him or her, and the secondary use of records, (i.e. cross-reference with other databases, or the resale of names for mailing lists). Privacy was studied by the Department of Communications in conjunction with the Department of Justice as early as 1972 in a Task Force on Privacy and Computers, and has been examined by a number of government bodies since. The Human Rights Act, Part IV, deals with certain privacy issues, and the "right to know" is also addressed by freedom of information legislation that has made government files more open to public scrutiny. Two aspects of privacy relate particularly to videotex: the privacy of content (including messaging and banking), and the privacy of billing records that could reveal a detailed profile of an individual.

EXHIBIT 7.1

Social Issues Related to Videotex

Employment Impacts	- effects on jobs, occupations, training requirements
Privacy	- confidentiality - secondary uses of databases (i.e. resale of information such as mailing lists; synthesis of separate databases, etc.) - unwanted advertising and "junk mail"
Vulnerability	- safety of stored records - increased dependance on technology - vulnerability to computer terrorism - computer crime
Access	- opportunity to be an information provider - opportunity to be a user of their system
Diversity of Information Provided	
Inclusion of Community and Public-Interest Information	
Social Equity	- stratification of society into information rich/poor - exclusion of segments of society from electronic services
Consumer Protection	- protection against impulse buying - protection against fraud and piracy - quality, taste, and truthfulness of information
Institutional Impacts	- effects on social institutions such as the press, banking and the education system
Changes in Social Patterns	- changes in lifestyle - increased social isolation/decreased social integration - depersonalization of services
Cultural Impacts	- Canadian content concerns - impacts on Canadian publishing - media concentration - control over content
Use by Special Needs Groups	
Health Issues	- effect of video display units, prolonged exposure to low level radiation

EXHIBIT 7.2

Social Impact Questions

Question	Broader Issue:
What happens if access for all information providers is not guaranteed?	Access
Can controls be placed on unwanted advertising to the home?	Privacy
What protections should be put in place to protect individuals against impulse buying?	Consumer Protection
What standards should be developed to ensure a minimum standard of computer literacy?	Equity of User Access
What potential exists for decreasing the stratification which might exist between the information rich and information poor in society, and what structures can be put in place to ensure access?	Equity of User Access
What technical developments can encourage widest possible use of Telidon among all groups?	Information Provider User Access
What are the potential demands for training and skills development?	Employment
If Telidon is used for health and medical purposes, what safeguards should be placed on records and ensuring confidentiality?	Privacy (Confidentiality)
What laws apply in assessing the quality and taste of information placed on Telidon?	Consumer Protection
What laws and rules need to be put in place regarding fraud or piracy of information and software?	Consumer Protection
If electronic shopping comes into a mass appeal, what impact will there be on pricing, (i.e. will prices change and "float" like currency exchange)?	Consumer Protection
What are the implications of electronic publishing for magazines or books? What content/policies can ensure cultural diversity?	Cultural Diversity
Are there mechanisms for individuals to define different "privacy" levels to protect their information and messaging?	Privacy
If Telidon is used for electronic mail, how will users not connected be serviced?	Social Integration/ Equity

Vulnerability is another major concern as society becomes more and more dependant on computer communications systems. Computer systems are vulnerable to interruption or damage from a range of eventualities, from wartime hostilities to terrorism and computer crime.

It is the employment impacts of new technologies, however, that have received the greatest attention in recent years. Numerous studies have attempted to forecast the effects of the advent of robotics or office automation of the labour force. In general these works have been highly speculative and no concensus can be found. Alongside the Cassandras who predict dire labour effects,[110] contrasting studies suggest that new occupations may offset whatever jobs are lost.[111]

The range of possible employment impacts includes: jobless growth (when an organization expands its activities without increasing staff); job displacement (when an individual loses a job but finds another elsewhere); occupational shifts (when certain occupations become obsolete while others emerge); and de-skilling (the over simplification of human work as computers control more parts of a job). As clerical and sales functions are increasingly automated (with telebanking, teleshopping, travel reservations databases, and so on), it has been suggested that a widening gap may divide the professional and the clerical classes. At the professional level new positions may keep opening, while at the clerical level, jobs are reduced but the individuals affected lack the education to profit from new professional jobs.

The problem with any attempt to predict the social impacts of a new technology, however, is that prognosticators tend to be wrong, since one is usually only making at best an intelligent guess. Three main points particularly confound prognostications about videotex: First the important possible uses of videotex are not yet apparent; secondly, videotex is not a separate technology that can be separated out of computer/communications generally; and finally, computer/communications may be "transformative" technologies that will deeply reshape society itself.

The New Media Muddle

The initial uses of communications technology have seldom been their eventual mass uses. The telephone, for example, during the first decade after its invention was thought of as a comparatively trivial device that could pipe music into the home. As another example, in the early years of the recording industry, entrepreneurs believed that they were selling reusable office dictaphones; the industry "only accidentally discovered it was in the music business, just in time to save itself from still-birth and bankruptcy".[112] The lesson from history is that it is myopic to visualize videotex in terms of its current use.

The confusion as to what uses will be found for videotex was evident in early promotional forays. For example, Bell Canada's initial marketing material for Vista in 1979 included a photograph of a family in front of the TV set reading news in alphanumeric print, as if:

> ... the family would spend their evenings looking up information. They may not have had much choice, for the Videotex system tied up the phone line and the television set, thereby eliminating two entertaining alternatives to a fun evening of Videotex retrieval.[113]

Furthermore, videotex cannot be considered as a development on its own but rather is part of an "information revolution". The computerization of information occurring today involves a number of separate technological breakthroughs (including innovations in telecommunications, information storage and design).[114] It is the integrated nature of electronic technology which has caused these emergent areas to be lumped together. Videotex, as a merging of all these areas, should be considered not as a single technology but as part of a larger computerization of society. To date, however, the diffusion rate of videotex has been much slower than closely related technologies such as microcomputers or communicating word processors.

Transformative Technologies

A transformative technology results in the creation of entirely new social and cultural structures, not merely the modification of old ones. But these changes become apparent only after wide diffusion of the technologies over a considerable length of time.

Two of the most transformative communication technologies in the past were the invention of writing with the phonetic alphabet and, centuries later, the invention of the printing press. Harold Innis, writing about changes in the ancient world when hierogliphics stone were replaced by writing on papyrus, described a transformative technology as one whose ongoing social, cultural and economic consequences for several hundred years afterward could never have been foretold.

The invention of phonic writing transformed the nature of human institutions, commerce and culture. It coincided closely with the emergence of codified law, monotheism, abstract science, formal logic and individualism, and "provided the framework for the mutual development of these innovations".[115] It has been proposed that the invention of the alphabet provided a model of abstract thinking, since words were segmented into meaningless phonemes which were then represented by arbitrary visual signs:

> This alphabet transformed the oral tribal society of the pre-classical Greeks into the world's first society based on abstract science, formal logic, rational philosophy and individualism all within 200 years of the first introduction of the phonetic in 700 B.C.[116]

It was Innis who developed the theory of the "bias of communications", arguing that the characteristics of a medium of communications have important implications for the character of knowledge itself.[117] Marshall Macluhan's dictum that "the medium is the message" stems directly from Innis's work.

In looking back at earlier transformative changes in communications, several points are relevant for videotex. First, technological and non-technological innovations tend to cluster in time. Phonetic writing, Western monotheism, abstract science and codified law were all invented in a comparatively short time-slice. With microelectronics, we may see in the next decades not only a plethora of new technologies, but changes in philosophy and culture as well. However it is apparent that the kinds of social impacts and upheavels likely to result from a transformative technology cannot be easily anticipated by persons of the same era.

Predictions and Prophecies

Secondly, although it is intuitively clear that it is impossible to foresee even short-term (twenty years) effects of a new technology, it is perhaps relevant to introduce an argument of the British philisopher of science, Karl Popper. Popper notes that the course of human history is strongly influenced by the growth of human knowledge. As we cannot predict, by rational or scientific methods, the future growth of our scientific knowledge, "we cannot, therefore, predict the future course of human history".[118] This argument does not refute the possibility of any type of social prediction; we cannot, however, predict "historical developments to the extent to which they may be influenced by the growth of our knowledge".[119]

Popper also makes a distinction between two kinds of predictions:

> We may predict (a) the coming of a typhoon, a prediction which may be of the greatest practical value because it may enable people to take shelter in time; but we may also predict (b) that if a certain shelter is to stand up to a typhoon, it must be constructed in a certain way, for instance with ferro concrete buttresses on its north side. .... In the one case we are told about an event we can do nothing to prevent. I shall call such a prediction a "prophecy"....

> Opposed to these are predictions of the second kind which we can describe as technological predictions, since predictions of this kind form the basis of engineering. They are, so to speak, constructive, intimating the steps open to us if we want to achieve certain results.[120]

In the context of social impacts, what Popper calls a "constructive" or "technological" prediction would involve some attempt to plan and modify anticipated effects. Most speculations about the future of videotex, however, are not constructive predictions but only what Popper would term "prophecies" about whether certain impacts will occur or not.

Rate of Change

A final lesson from the history of innovations is that the timeframe for development has dramatically compressed. Today's inventions are diffusing at an extremely rapid rate, an order of magnitude faster than the traditional time lag of 50 to 100 years between a basic

discovery and its first commercial products. For example, Clark Maxwell's basic discovery in electromagnetics did not yield commercial products until a century afterwards. The art of printing with moveable type was invented by the early 1450's but due to religious and political censorship, printing was not a free activity until 1695.

Integrated circuits, on the other hand, were only invented in 1969, microprocessors in 1971. The competitive pace has become so heated that companies fear their products will be obsolete before they are ready for release.

Approaches Used to Assess Impacts

Despite the basic limitations in predicting the future of a new technology, a variety of means have been developed to assess both short and long term effects. The methodologies applied to social issues range from discussions with individuals (expert or otherwise), to structured experiments that monitor both control and test groups. Studies variously focus upon the individual, the social group or organization, or society as a whole.

The Quality of Working Life approach, as the name implies, focuses on the effects of technology on individuals in the work environment. A basic objective is to create more satisfying work; the organization, it is assumed, will benefit through more satisfied workers who have higher productivity. The QWL approach includes a variety of techniques and management styles to give workers more responsibility and autonomy.

A major contributor to the QWL approach has been the Tavistock Institute of Human Relations based in London. This group looked beyond the level of the individual employee to the organization of work itself, in an effort to increase organizational effectiveness. The Institute began to recognize the influence of technology on both the nature of jobs and the social organization of the workplace. The Tavistock researchers noted that engineers designed technical systems with little understanding of the human and social systems that would result, and developed an alternative concept of an organization as a "socio-technical system". Work design, it was argued, should be a process of joint optimization of the social and technical systems -- a process that came to be known as socio-technology. Socio-technology focuses on work design within an organization and can be viewed as tool to achieve quality of working life goals.

