ABSTRACT

The present study analyzes the Canadian videotex technology, Telidon and the Federal Government program surrounding its development and growth into a new industry.

The research presents an analytical chronology of Telidon's development as well as the analysis of research propositions concerning Management of Technology issues: Research & Development (focussing on Standards Development), Marketing (including Field Trials) and Industry Viability.

Personal interviews with thirty-six individuals involved in the Telidon program in varied capacities were conducted in Ottawa, Toronto and Montreal from which their expert opinions were used to analyze the research propositions.

Research results indicate that the Telidon program was an enormous undertaking during a relatively short period of time. Analysis of the research propositions and literature review have led to the conclusion that the Telidon technology was developed to the extent that a foundation had been laid for future growth and this technology is currently prospering. The industry that the program created is a small and self-sufficient group using the Canadian technology that was established as a national and international standard during the program as a result of a large government/industry effort.

TELIDON

Hopes, Expectations and Reality

A Historical Case Study

by

Carla M.C. Mascioli, B. Comm. (Honours)

A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of
Master in Management Studies

School of Business
Carleton University
Ottawa, Ontario.

June 24, 1991

ISBN 0-315-70906-5

The undersigned recommend to the Faculty of Graduate Studies
and Research acceptance of the thesis

TELIDON
HOPES, EXPECTATIONS AND REALITY
A HISTORICAL CASE STUDY

submitted by Carla M. Mascioli, B.Comm. (Honours)

in partial fulfilment of the requirements for

the degree of Master in Management Studies

George H. Harrison

Thesis Supervisor

D Roland Thomas

Director, School of Business

Carleton University
Ottawa, Ontario.

June 24, 1991

ABSTRACT

The present study analyzes the Canadian videotex technology, Telidon and the Federal Government program surrounding its development and growth into a new industry.

The research presents an analytical chronology of Telidon's development as well as the analysis of research propositions concerning Management of Technology issues: Research & Development (focussing on Standards