A number of applied methodologies for collecting and analyzing information are associated with both of these approaches. With QWL, group discussions, interviews and questionnaires investigate how workers perceive their jobs. A steering group (with participants from both labour and management) analyses work patterns to examine efficiency.

Sociotechnology uses formal analytic tools to optimize division of labour and job design. Major steps include: the "scanning" of the work system for an overview; identification of unit operations; and the identification of "key variances" (points at which deviations from a desired standard are likely to occur). QWL and sociotechnical approaches have become increasingly popular, but have not been applied yet to the business contexts of videotex.

Network Analysis is a method that assesses the impacts of a technology at the organizational level by studying communications linkages between individuals (or organizational sub-units). A matrix of interactions can be constructed showing "who communicates with whom". This matrix can undergo various forms of analysis, including time series analyses, probablistic approaches, and stochastic modelling (such as Markov chain analysis) that attempt to map likely outcomes from one time period to the next.

New information technologies such as business applications of Telidon can be expected to affect organizational patterns. The value of network analysis is that it looks at relational communication processes, and how interactions among individuals are affected by the technology introduced.

With any method of assessing social impacts, there is a fundamental need to allow adequate time for observations. Network analysis offers the opportunity to incorporate time as a unit of measurement and as an interval of observation. Another feature of this method is that, in addition to questionnaire surveys and self-report diaries, the context of social interaction is also observed directly by the researcher.

Another research method based on organizational behaviour has been developed at the University of Waterloo.[121] This approach begins with three basic questions: What do people do? What do people think they do? What do people think about what they do? The purpose of investigation is to understand what is going on in the organization to provide a

basis for measuring a new technology's impact. Methods used to gather information include a form on which to write what activities "one thinks one does", a diary to recall all interpersonal communications, and interviews to obtain details.

The main problem with this method is its reliance on respondents for extensive self-reports of their activities and attitudes. A strong point, however, is attention given not only to the users' responses to the technology but to the context where the technology is introduced. When combined with quasi-experimental designs and with other instruments such as surveys or tracking data, this approach has the potential to assess impacts in a more complete way.

Laboratory methods in communications research undertake controlled testing of a specific hypothesis in an artifically controlled environment and have been used to examine detailed human factors questions. These methods are particularly useful at the product development stage for testing behavioural and psychological responses to features of the new technology. Limitations include the uncertainty of generalizing findings to a broad population, and the time required for individuals to become proficient with equipment in the lab. Lab studies are particularly limited in terms of social research.

In contrast to "micro-level" effects on individuals and organizations, "macro level impacts" relate to society as a whole; they include, employment impacts, labour shifts, and altered leisure patterns. A number of these approaches attempt to forecast the future of a technology in its broadest sense.

Leading edge analysis focuses on early or "leading edge" users of a technology, (either individuals or companies) and attempts to extrapolate trends as an innovation diffuses to a broader base. The leading edge groups, who are often introduced to the technology in test situations, are assumed to be representative of a larger population.

In most such studies, a detailed assessment of the users' experience is carried out, including attitudes towards the technology. Where quantitative data is collected, the results are often used to forecast the success of the technology in the marketplace. The most obvious limitation with this approach is that there is an a priori selection of the "leading edge" companies or population segments, so that trend extrapolations should be

very cautiously made. Also, there tends to be nonrigorous measurement of perceived impacts.

The Delphi technique is a consensus opinion approach that has been used to forecast the future of a number of technologies, including videotex. Questionnaires are distributed to a selection of experts; their opinions are compiled to give a quantitative indication of outstanding tendencies; these responses are returned to the experts, who are asked to either shift their original answers or explain their reasons for differing from the dominant views.

The Delphi technique is a useful way to obtain opinions from experts, but is less successful in providing accurate predictions. With Telidon in particular, there are very few examples other than field trials to form the basis of a viewpoint; yet there has been no lack of opinion about what potential impacts this new technology will have. An assessment of Delphi by a major telephone company found that the concept of "expert" was virtually meaningless when dealing with complex social phenomena.[122] Also, reliance on a panel of experts can be an elitist means of defining problems.

A more modest research approach that focusses on short-term impacts is time and activity analysis: studying the effect of an innovation on how individuals spend their time. Changes in daily life activities are examined, such as altered transportation patterns when teleshopping or banking are introduced.

Generally, surveys asking individuals to recall their behaviour have been the main source of data in such studies, usually collected "longitudinally" over several time periods. The limitations of such techniques in measuring social phenomena include a concentration on "average days" that neglects variations and individual differences, and neglect of the context in which individuals are acting. In a household setting, for example, the activities of family members are affected by the fact that they share the use of TV equipment used either for television or for videotex. The activity of any one individual may be a compromise; but time/activity analyses and diaries offer no way to take account of available options, or of preferences that are not expressed as acts.

Time/activity approaches also tend to generate an over abundance of data (far more than can be adequately analysed), often leading to silly or obvious generalizations. The nature of the classifications used can also be limiting, when human behaviour is sorted into quantifiable subsets. Often, broad categories can become "catch-alls" at the expense of detail. For example, typical time/activity studies refer to "work-time", a deceptively familiar phrase that masks numerous sub-classifications. Whether people were driving trucks or writing novels, all are homogenized under the heading of "work".

The use of <u>diaries</u> is a form of time/activity analysis in which respondents keep logs of their activities during the day. The advantage of diaries is that they gather more accurate data than interviews and ask respondents to remember how they spent their time. The problems with this method include the costs of collecting and analyzing the very detailed information available, especially if the interval at which respondents are asked to record activity is too small. If the interval is too large, on the other hand, details about short-term activities are lost.

Field Trial Research

Field trials offer an opportunity to evaluate new technologies in real-world environments and generally follow one of three designs:

1. true experiments in field settings
2. quasi experiments
3. non-experimental designs.

This last approach is more akin to case studies in that little or no control is exercised by the researcher. Experimental designs, on the other hand, are typified by full control over the items to be measured and by the assignment of individuals to test or control groups. Quasi-experimental designs allow only partial control, and usually include: a control group as well as a test groups; the application of pre-trial measures; and the observation of post-trial results. The quasi-experimental approach is usually considered the most appropriate for examining short-term impacts, as a compromise between the highly structured controlled experiment and the non-experimental case study. Field trials of computer technology offer a particular advantage, in that computer generated tracking data can record information about how the system was used.

The Canadian Telidon Field Trials and the Measurement of Social Impacts

The field trials conducted in Canada were limited vehicles for promoting research into social issues. However, given the Department of Communication's influential role in the development of Telidon technology, it was considered important that social research accompany the field trials, and a number of projects were funded. Impacts thought to be relevant for measurement included effects on quality of life, sense of privacy, interpersonal relationships, and lifestyles -- in other words, changes at the "micro" or individual level, studied mainly through interviews with trial participants. Exhibit 7.3 lists a number of social issues investigated.

As Exhibit 7.4 indicates, most trials were classified as "quasi-experimental". However, in most cases significant limitations were evident, which raises fundamental questions about the quasi-experimental nature. In the B.C. Tel trial, for example, there was no control group, no attempt to systematically select participants (who were mostly volunteers), and no mechanism to replace drop-outs from the trial. Project Elie collected data on two comparison groups: households in the Elie not participating in the trial, and also a control sample outside the area. While this design was the closest to a true quasi-experimental model, still there was no indication of how the sample was selected.

The Bell Canada trial selected its households more systematically. A sample of customers were advised of the field trial by mail and asked to indicate interest in participating. A questionnaire then assessed their socio-demographic status, their use of technology, and also applied a socio-psychological scale. However, results from the trial were based only on the actual participants, with no control group. The OECA trial used only a test group, and in the Project Mercury trial conducted by New Brunswick Telephone, a control group was initially planned but ultimately only a small test group of some 25 families was used.

The types of data collected in the various trials included **pre-trial qualitative research**, usually conducted in focus group formats or personal interviews. The pre-trial assessments generally measured attitudes, expectations, technology awareness, media behaviour and demographic profiles.

EXHIBIT 7.3

Social Issues and Examinations in the Field Trials

Issue	Types of Examination in Field Trials
Privacy	Pre-trial discussions with users, IP's and industry experts (no direct measurement); background studies.
Access to Current Service	Inference from trial designs, e.g. terminal placement, operating hours, tracking data, field trial operating plans, and demographic segmentation.
Vulnerability, Dependency Technophobia	No direct measures, only some reference in pre-trial discussions.
Social Participation	Usage data from residential trials; special user group evaluation.
Education	Preferences for information services.
Special Needs	Impacts on handicapped and physically impaired. Various trial components proposed, but little data available.
Lifestyles	Pre-trial, post-trial impact on activity/time use at the individual level. Most trials' evaluations limited in this area. Comparisons between trials not possible. Some literature on substitution of travel by teleservices and related studies dealing with altered work times, recreation, leisure, and learning patterns.
Family Relationships	Pre-trial, during-trial and post-trial measures; evaluation studies from trials not available.
Community Involvement	Response to community databases; involvement of community organizations; content of social and community relevance. Discussion with those responsible for community databases.
Cultural Impacts	Only limited pre-trial assessment; background reports on electronic publishing impacts. Limited discussion with users and operators.
Employment Impacts	No assessment of these issues to date; some reference from other studies on automation, labour displacement studies.
Computer Literacy	No direct measures; some discussions in literature.
Access (Societal)	No direct assessment of broad implications; some discussion in background studies.
Consumer Protection	No direct assessment; some discussions with consumers and potential users; some assessment in workshops and seminars.
Office Impacts	Activity analysis in business trial context; associated studies on office automation.

EXHIBIT 7.4

Selected Field Trials and Designs

1. B.C. Telephone   Quasi-experimental design

2. Alberta Government Telephone   Case study

3. Project Eli   Quasi-experimental design

4. Vista   Quasi-experimental design

5. O.E.C.A.   Case study

6. Project Mercury   Case study

7. Cantel   Case study

8. WETA   Quasi-experimental design

On-going trial assessments included survey-based measures of system usage, preferences for information, perceived utility, and attitudes toward the technology. Tracking data recorded user statistics such as terminal location, access time, session length, and type of information retrieved. Self-monitoring and user diaries were other methods used to indicate information consumption, media behaviour, daily activities and Telidon usage. Finally, post-trial evaluation included qualitative assessments through group discussions, quantitative measures of attitudes, and follow-up measures of time/activity behaviour.

Generally, the limitations of the data gathered in the trial made it difficult to assess even short-term impacts — much less, long-term trends. The results from the trials can be considered descriptive of particular situations at particular times, but it would be highly suspect to extract any broad findings. In addition to the lack of control groups, a major limitation was the neglect of sampling procedures. In almost all cases, the field trial groups were convenience samples, and were not systematically drawn from a broader population.

Sample groups also tended to be biased towards an affluent segment of society considered more likely to be "leading edge users". (In the Elie trial, for example, 45% of the heads of households were executives, business owners or skilled labourers, and 89% owned their own homes).[123] In addition, most trials allowed for only short time frames of observation, too short, perhaps, to allow for novelty effects, or to ensure adequate familiarity with the technology. Some trials planned for control groups, careful sampling and longer observation periods in their initial design phases; however, under the technical pressures of the field trial, such concerns tended to fall by the wayside.

Other limitations related to technical characteristics. Along with the basic problem of very preliminary databases, technical difficulties were often experienced. There was also a concentration on the existing service configuration of videotex, (i.e., simple one-way information retrieval), though this may not be the configuration used in even the short-term future. Furthermore, in most trials, databases changed daily and weekly. There was no ability to control for these changes and how they affected users' perceptions.

There was generally a lack of focus on social issues, with emphasis placed instead on direct marketing implications. No trials "measured" any aspects of such prominent issues

as privacy, access to information, and so on. If even short-term impacts such as effects on family structure, lifestyles, travel patterns were to be examined, they would require rigourous and controlled testing with "longtitudinal" observations. Furthermore, measuring attitudes requires the construction of scales, and scale validation in turn requires a significant amount of effort.

In sum, these field trials were more appropriate for evaluating responses to technical performance than to assessing any socio-psychological impacts. Attitudes towards technology could not be adequately measured in the loosely defined settings that occurred, and the utility of the trials for measuring broader social issues was even more restricted, especially when data collection paid little heed to the fundamentals of research design.

In addition, participants were often asked biased questions, such as "Whether or not Telidon has increased their awareness of what goes on in their community". This sort of question invites a positive response; it is not surprising that 59.3% of respondents in the Elie trial answered yes. When respondents were asked whether or not they felt that Telidon would be "an important part of their future, 93.5% answered yes — even though 84% had indicated that Telidon had not affected their daily routine in any way.

Social Uses of Videotex

Rather than trying to prophecy the social impacts of videotex, it may be more useful at this early stage to investigate the socially beneficial uses to which the technology can be put. A number of initiatives in the Telidon field trials experimented with videotex and teletext for public interest or educational applications. The British experience with Prestel and teletext has included social uses of the technology as well.

The Prestel videotex policy was in marked contrast to the approach taken in Canada, where the Department of Communications paid special attention to social concerns. In Britain, social applications developed in spite of the prevailing commercial nature of Prestel and a general lack of government support.[124] It has also been suggested that as Prestel "reoriented" from the public marketplace to specialized business applications, a certain vision of the technology as a cheap, accessible medium for social applications was lost.[125]

Early British educational experiments with teletext included 19 school projects set up in 1979 where special pages of information complemented TV programs. Also, a tele-software trial downloaded computer software to schools over both the Oracle and Ceefax teletext services. Experiments with videotex included a trial in 32 institutions that covered a range of educational and training interests. Prestel has even been used in processing university applications.

Public interest uses of Prestel have included pages of information supplied by government departments, large charities, and libraries. Also, several local councils formed a consortium to reduce the high costs of putting up pages so that they could supply information to users at no cost. Content for special needs groups include Telemachus, which provides pages for the physically disabled, and applications on Ceefax and Oracle to service the deaf.

Telidon and Education in the Field Trials

Four main types of social applications were tested in the Telidon field trial settings: educational content; applications for special needs groups; publics interest or non-commercial information, and the Cantel database of federal government information.

At present, as described in a previous chapter, the educational uses of Telidon remain uncertain. Telidon terminals would have to be extremely cheap to make any headway in the educational marketplace, and the development of educational software is a time consuming and costly process. Much more likely are linkages between Telidon and the microcomputers rapidly diffusing through schools. Telidon could be incorporated as a software protocol into this technology; also, videotex networks or teletext broadcast could be used to download computer-aided learning software. The use of videotex or Telidon for actual computer-aided learning, however, (CAL) remains largely unexplored. Major limitations for CAL in the field trials were Telidon's menu structure, and the fact that terminals had only simple keypads rather than alphanumeric keyboards.

Because education is a provincial matter,[126] it was not formally part of the Department of Communications' four year industry stimulation program to transfer Telidon technology from the research lab. Nonetheless, **TV Ontario** (the provincial educational

communications authority) conducted a major field trial of both videotex and teletext from 1979 to 1982, largely supported by the federal Department of Communications. Fifty user terminals were used for both teletext and videotex services and were distributed throughout the province in schools, colleges and universities, public libraries, and special institutions such as schools for the deaf.

TV Ontario encouraged teachers to use the page creation systems at TV Ontario to make "learning units" themselves. Including the content TV Ontario staff produced, the trial provided access to some 60 learning sequences (and to the Vista database as well). School level applications included educational games, question and answer drills, a biology lesson, and two math courses. Two learning sequences were directed toward the hearing impaired. The broadcast content consisted of over 100 pages but unfortunately was not formally evaluated. (In a similar teletext trial by the KCET public TV station in Los Angeles, teachers cited motivation and enhancement as the major advantages of the service).

At all sites, most uses of Telidon were for learning about the technology, rather than with the technology, and demonstrations and casual exploration were predominant. Use for actual learning tended to occur when teachers used sequences they had created themselves. In elementary schools, teachers usually mediated between the students and the technology (operating the keypad or reading out loud from the screen). At universities, most use was for research and development related to the technology, rather than for the content itself.

Technical problems in access and transmission were common. Generally, participants expressed a need for more content and complained of complex graphics that took too long to appear. Teachers familar with computer-aided learning software found Telidon limited.

In 1980, TV Ontario began to operate a network of terminals placed in secondary schools, youth employment centres and public libraries, to access a database of educational learning materials and a major student guidance service converted into Telidon form.[127]

In the Elie field trial, the **Cybershare** database included interactive computer-aided learning courses on math and other subjects, as well as, several information retrieval applications. Also in this trial, a team called the Manitoba Educational Telidon Association **(META)** encouraged teachers to design short lessons that were then taken to Infomart for page creation. Unfortunately, no evaluation of these applications is available; however, surveys indicated that the most frequent users were children. In terms of overall services used in the trial, educational material ranked last, but 26% of the user population had at least sampled the educational content.[128]

In the **Vista** trial, participants had access to the TV Ontario content (which was stored on Bell Canada's host computer). The TV Ontario material rarely ranked lower than fifth in use, however, this may reflect the fact that "pages accessed" included use by schools testing Telidon for TV Ontario's own trial. Still, there is evidence from the Times Mirror Telidon trial in California that the public considers education to be an important component in videotex. (57% of respondents considered education for children to be an essential service).[129]

There was also experimentation with Telidon for non-formal education. For example, the National Museum of Man created two educational packages as part of the TV Ontario field trial. (One package gave background information about the museum, and the other described the technology of early native Canadians).

Distance Education

In 1982, the University of Calgary cooperated with Alberta Government Telephone and Athabasca University on a pilot project to combine Telidon with audio conferencing for an English grammar course. The project worked successfully, and it was concluded that the addition of graphics was worthwhile. However, it was also felt that the voice/data combination should be technically easier to handle and that the use of ephemeral Telidon images vs hardcopy should be carefully assessed.

Also in Alberta, in 1981 the Alberta Correspondence School, Alberta Education and Alberta Government Telephone cooperated on a grade 12 mechanics correspondence course. Students answered multiple choice questions with a Telidon keypad. Over 60

students took the course, and Telidon appeared to be as effective as traditional education. There was also a higher completion rate for the Telidon group. An evaluation of this project recommended that the Telidon graphics protocol should be used in the delivery of computer-based distance education, but that videotex should be replaced with a "true computer-based learning system".[130]

Generally, at the time of the field trials Telidon's tree structure and the lack of an alphnumeric keyboard made the technology extremely limited for educational applications. These limitations, however, are not inherent in the nature of videotex and could be overcome through appropriate technological developments.[131]

In particular, Telidon could be integrated as a software protocol into more sophisticated educational software. (For example, Telidon has been linked in at least two instances with Canadian-made computer-aided learning systems: the NATAL authoring language developed by the National Research Centre, and the CAN system at the Ontario Institute for Studies in Education). Any moves in this direction, however, must take into account the fact that major advances are expected in computer-aided learning as the use of artificial intelligence (AI) approaches grow. The systems into which Telidon is integrated will have to be state-of-the-art.

Educational Subcommittee of the CVCC

The CVCC (Canadian Videotex Consultative Committee) was formed to advise the Department of Communications during the early years of videotex development and included an education subcommittee. This subcommittee has continued past the life of the CVCC itself and has made a number of recommendations for videotex development, including: support for educational-based content creation, the revision of copyright law, the development of a telematics policy with common production standards, and the development of open networks for educational purposes.[132]

Special Needs Applications

Special needs groups include the speech impaired, the visually impaired, the hard of hearing, and the physically handicapped. Videotex potentially offers social benefits to

these groups in a number of ways, including: a means of typed-input communications for the speech impaired and a delivery system for health care information for the hearing-impaired. Teletext can also provide closed captioning for TV programs (i.e., captioning that is invisible during broadcasts except with a special decoder). Videotex applications could help the physically impaired to function more effectively in their home and work environment and could reduce the "communications isolation" the disabled often experience. In many cases, special hardware will be needed to meet physical handicaps. For example, at the University of Western Ontario, work has been done on sending pages of information to a braile printer.

While efforts to include applications for the disabled in the field trials were limited, a few relevant examples of videotex services exist. The Ontario Federation for Cerebral Palsy has created information on resources available for the disabled, and a community based videotex service known as AGORA, developed by the Universite du Quebec a Montreal included information for the disabled. Also, a study funded by the Department of Communications has examined the feasibility of a Telidon based facility at the Bliss Symbolics Communication Institute in Toronto. (Bliss symbols are a symbolic system of communications for the speech impaired). This study noted the rapid advances in the last decade in electronic communications aids for the disabled. Existing communication systems still require individuals to make a great deal of effort and are also relatively slow. The study emphasized the importance of economic factors and the need for well designed software for the interface between individuals and machines.[133]

In 1981, the Social Impacts Subcommittee of the CVCC conducted a set of workshops dealing with videotex and special needs groups.[134] These lessons led to recommendations that a committee of users with special needs be created to advise the Department of Communications on videotex and that all levels of governments, manufacturers and system suppliers be sensitized to the implications of videotex for those with special communication needs. Another key point raised was the high cost of developing suitable systems, and the need to subsidize equipment and services for the handicapped.

Another special applications area is preventative health care programs. Videotex link-ups could distribute health care information to the public in remote locations, including services for Indian and native peoples.[135] Videotex could also deliver services to health

care professionals in rural areas, such as training sessions to update skills, or diagnostic aids. Several videotex projects in Quebec offer health care information to both the general public and health care professionals.

Public Interest Information

Public-interest applications that inform people of services, events and issues have been considered a special component of videotex databases, accessed either by home users or through public terminals. Videotex offers a number of advantageous features as a vehicle for public-interest content, such as the ability to update information easily, and the possibility of access at any time of day or night. A public service organization could use videotex to handle commonly asked questions, letting staff give personalized attention to other requests. In addition to information retrieval, community-oriented computer networks could link special interest groups, ethnic communities, the handicapped, and so on.[136]

In the Telidon field trials most applications were commercial in nature, and public-interest groups received relatively little support from system operators. Still, in each trial some effort was made to include non-commercial information. In the B.C. Tel database, community services, non-profit organizations, educational institutions, libraries and government applications accounted for 38% of the total number of pages compared to 50.3% for commercial services. (Government applications made up almost half of the non-commercial information in this trial).[137] In the Elie trial, non-commercial IP's provided cultural information, educational and government applications, health and fitness advice, consumer information and community content. A major community information centre was involved with the Vista trial. Vista offered government and educational applications, and content by such groups as the Consumers' Association of Canada. (It should be noted, however, than in some cases "community information" was defined very broadly and even included weather and guides to entertainment).

There are three main concerns which emerge in the provision of non-commercial information on videotex:

1. The need to clarify the terms by which content can be designated as "non-commerical" or "public-interest", so that preferential treatment can be applied;

2. Consideration of how videotex competes with or complements other methods of disseminating public-interest information;

3. Consideration of the best ways to provide support for non-commercial content.

The problem of defining "non-commercial" content has been particularly difficult. While some videotex applications are clearly commercial and some are non-commercial, in between lies an extremely large gray zone.

Furthermore, the term "non-commercial" does not necessarily mean a reluctance to generate money through videotex use; some non-commercial IP's may feel they might have to charge users for their pages eventually. Nor does it mean that information will necessarily be free of advertising content. Rather, "non-commerical" refers to the motivation of the information provider, who is interested in making information available as a public service rather than for direct financial gain. Non-commercial IP's usually include governments, community information organizations, libraries, educational organizations, and public-interest groups such as the Consumers' Association of Canada. It has often been the case that a public service organization decides to charge for page accesses, to recoup maintenance costs, and in this case, it becomes even more difficult to determine whether a commercial service is occuring or not.

Certain policies adopted by some commercial IP's illustrate the difficulties of defining non-commercial content. Infomart for example agreed to provide 5% of its Teleguide database to non-profit organizations at no storage cost. Libraries and government agencies, however, were not included in the non-profit category and were expected to pay storage fees. Only charitable organizations were strictly defined as "non-profit" and although Infomart considered the Toronto Community Information Centre to be a non-profit organization, it restricted the listing the centre could put in its Community Calendar to only other "non-profit" groups.

A major question about public-interest content in videotex databases is how to finance production and storage costs. Given that public-interest and community content have a unique role in videotex, an important short-term policy goal of government should be to encourage these services, but at the same time not make them solely dependent on public funding. Studies should investigate alternative funding arrangements, such as joint industry and agency projects, for example. Eventually, long-term funding for non-commercial content may have to be derived from commercial series, either in the form of user fees or through tax incentives directed to commerical IP's or system operators.

Community Information is a special type of public-interest content. Community information might be provided by governments at any level, by public service agencies, libraries, non-commercial IP's such as consumer associations, or commercial enterprises. In other words, as Exhibit 7.5 indicates, community applications can be provided by a wide range of both profit-making and non-profit organizations.

Community Information Case Examples

The following examples do not include all community information in the Telidon trials, but rather focus on a few key instances. (Exhibit 7.6 provides background information).

EXHIBIT 7.5

Application Area: Community Services

Application	Description	Providers	Users
Community Bulletin Board	Listing of local events accessible by subject type, place, etc. Also proposed as a public information utility. Electronic referral services.	City government, local newspaper, community groups	Local Residents
Transit/ travel Information	Bus, train and airline route schedules plus intercity connections. In enhanced version, trip planning capabilities are available.	Transit authority, airlines, travel agents, AAA	Travellers
Emergency Information	Latest reports on accidents, road conditions, weather, air pollution, etc.	Local government, highway patrol	Local Residents
Government Information	List of meetings and hearings. Meeting agenda. Notice of reports, regulation changes, etc.	Local government	Local Residents
Housing Availability	Multiple listing services. House, apartment, condominium sales and rentals. Hotel and motel space available.	Landlords, realtors, hotels and motels	House hunters, Travellers
Comparison Shopping	Umbrella group collects information on current prices for particular products.	Non-profit community group	Consumers
Electronic Hotlines	Match requests to information (e.g. poison control information — type of poison entered and recommended action immediately displayed).	Special interest groups (e.g. poison control problems centre)	Residents with Emergencies
Foreign Language Service	Translations of community announcements and other information	Local government, ethnic community groups	Non-English speakers

EXHIBIT 7.5 (Continued)

Application	Description	Providers	Users
Captioning	Subtitling of TV programs, news, etc.	Caption centre, broadcasters	Hearing Impaired
Electronic Directories	Open or closed systems for providing listings of employees, buildings, stores, hours of service, etc. Telephone white pages.	Companies, associations, phone company	Employees, customers, group members, phone users

Source: Tydeman, J., Lipinski, H., Adler, R., Nyhem, M., Zwimpter, L., Teletext and Videotex in the United States: Market Potential Technology, Public Policy Issues, McGraw-Hill, New York, 1982.

EXHIBIT 7.6

Organizations Providing Community Information Services

Location and Name of Service	Size of Community Served	Organizations Represented by Service
GVIRS - Greater Vancouver Information and Referral Service	Lower Mainland Mainly Urban	All public services, government and non-profit. Some commercial, e.g. Home Aid. Lists business information directories.
Toronto Community Information Centre CIC	Metropolitan Toronto Mainly Urban	Non-profit, government and selected commercial services which assist people in the quality of life.
New Brunswick Public Library, St. Johns, N.B.	100,000 people, Metropolitan St. Johns	Social services, business groups, clubs, recreational groups, essentially non-profit groups,
Cap Rouge, Quebec	10,000 people	Local government, schools, sports and cultural groups, non-commercial groups
Information and Referral Centre of Greater Montreal (Le Group Videotex Communitaire)	Greater Montreal Area (2-2.5 million people)	Private, public, two para-public organizations involved in all social fields

EXHIBIT 7.6 (Continued)

Location and Name of Service	Users of Centre's Information Services	Centre's Current Sources of Support and Funding
GVIRS - Greater Vancouver Information and Referral Service	13,000 users; 5,000 professionals, agencies; 8,000 consumers, individuals	Member agency of United Way; Contract with B.C. Ministry of Human Resources; Small grant from City of Vancouver Revenue from sales and services 55% grants, 45% earned revenues
Toronto Community	50% general public; 50% other information providers. Actual phone calls: 2/3 public, 1/3 professionals. Responded to almost 100,000 inquiries (21% of their inquires related to services for seniors).	Province of Ontario; Metropolitan Toronto; United Way; Self (donations, publications, fees). Approximately 25% from each source. Centre has made a major commitment to generate revenues.
New Brunswick Public Library, St. Johns,	Not able to provide estimates.	Funded provincially and by city. Funded by D.O.C. for Telidon project.
Information and Referral Centre of Greater Montreal (Le Group Videotex Communitaire)	61,322 calls; 51,000 calls from public; 10,000 calls from agencies, organizations, professionals.	Centraide (United Way); Ministre des Affaires Sociales; City of Montreal; Foundations; Own revenue (from directories).

In the B.C. Tel trial, it was expected that the Greater Vancouver Information Referral Service would develop a major database of community information, and the Department of Communications supplied funding and an input terminal. However, no participation materialized during the course of the trial, and community information made up only .9% of the total database.

The Community Information Centre of Metropolitan Toronto, (CIC is itself an "umbrella" for some 1200 organizations), was involved in Vista from its earliest planning stages. CIC received funds from a variety of sources to participate in the trial (including Bell Canada, Ontario, and the federal government). A number of staff members worked full time on videotex, including in-house page creation as the cost of commercial services was found to be too high. CIC also took on the role of demonstrating Telidon to other information centres and interested organizations. Its videotex applications included community calendars, information on day care and recreation services, and an electronic directory.

The Greater Montreal Information Referral Centre was one of eight organizations in involved in community applications for Vista. The Centre tried to coordinate a variety of other organizations to ensure broad representation on the database. Some support was provided by Bell Canada (in page creation, equipment, and consultation).

In the Cap Rouge section of the Vista trial, Edimedia, a commercial IP, provided community information as part of its overall services at its own expense. Edimedia is a publishing company, but its role in community information expanded to the point where the community pages were one of the most popular sections in the trial. In this case, however, community information tended to be more commercial than the examples above, and included restaurants, and film listings for instance.

In the Project Mercury trial operated by New Brunswick Telephone, no existing community information centre existed, and NB Tel encouraged the public library to offer community pages. The telephone company provided management support and the use of page creation terminals, and representatives from the Department of Communications helped plan the database. Funding was provided by NB Tel, local service organizations and the federal government. The library acted as an umbrella for other community groups and associations, which designed their own content.

The major problems encountered in this trial were similar to those in the other examples. Specifically, the need to coordinate a number of groups or organizations under one umbrella was often difficult. In almost all cases examined, organizations were filling the role of an umbrella IP, coordinating the database, contacting other groups, and setting standards for content and design. Information that needed frequent updating was especially expensive. Smaller groups, meanwhile, often objected to the umbrella group as a threat to autonomy. Nonetheless, where organizations can group together and share equipment, substantial cost savings can result.

Generally, these examples of community applications showed that start-up costs and the amount of effort needed for videotex tends to be much greater than initially anticipated. Groups that already have experience in gathering community information have a clear advantage over those new to such activities, as they have an established infrastructure in place. The location of terminals also became an issue in the trials, since this tended to be determined by trial operators who had commercial and not community applications in mind.

Most of the participating organizations reflecting on their trial experiences are still uncertain about the future for videotex in providing public information: there were too many "unknowns" to make realistic forecasts. Funding was one of the most critical matters; traditionally, community information centres have suffered from the vagaries of government support. Stable funding is critical for the long-term committment of adapting a new technology and creating databases.

It is not possible to estimate how many pages in the trials related to community information, both because most trial operators have not provided page counts that can be analysed by content type, and because the definition of "community information" varied from trial to trial.

Cantel

One of the major policy statements made by the Department of Communications in its reasons for investment in Telidon was to encourage the use of the new technology for public service applications. Cantel was developed as a means for the public to access

government information. A 50,000 page database was created by the federal Task Force on the Nature of Service to the Public, at a cost estimated at nearly $4 million.[138] Cantel would be accessed by 34 public terminals, (fourteen located in Task Force Service Bureaux, and thirty in unmanned kiosks in public places such as shopping malls and libraries). The database itself was developed by Infomart of Toronto which also operated the host computer, developed the software, undertook most page creation and provided consulting advice.

Content areas included a large, static (i.e. unchanging) directory of government programs and services, plus "dynamic" updated packages of information that included weather, the national job bank, Statistics Canada information, sport quizzes and a tourism package.

A research study evaluating Cantel interviewed people who had used the service and also individuals involved in its organization and management. Public use of Cantel tended to come from a relatively small segment of the population: 85% were male, 90% were under forty, and generally these people had a higher level of education than average (40% had attended university, 38% were students). Most were mainly interested in experimenting with the technology rather than obtaining specific information. The most popular topics accessed were jobs and work (i.e. the national job bank), statistics, facts, quizzes, and weather information, which together accounted for approximately 60% of the total time spent using Cantel.[139] In one month, 557,000 pages were retrieved, or 400 page accesses per location per day.

Generally, those interviewed in the follow-up surveys felt that the "dynamic" content was more appropriate for a public access system than the directory type of information that predominated. The problems cited most often related to indexing. Too many steps were required to reach a desired topic, and 54% of users said they would prefer other sources of information than Cantel, mainly because it was too time consuming. Also, the level of detail was not considered sufficient. On the positive side, the project helped familarize the public with Telidon and represented an effort by the government to examine alternatives for delivering of public information.

The Cantel trial also offered some lessons about public access terminals. Most obviously, equipment must be modified to withstand high usage and the possibilities of vandalism.

Also, both the Cantel and B.C. Tel trial showed that terminals in public locations tend to be used by a younger set of people, that is predominantly male. B.C. Tel placed almost half of its terminals in "public access" locations such as malls, hotel lobbies, libraries and banks. At these locations 54% of users were under 25 and the majority tended to be male and have occupations associated with the higher socio-economic levels.[140]

Canadian Attitudes Toward Technology

Attitudes toward technology can affect the rate at which a new product or service will diffuse. In 1982, a study of public attitudes found that the majority of the public was unfamiliar with new microelectronics technologies. Awareness was greatest among males, young people, and those with college education; among women and less educated people, awareness was low.[141]

While more than three-quarters of the public surveyed in this study believed that technological change was necessary and beneficial for the economy, a majority also worried about resulting unemployment and working conditions. (This was a broad societial worry; only a few were concerned about their own jobs). Most people felt there should be joint decision making between labour and management and even government supervision in the introduction of new technologies to the work place. At the same time, many people were cautious about excessive government intervention, and the bulk of responsibility for social impacts was placed upon employers, not government. A majority of respondents expected employers to take responsibility for retraining; slightly less than a majority held employers responsible for finding alternative employment for displaced workers.

Privacy and information control were the only issues where concern increased with the level of knowledge about microelectronics. People were also worried that the increasing use of computers would result in greater confusion and billing errors for services.

In general, the study revealed an ambivalent attitude toward new technology, and that concerns about privacy, information control and other impacts may ultimately constrain the pace of technological change. Public attitudes should be carefully examined when introducing a new technology such videotex. (One Canadian researcher, for example, has proposed such measurements as a "technophobia rating" and an "attitude-toward-new-information-machine scale").[142]

Summary

The medium and long term social impacts of videotex and teletext (should these new technologies become widely adopted), are both unknown and unknowable at this time. Governments should resist any temptation to instigate another national task force on these topics (as has been recommended elsehwere).[143] An alternate approach is suggested: research on short-term impacts and concentration on social uses of the technology, rather than prophecies of its effects.

While long-term effects are essentially unknowable, it may be feasible to delineate short-term effects such as changes in communications patterns. The videotex field trials, unfortunately were unsuitable vehicles for such measurements, due to the limited nature of the databases available, and to the lack of control groups and other shortcomings in research design. Further research requires more rigorous conditions and more refined techniques to examine the appropriate issues.

Also, despite the impossibility of predicting long-term impacts, it would nonetheless be useful for policy makers to have some notion of probable effects in the next decade. While such "research" is basically only speculation, speculation may be of value if it is well informed. Individual researchers may be more likely to provide such well thought out speculation than expert panels or government committees. It is recommended that individual research projects in the areas of the history and philosophy of science and technology be undertaken, to study the impact of past technologies and their relevance to future impacts of videotex. Far from understanding the future impacts of a new technology, as yet we have little understanding of the social effects of past technologies such as telephone and television.

Also, research on the social impacts of videotex has concentrated excessively on the individual (i.e. attitude studies). Such approaches do little in terms of telling us how larger social benefits might accrue. There is a need to broaden the scope in assessing social impacts. Furthermore, as videotex is only one of a cluster of chip-based technologies, studies should take a look at personal computers, work stations, new kinds of networks, and so on in a more holistic way.

Finally, rather than focussing only on how technology will impact society, attention should be given to applications that use the technology to achieve social needs, such as health care, services to the handicapped, local community services and special education. As in commercial areas, there is still a critical need to test actual applications and experiment with equipment, software design, and terminal placement. Also as in the commercial sector, the linkage of Telidon to other available technologies should be examined.

In none of the field trials were services targeted to the physically or mentally disabled. Rather in most cases services were aimed at the upper economic levels of society. Investigations of information retrieval, interactive services (such as banking and shopping), electronic messaging and employment-related applications directed to special-needs groups should also explored.

Public interest and community databases have a unique role in videotex; a short-term policy goal should therefore be to encourage these services, but at the same time they should not be solely dependent on government funding. Community information centres should be given training and help in database development. As experience has shown, established information service organizations are the most adept at providing Telidon based services; libraries and existing information centres are therefore good starting points for the diffusion of videotex technology into the non-commercial sector.

The federal government's Cantel trial showed moderate levels of success, but more attention must be given in such services to database design and content selection. Efforts must also be directed to upgrading services, and broadening access opportunities.

Footnotes – Chapter 7

110. See, for example, J. Sleigh, B. Boatwright, P. Irwin, and R. Stanyon, "The Manpower Implications of Microelectronics Technology", Crown Publications, London, 1979.

111. For example, Wills, "Computer-based Scheduling and Billing in the Canadian Transportation Industry, (Task Force on Microelectronics and Employment, Department of Labour, Ottawa, 1982), found that while new computer technologies created considerable job shifts and new occupation types, a minimal amount of net unemployment occurred.

112. Russel, Robert A., Executive Magazine, April 1982.

113. Ibid.

114. Logan, R.K., "Telidon, Canada's Thin Edge into the Information Age", Department of Physics, (Culture and Technology Seminar), University of Toronto, undated.

115. McLuhan, M., and R.K. Logan, Et Cetera, Vol. 34, No. 4, p. 373, as cited in Robert K. Logan, "Telidon, Canada's Thin Edge into the Information Age, op. cit.

116. Ibid.

117. Innis, Harold, The Bias of Communication, (Toronto: University of Toronto Press, 1951).

118. Popper, K., The Poverty of Historicism, (London, England: Routledge and Kegan-Paul, 1961), p. vi.'

119. Ibid.

120. Ibid, p. 43.

121. Conrath, D., et al, "The Electronic Office and Organizational Behaviour: "Measuring Office Activities", Computer Networks 5, 1981.

122. Bell Canada, "Technology Assessment of Future Residence Communication Services", Jan. 1976.

123. Department of Communications, 1981, Telidon Field Trial, Elie/St. Eustache, Phase I, p. 121.

124. Champness, B.C., "Social Uses of Videotex and Teletext in the U.K.", On-line Conferences, Videotex 81, Toronto, Ontario, p. 332.

125. Bruce, Margaret, "Changing the Social Impacts of Videotex: New Designs and Markets", Videotex 84, Switzerland.

126. Feeley, James, "Time Lines", <u>Proceedings of the Education Telidon Conference</u>, April 15-17, 1981. Toronto: Organizing Committee and Educational Subcommittee of the Canadian Videotex Consultative Committee, 1981, p. 40.

127. This project was jointly funded by the provincial Ministry of Education, the federal Department of Communications and TV Ontario.

128. Wilson, Joy, TV Ontario, "Educational Applications of Videotex/Telidon in Canada", (Paper 11, <u>New Technologies in Canadian Education</u>, Canadian Commission for UNESCO), January 1984.

129. Ibid, citing Times Mirror, Preliminary Research Findings as Reported in <u>Videotex America News</u>, March 21, 1983.

130. Montgomerie, T. Craig, "Telidon Distance Education Field Trial", Alberta Education, Planning and Research, Nov. 5, 1982.

131. Brahan, J.W., and D. Godfrey, "The Big Red/Green/Blue Schoolhouse: Videotex and Learning in the 80's", proceedings of Viewdata 81, (Norwood, U.S., On-Line Conferences), p. 311.

132. Education Subcommittee of the Canadian Videotex Consultative Committee, "CVCC Subcommittee Recommendations", <u>Telidon Reports</u>, March 10, 1983, p. 2. This subcommittee has been renamed the Inter-Provincial Agency for Telematics and Telidon (IPATT).

133. Canadian Videotex Consultative Committee, Subcommittee on The Individual and Society, "Videotex and Special Needs Groups: A report on Workshops in Montreal and Toronto", Department of Communications, 1981.

134. Levy, R. <u>Feasibility Study: Provision of a Telidon Based Facility for Persons with Speech Impairment</u>, Department of Communications, Ottawa, 1982.

135. Pressman, Elaine, "Videotex: Some Social Issues", undated, p. 13.

136. Weinstein, Betty and R. Fancy, "Community Based Telidon Computer Networks", Paper presented at the 10th Annual Conference of the Canadian Association of Information Science, May 1982.

137. October 1982. System pages (such as menus and indexes) accounted for a further 11.4% of the database.

138. Department of Supply and Services, "Interim Evaluation of the Cantel Program", September 1982, Ottawa, p. 1.

139. Ibid.

140. Booth, P.J., "Analysis of Public In-depth Interviews, Public Services", B.C. Telephone Co., Telidon Field Trial Evaluation, September 1982.

141. Bell Canada, "Public Attitudes Toward the New Microelectronics Technologies", Montreal, May 1982.

142. Gardner S., "A Study of Attitudes Toward New Communications Technologies", GAMMA, Montreal, Quebec, April 1982.

143. The Canadian Videotex Consultative Committee's Subcomittee on the Individual and Society (the Social Impact Subcommittee) made this recommendation in 1983.

CHAPTER 8
Regulatory and Policy Framework

The ways in which videotex and teletext are regulated may have significant impacts on their development. Historically, the telecommunications sector in Canada has experienced a high degree of government control. Whether videotex is offered over telephone lines, cable-TV, or the airwaves, it will emerge as a new service delivered by extensively regulated industries. Discussion has been occuring for some years as to which facets of traditional regulation, if any, should be applied. At the same time, videotex is also a form of publishing -- a largely unregulated activity, steeped in a tradition of "freedom of the press". Videotex is also a computer service, which in Canada is a relatively unregulated industry as well. Furthermore, with specific videotex applications, such as banking, different sets of regulatory concerns may come into play.

The major regulatory issues that stand out at present are access, the nature of competition, and the regulation of content. These issues fall under the responsibility of the Canadian Radio-Television and Telecommunications Commission (the CRTC, which regulates telecommunications industries) and the Department of Communications, while matters such as consumer protection and copyright are handled by the Department of Consumer and Corporate Affairs. In the prairie provinces, however, telephone companies are Crown corporations and are regulated on a provincial basis.

Historical Issues in Telecommunications Regulation

There are two main streams of regulation in the telecommunications sector in Canada. The first relates to telephone companies as common carriers, and the second to broadcasters who are responsible for the content they transmit. Also, implicit in regulation is the question of market entry: Who is permitted to offer a particular service, and what types of limits are placed on different actors playing various roles.

Telephone Companies: Common Carriage and Natural Monopoly

Two main principles underlying the regulation of telephone companies or "telco's": common carriage and natural monopoly. Common carriage is a principle of non-discriminatory access to service, a concept inherited from the physical transport of goods. (Railway companies were required to transport goods at rates common to all users). A second aspect to common carriage has been the separation of content and carriage; the carrier engages in transmission only and exerts no influence over the content itself.[144]

A major problem with the advent of data processing and computer services has been that separation of content and carriage has become more complex. Many videotex services may fall into a gray zone, lying somewhere between simple transmission of data and outright influence over content. Database searches, for example, do little more than transmit content from a source to a user, with only a minimal amount of "influence" (i.e. selection) taking place.

The second major cornerstone in telco regulation is that of natural monopoly, a concept from economic theory that is applied to public utilities. With a public utility, market competition is considered unworkable for several reasons: the size of capital investment argues against duplication; cost-saving efficiencies are made possible with economies of scale and there is a situation of demand inelasticity, i.e. the public utility is offering a virtually indispensible service.

When a monopoly privilege is granted to a public utility, regulations are typically put in place to ensure a fair rate of return for the firm and to protect the consumer from unfair rates and practices. With telephony, for example, telcos must provide equity of service to all users at approved rates, and must grant interconnection access to certain other carriers.[145]

Telcos have also been restricted from entering markets other than their basic monopoly services. Bell Canada, for example, has specific limits against holding a broadcasting or cable-TV license.[146] The major question of telco expansion into further services has arisen with data processinng, a lucrative activity to which telecommunications facilities could be easily applied. While Bell is prohibited from exerting any "control" or "influence"

over content, these terms can become ambiguous with data processing, and even more ambiguous with information retrieval services such as videotex.

Telco participation in data processing also encroaches on the principle of non-discrimination that is basic to common carriage. The data processing industry has protested the entry of telephone companies into their market on the basis of unfair competition, possible subsidization of competitive services by monopoly services, and a potentially dangerous concentration of power.[147]

The device used to settle the controversy about market entry has been the arms-length corporation. In 1973, a government position paper stated that common carriers should be permitted to enter the computer services industry by arms-length affiliates, to "increase the likelihood of a strong Canadian presence" in the industry.[148] A set of guidelines followed in 1974[149], and at least one telco (Bell Canada) has entered computer services through a suitable subsidiary. However, the federal guidelines are less than helpful for videotex, as their definition of data processing leaves room to argue that videotex, in simple forms where the basic information content remains unchanged, is not "data processing".

Broadcasting: Canadian Presence

The central goal of broadcasting regulation in Canada has been the promotion of Canadian content. Unlike telephony (where the transmission network offers unlimited access), broadcasting regulation is responding to scarce-resource conditions: the broadcasting spectrum is limited, as are the hours of broadcasting per day, especially in prime-time. The broadcasting spectrum is considered to be a public resource, and both stations and networks must be licensed to use the spectrum for radio or TV "in the public interest".

Above all, policy has aimed to ensure a place on the airwaves for Canadian material. Since the time of the Aird Commission (the first Royal Commission on Broadcasting in 1929), U.S. material has been perceived as an overwhelming infiltration, and protective measures have been taken. Foreign ownership of Canadian stations has been curtailed. A public agency, the CBC, (Canadian Broadcasting Corporation), has a mandate to "contribute to the development of national unity and provide for a continuing expression

of Canadian identity". Canadian content regulations have required all licensees to allocate a certain number of hours in their schedules to Canadian material.

Content Characteristics

Other aspects of broadcasting content have also received attention. Broadcasters have certain editorial responsibilities for the quality of the content they disseminate: for instance, content must not be unlawful, obscene, or abusive of race, religion or creed. False or misleading news must not be broadcast; certain types of content (such as certain lotteries and contests) are prohibited.

Advertising has been subject to special regulation. The number of advertising minutes per programming hour has been limited, for example, and advertising must be clearly demarcated from programming content. (In contrast, with videotex services advertising and information can frequently be expected to blend).

With videotex, analogous questions about content have already arisen. Is it important to promote Canadian content? Is it essential, or even feasible, to make a demarcation between advertising and information? Do information providers or system operators bear any editorial responsibility for the quality and truthfulness of information offered?

Cable TV: A Hybrid Industry

Cable TV has generally been considered by the CRTC (Canadian Radio-Television and Telecommunications Commission) to be a "hybrid industry", with characteristics of both a carrier and a broadcaster. Like a carrier, cable TV transmits signals originated by others (that is, it carries the signals of off-air broadcasters). Like a broadcaster, cable TV companies also originate certain material themselves.

A cable TV company receives an exclusive license to operate in a given area and so functions in effect as a local monopoly, though the regulation associated with natural monopolies has never been fully applied. Rates have been controlled and equity of service is required, (i.e. fees are the same for all subscribers), but rate of return regulation has never been exercised. Cable TV shows clear natural monopoly characteristics in terms of

economies of scale and the heavy capital investment that restricts market entry. The argument against treating cable TV as a public utility is that it does not provide a nearly-indispensible service for which alternatives are not readily available. The CRTC has viewed cable TV as an optional consumer choice, for which "members of the public who can afford it are willing to pay to receive a wider choice of programming".[150] Regulation has characterized cable TV as an adjunct to broadcasting, and tried specifically to minimize its "economic threat" to Canadian broadcasters.

Broadcasting Industry Protection

Cable TV has been defined in regulatory terms as a "broadcast receiving undertaking", whose main function is to receive off-air broadcast signals and retransmit them to subscribers' homes. Since the industry's earliest days, a major appeal to consumers has been the delivery of U.S. stations to Canadian homes. The popularity of U.S. programs has meant that cable TV "fragments" the audiences of Canadian broadcasters. As both private broadcasters and the public CBC system sell advertising based on audience size, "fragmentation" hits hard economically.

A number of policies were devised by the CRTC to control fragmentation.[151] While in both Canada and the U.S., the stance taken towards cable as a threat to local broadcasters has been reassessed as over-protective, reducing damage to broadcasters has been the primary motivation for cable regulation in the past and still has influence regarding new services.

Jurisdictional Uncertainty

A second important factor in federal regulation of cable TV is the desire to retain jurisdiction over the industry. Given the importance attached to national cultural policy in broadcasting, control over the content offered by cable TV is considered essential.

However, when the cable TV system is not simply retransmitting off-air signals, federal jurisdiction is disputable. Most provinces have asserted a claim to jurisdiction over new services (such as pay TV) at some point, and non-programming services (such as videotex and telextext) are particularly a jurisdictional no-man's land. For the moment, federal

At this point, the major questions to be resolved are structural matters: which functions the three major telecommunications industries (telephony, broadcasting, and cable TV) will perform, how the separation of content and carriage will be applied and what the conditions of access will be.

It has been argued that if those parties who control transmission are allowed to create content, they may exclude competitors. However, if a stringent policy of content-carriage separation is applied to telephony and cable TV, in a country like Canada with a limited number of information providers, valuable competitors will be excluded from a fledgling industry. The need for content-carriage separation is dependant on the number of carrying media available. Presently, videotex and teletext have at least three potential outlets: telephone lines, cable TV, and off-air TV signals, each considered below. (Other delivery media are also possible, including radio signals or MDS -Multipoint Distribution Systems, not yet authorized in Canada).

Under these conditions of multiple media, regulation can become more flexible. The recommendations offered here consider access opportunities for information providers, while also creating conditions for the major telecommunications industries to invest in videotex as well.

Broadcast Teletext

Since the vertical blanking interval (vbi) of television is a scarce resource, it has been suggested that broadcast teletext should be directly regulated in the public interest, as broadcast programming is. Two approaches are possible: the existing broadcaster could use the vbi as part of its broadcasting license, or an unaffiliated party might be licensed by the CRTC to lease the vbi from the broadcaster.[154] The capacity of narrowband teletext (the 200 pages of the vbi) is so small that it can feasibly accommodate only one publisher. Out of practicality, it seems likely that the CRTC will allow broadcasters to control their entire licensed signal, including the vbi. The fact that teletext might frequently be used during TV commercials breaks is a further argument for broadcasters to program the vbi themselves.

A second policy issue is content regulation: whether the Television Broadcasting Regulations - including Canadian content requirements - should be applied to broadcast teletext, and whether the spirit of content rules could be effectively enforced.

Content rules were developed from continuous programming; their meaning becomes questionable when content is information accessed by the user at his or her discretion. There is also a risk that content rules could inhibit the development of teletext. Furthermore, rules could easily be circumvented in this media as they have been in others.

It is recommended here that the CRTC create a new non-regulated status for narrowband teletext, so that services are not subject to content rules (beyond editorial prohibition of obscene and abusive material). System operators should have the freedom to select content, to create pages, and to switch back and forth between free and pay services if desired.

Telephone Videotex

There are three main policy issues associated with telephone videotex: whether carriers should be allowed to provide videotex content; whether rate of return regulation should be applied to telco videotex; and whether type of access should be provided by telephone companies to external videotex services. There are a number of broad policy options for access by IP's and system operators to a carrier's network:

- a common carriage model could be followed, completely separating content and carriage and requiring the carrier to provide access to all;

- a carrier could be permitted to operate videotex systems through an arms-length subsidiary. External information providers would be guaranteed access to the communications network, but not to the videotex system.

- carriers could themselves act as videotex systems operators, with the responsibility to provide access to all external information providers.

- a carrier could be permitted to operate a videotex system, and to exercise selective decisions about which services are included.

As a result of Computer Inquiry II, videotex services in the U.S. have been classified as "enhanced services" and are thus unregulated. The U.S. Federal Communication Commission felt that a competitive market approach for new services such as videotex was preferable. However, critics have argued that:

- the monopolistic position of a telephone company could allow them to use monopoly revenues to subsidize enhanced systems;
- telephone companies could use their control of transmission lines to place restraints on their competitors;
- undue concentration will occur if a telephone company is allowed into the electronic publishing industry.

Although the Bell Telephone system informed Congress that it was not interested in the electronic publishing business, it is interested in putting its print services, such as the yellow pages, into videotex form. The newspaper industry has argued that computerized yellow pages are essentially an advertising service and that AT & T can unfairly exclude competitors. In response to such arguments, a series of Senate Bills has attempted to limit AT & T's videotex services to weather, time and directories. Bill S.898 allows telcos to provide computer storage of videotex content supplied by other firms, but this must occur through an arms-length subsidiary, and the storage facility must provide open access to any information provider. Furthermore, AT & T is prohibited from editing information content. However, it seems there are no restrictions against AT & T providing interactive videotex services such as banking or mail.

In Canada, several telephone companies participated in field trials for Telidon. At present, telcos under federal regulation (i.e. Bell companies and B.C. Tel) are required to separate content and carriage but could offer videotex services through arms-length subsidiaries. (Other federally regulated carriers, such as CNCP Telecommunications, would have to follow similar procedures also). A telephone company could provide yellow pages, for example, through an arms-length subsidiary firm.

It is recommended here that telephone companies be permitted to offer and originate videotex information, data and transactional services, using an arms-length relation and without rate regulation. At the same time, however, telcos should be required to provide equivalent access to their switched networks by external videotex systems operators and information providers. This approach would go further than U.S. deregulatory measures, to give phone companies a measure of competitive incentives in this new area in order to stengthen the Canadian industry. The telco's subsidiary firms should be responsible for any content offered, but information services should not be subject to any specific content regulations such as a specified amount of Canadian material.

Teletext and Videotex Delivered by Cable TV

Cable TV in Canada, as discussed earlier, has been given a "hybrid" status by regulators, with characteristics of both a programmer of content and a carrier. There are several alternative ways in which videotex/teletext could emerge on cable TV: the cable operator could create content; the cable operator could assemble a package of services from external sources; or capacity could be leased to outside videotex systems operators.

At present, cable TV systems in Canada have limited channel capacity and are capable of only one-way communication. In the future, however, systems will upgrade to two-way capabilities with greater bandwidth, and a cable system will approach the conditions of "unlimited capacity" that characterize telephony, and that underlay the notion of common carriage in which anyone who wants to input to the system can be accommodated. In this case, a major regulatory question is whether cable TV should be required to provide common carriage access to its network or not.

The recommendation here is that if further deregulation of cable TV occurs, cable companies should be allowed to provide information and transaction services without being required to provide access to their networks by other systems operators or information providers. This approach reflects the role of a cable operator as a retailer of a select package or services to subscribers, subject to regulatory monitoring. Cable operators would continue to require CRTC approval for channel usage, and in the case of teletext (where a service requires a full channel of bandwidth) a relatively small number of services could be carried. Problems of diversity (regarding either type of content or information source) could be dealt with as they arise.

The initial aim of policy should be to stimulate Canadian industry. At later times, if necessary, further regulatory provisions may be developed - to provide interconnect access, for example to outside videotex system operators if cable evolves into a two-way information utility medium.

Finally, given the nature of videotex/teletext content, (where "information" and "advertising" easily blend and financial support form advertising may be significant), cable regulations must be amended to allow appropriate "advertising" forms.

In general, with all three delivery media considered here, a deregulatory stance is proposed. A softening in the traditional policy of separation of content and carriage may encourage vertical integration and the development of coalitions involving carriers, broadcasters, newspapers, cable companies and financial sources. Access to the switched telephone network is guaranteed for small information providers, but the development of larger IP's, able to compete effectively with foreign products, is also essential. Diversity, meanwhile, is fostered by assured access to the public phone network, and attractive provisions for a number of industries to enter videotex/teletext services and provide distinct sources of information in a given community.

Broader Policy Issues

This chapter has concentrated on structural questions of market entry, industry roles, and access conditions. A number of other policy matters are considered in this section: copyright; international competition; and the need to encourage software exports in a worldwide marketplace.

Copyright is an issue that cuts across all forms of videotex. Copyright in Canada is the legal recognition of the right of a creator to determine the use of a work, and to share in the benefits produced by that use. Copyright provisions were originally developed for printed works and have been inadequately extended to electronic information in Canada to date; copyright for computer software remains a murky area. Certain changes in legislation have been proposed, but it is also possible that copyright problems will be dealt with through trials brought before the judicial courts.

The most volatile area of copyright infringements for computer software has been the piracy of software diskettes by consumers. At the corporate level, however, there have also been major cases where firms have accused competitors of selling copyrighted material.

One of the cornerstones of copyright is "originality" in expression and independance of effort. It may be extremely difficult to decide at which point computer program B is or is not a "copy" of computer program A. With applications such as videotex, where content is constantly updated and altered, copyright may be more complicated still.

At this point, in Canada computer programs in human-readable form are protected by copyright in the same ways as literary of scientific works, but protection has not been extended to machine-readable programs. The status of programs in machine-readable form varies greatly from country to country. The United States was the first industrialized country to mention computer programs in its copyright legislation; an Australian court, on the other hand, ruled that copyright does not apply to computer programs.

A recent White Paper on copyright in Canada recommended that the definition of a computer program include both human-readable and machine-readable programs, and that a set of measures be developed to protect machine-readable programs. However, until either the courts or legislation clarify copyright, uncertainties remain a disincentive for content creators to invest in the extensive development work needed to make, for example, videotex software.

International Competition

Many of the regulatory matters dealt with in this chapter are industrial issues, i.e. which industries should be permitted to enter which videotex markets, and under what conditions? Another major industrial issue is foreign competition. Canada is a small market highly permeable to U.S. information sector exports. Any policy consideration of videotex and teletext must consider means to encourage participation in the wider global marketplace, if a viable domestic industry is to grow.

Domestic Protectionism

The Canadian record in telecommunications technologies has often shown a pattern of innovation in product research, development and engineering, followed by weak provision of actual information content. (Cable TV and direct broadcast satellites are examples). Thus far, Telidon has followed this pattern, and one of the reasons that the field trials have had mixed success is that information content was simply not extensive enough. It is feared that eventually Canada will follow the same pattern with videotex as we have with TV and other media, importing content made in the U.S. at bargain prices.

A number of protectionist measures have been proposed to support domestic industry. For example, it has been suggested that limits be placed on the entry of foreign videotex material. However, experience with Canadian TV has shown that rules can be circumvented to the point where their original intent is distorted. (For instance, the CBC highlights popular shows like Dallas to generate revenues for Canadian programs that few people watch).

Rather than prohibitive or circuitous solutions (such as the use of foreign content to cross-subsidize domestic material), a better approach is to instigate tax incentives for software and content that would allow Canadian companies to more cheaply create and export videotex material. Videotex and teletext are only part of a larger context of microelectronics industries, in which the best strategy is to encourage competition in a world-wide marketplace. Given the possibility that Canada may act as a passive market, importing both hardware and content, export support measures are critical.

The Importance of Software

It is an underlying assumption in the following discussion that opportunities in virtually all microelectronics technologies (videotex and teletext, office automation, speech recognition, robotics, artifical intelligence, personal computers and educational computing) will lie increasingly with software rather than the hardware component. For example, software now accounts for more than 80% of the total costs of products incorporating chips.[155] It has been estimated that by 1985 North America software sales will comprise almost $34 billion, or approximately 60% of the hardware business.

(However, since many computer users write their own programs, the importance of software is greater than these figures show). This emphasis on software does not imply that one should ignore hardware manufacturing in Canada, but that considerably more support should be given to software/content.

Regardless of major efforts to make software writing more methodical and "scientific", it remains a highly labour-intensive process. In Canada, there have been few attempts to develop applications generators to lower the page creation cost for videotex content. In the U.S., firms specializing in applications generators - (raw software tools which increase the productivity of the programmer) - have become a major sector of the software industry.

During this decade, major changes will occur in the nature of computer software. Computers will increasingly be able to simulate some aspects of intelligence; non-procedural query languages will allow people to interact easily with database; speech recognition will develop; and "expert systems" (applications that simulate expertise in a given area of knowledge) will be commercialized.

These changes in the sophistication of computer software will have major effects on videotex markets. For example, keyword searches that incorporate artificial intelligence have already made the tree-structure search procedures of Telidon obsolete.

The Relevance of the NIC's

It has generally been the case that Canada looks to other industrialized countries for models for policy approaches. However, with respect to a number of major economic indicators (such as balance of payments, and the extent of foreign control in industry), Canada more closely resembles some of the newly industrialized countries (NIC's) such as Brazil or South Korea than it does other OECD nations. For this reason, measures applied in such countries to support the microelectronics industries become of interest.

In many cases, the newly industrialized countries are emphasizing computer industries as a future growth area. (With the advent of computer-aided design and manufacturing systems, (CAD/CAM), many multinational firms which have located plants in less

developed countries with cheap labour will now find it more economical to produce goods in automated factories. The less developed countries can expect job losses). Another motivation to develop computer industries is to avoid balance of payment problems if computer products are largely imported.

Canada too suffers from balance of payment problems: the trade deficit for office equipment and computers exceeded $2 billion in 1982.[156] This trade imbalance is almost $1 billion more than the 1980 figure of $1.2 billion,[157] and it has been predicted that by 1986 a $5 billion deficit could occur.[158]

Of particular relevance for Canadian policy makers are examples in the NIC's of:

- use of government procurement power
- industrial finance mechanisms
- export promotion mechanisms.

Specific export programs used by the South Korean government, for example, include tax exemptions on imported material used in the manufacture of exported goods, a reduction of 50% for income tax on all export revenues, and a 100% reduction on business tax for selected high tech exports. The South Koreans also introduced preferential interest rates on loans for exports (whereby an exporter can borrow up to 90% of the sum required at 6% interest). Other NIC's have instigated indirect tax rebate certificates for exports that can be used to "pay" corporate taxes due.

Singapore's industrial strategy to convert itself into an area of software expertise is of special interest. Specific incentives directed towards this aim include the Capital Pioneer Status Incentive, which allows total exemption of any firm's taxes for up to ten years, an exemption granted to firms that engage in local software training and development. The International Consultancy Service Incentive makes available a 20% tax rate to qualifying software export products. (A minimum requirement is $1 million revenue per year from overseas projects).

In Canada, the Ontario Microelectronics Task Force in 1981 made a number of proposals to encourage the software industry. It recommended that software programming and

design should be treated as R & D and that the definition of R & D also be expanded to include marketing and pre-production costs. It also recommended that sales tax exemptions should pertain to software as they do to hardware, that accelerated depreciation allowances and other fiscal incentives (including manufacturing investment tax credits) should be applied to the software industry as they are to hardware.

However, in comparison to the extraordinary fiscal and taxation support given to the informatics industries by Canada's competitors, especially the NIC's, these measures are not sufficient. Tax and fiscal measures enacted in other countries include a total exemption of taxation on all computer and software exports; the instigation of special tax reserves to support export marketing costs and export financing in general; allowing foreign export losses as deductions from domestic profits; tying tax incentives to the quality of export performance; low interest loans; and so on.

Using these international models, a number of recommendations for videotex and microelectronics industries generally are offered here.

- Financial/tax support should encourage firms to provide software packages which convert personal computers, work stations and word processors into Telidon-compatible user and IP terminals.

- Government incentives for videotex should shift from direct grants and subsidies to alternative general approaches, such as tax incentives for research and software development costs.

- Telidon services should be integrated into the federal government's committment to office automation, satellite programs, mobile communication service, etc.

- Export diversification incentives should be instigated. In several countries, tax drawbacks have been implemented for firms which export high technology products with a specific percentage of national content. Such a graded drawback scale should be established in Canada, giving high priority to technology exports, and lower priority to exports of raw and semi-processed natural resources. Drawbacks and tax exemptions should be region specific.

- While fiscal incentives should encourage firms in Canada to buy domestic computer software and equipment, fiscal and tax incentives should especially aim to increase exports of software and computer services. For example, tax exemptions should be established for all imported informatics components (such as AI workstations) used in the production of exported products and services. Further tax concessions should be granted when exports are carried out by export consortia.

- Developments in artifical intelligence should be encouraged by government through identifying commercial applications and priority areas, examining the training requirements for AI programming proficiency, and examining policy approaches to share in the benefits of the extensive research in this area occuring in the U.S. and Japan.

- The capability of small and medium sized firms to obtain financing should be strengthened, since the Canadian software and computer sector is composed mainly of companies of this size.

- Procurement policy should be used to promote software developments, especially in the areas of applications generators, software related to the natural resource industries (which have particular export potential), and artifical intelligence.

- In addition, a new set of international marketing initiatives should be supported. In particular, the government can usefully provide market intelligence: information on high technology buyers and sellers, off-shore industrial trends, market information for specific products, advice on doing business in other countries, etc. Applications areas can be pin pointed and further segmented by geographical lines for in-depth assessments of market penetration, major competitors, export potential, and so on. A geographic area with special promise are the ASEAN nations (Assocation of Southeast Asian Nations), whose economies have shown remarkable growth in the last decade. Singapore in particular, as a shopping window for Asia and China, is of major interest.[159]

144. Legislation has expressed this separation as follows: the telecommunications carrier shall "act solely as a common carrier, and shall neither control the contents nor influence the meaning or purpose of the message emitted, transmitted, or received as aforesaid".
S.C. 1967-68, c.48. s.6, The Bell Canada Special Act.

145. The CNCP Interconnect Case ordering telephone companies to allow interconnection to their systems by CNCP Telecommunications was a landmark regulatory decision. CNCP Telecommunications: Interconnection with Bell Canada, CRCT Telecom Decision 79-11, May 19, 1979.

146. Bell Canada Special Act, op. cit.

147. Godrey, D. and Parkhill, D., eds., Gutenberg Two, op. cit.

148. Department of Communications, "Computer/Communications Policy: A Position Statement by the Government of Canada", op. cit., Statement 15.

149. "Federally Regulated Carriers and Chartered Banks Participation in Commercial Data Processing", Joint Statement of the Ministers of Finance and Communications, January 6, 1975.

150. CRTC, "Policies Respecting Broadcasting Receiving Undertakings (Cable Television)", December 16, 1975, p.4.

151. Simultaneous substitution is a major example. If a Canadian TV station schedules the same program being shown by a U.S. station at the same time, the Canadian station can be required to substitute its own signals, including commercials, on the U.S. channel.

152. Cable Television Regulations, CRC, c.374.

153. Decision CRTC 79-9, January 9, 1979.

154. Dalfen, op. cit.

155. Russel M. Wills, "Microprocessor-Based Media", International Development Research Centre, Ottawa, 1981.

156. While exports reached $890 million, imports rose to $3 billion (mainly accounted for by words processors and personal computers).

157. Globe and Mail, February 11, 1983, p.B5.

158. Evans Research Corporation estimate.

159. See Russel Wills, Steven Globerman and Peter Booth, "Software Policies for Growth and Export", Working paper, Institute for Research in Public Policy, Ottawa, 1985.

GLOSSARY

AI - Artificial intelligence; that branch of computer science which attempts to induce computers to replicate some aspects of human intelligence.

ARPANet - a packet switched computer network developed for the United States Department of Defense.

ASCII - American Standard Code for Information Interchange.

ATM - Automated Teller Machine; an electronic banking machine capable of completing most functions and services provided by a bank teller, e.g. deposits, withdrawals, account balances, transfer of funds, and sometimes mortgage and bill payment capabilities.

Antiope - An alphamosaic protocol created by the French government.

Aspect Ratio - the ratio between the height and width (in this case) of a television screen.

CAD/CAM - computer-aided design/computer-aided manufacturing.

CAL - computer assisted learning.

CATV - Cable TV.

CBC - Canadian Broadcasting Corporation. The publicly-owned radio and TV broadcasting system in Canada.

CCIR - The International Radio Consultative Committee, a committee of the International Telecommunications Union of the United Nations, responsible for radio transmission standards.

CCITT - The International Telegraph and Telephone Consultative Committee, a committee of the International Telecommunications Union of the United Nations, responsible for telecommunications standards.

CEPT - European Conference of Postal Telecommunications Authorities.

CRTC - Canadian Radio Television and Telecommunications Commission; the Canadian government regulatory body for the communications and telecommunications industries in Canada.

Captain - The Japanese telephone based videotex system.

Common Visual Space Network - the technical system under development at the Department of Communications which allows interactive graphic communication among persons or groups at two, three or more locations.

Compression Methods - methods by which the amount of data used to encode an image is reduced.

DRCS - (dynamically - redefinable character sets); a specific graphic refinement concept; allows higher resolution graphics by creating graphics dynamically (in much the same way as the down-loaded alphabet creates nonstandard letters).

Descender - the tail on letters of the alphabet such as "g" or "j" which descends below the line on which text is written.

Descriptors - words added to items on a menu in a database so that the menu item will be clearer to the searcher.

ETV - Enhanced TV; increased scan lines.

FCC - Federal Communications Commission - the governmental communications regulatory body in the United States.

Firmware - software permanently embedded into hardware.

Force Tuning - with a force tuning ability, any two-way cable system can allow consumers to switch back and forth between video to videotex for either price or product information.

Gateway Services - any electronic link between two or more computers allowing users who access the first computer to have access to the others without having to make a separate linkage.

HDTV - High Definition Television; developed by the Japanese; this equipment uses 1,125 scanning lines per picture frame (compared to 525 lines in existing U.S. television), has an aspect ratio of 8 x 5 (compared to 4 x 3 in existing T.V.), and requires a band-width of some 30 MHz (compared to 6 MHz for existing TV).

High Definition Visual Displays - visual displays that are capable of displaying more pixels than present television technology.

IGPL - Interactive Graphic Program Language.

IISP - Information Industry Stimulation Program.

Information Provider - (IP or IPS) - any company or person providing videotex information to consumers via a system operator. An information provider does not necessarily process transactions and does not necessarily have a direct link to the consumer.

Keyboard - the alphanumeric device used to input information into a computer terminal. It may also contains some special function keys.

Keypad - a small, hand held device used to enter information into a computer or videotex terminal. The keypad contains only numerals and a few special function keys.

Keyword-menu Hybrid - a form of information retrieval system where the use of a keyword puts the searcher into the database at some level deeper than the top of the hierarchy. Search then continues using the menu or hierarchical system.

LAN - Local Area Network.

Legibility - the subject's ability to locate a certain letter in a full screen of randomly selected characters on a visual display unit.

Macro Set - element of an encoding scheme for videotex.

Mosaic Set - element of an encoding protocol for NAPLPS.

Menu Index Search System - the upper levels of a tree structure are used for indexing purposes to guide users who are interested in particular subject matter to the information they require.

NABTS - North American Broadcast Television Standard.

NAPLPS - North American Presentation Level Protocol Syntax; this is an alphageometric protocol of AT&T which is derived from Telidon.

NBC - National Broadcasting Corporation.

NIC - Newly Industrialized Country.

NTSC - National Television Standards Committee - defined the technical standard on which television broadcasting is based in North America.

Narrow Casting - Broadcast over fixed network, i.e. telephone line.

OECA - Ontario Educational Communications Authority.

PBX - Private Branch Exchange.

PC - personal computer.

PDI - Picture Description Instruction; used in Telidon to define basic shapes such as a point, a line, an arc of a circle, a rectangular area, or a polygon.

Pixel - the smallest addressable area in a visual display. This varies with the display hardware used.

Telidon - a method of encoding visual information for subsequent transmission. Designed at the Department of Communications, the scheme permits efficient transmission of graphic and textual information over telephone, broadcast and other telecommunications channels. The term is also used to refer to Telidon based teletext and videotex services in Canada and elsewhere.

Transactional Services - e.g. reservations, teleshopping, telebanking.

Tree Structure - hierarchial menu for searching data bases; the aim of the tree structure is to provide the user with a simple "menu" choice that does not require skill with computer languages or extensive training to be understood and can be accessed with a simple keypad.

UWVS - Universal World Videotex Standard.

Unix Screen Concept - a specific way of organizing information on a screen to allow for easy processing.

vbi - vertical blanking interval; that part of the TV screen which is black when the picture is rolling.

VDT - visual display terminal; any device that can receive and display an electronic signal in text or graphics.

VHF - very high frequency - a portion of the frequency spectrum which can be used for normal over-the-air television broadcasts.

Videotex - an electronic data base service where information is received over telephone lines or other telecommunications channels and appears on a visual display terminal designed for receiving the signal or on a television set with a special receiver terminal.

5 x 7 Character Set - encoding scheme for NAPLPS.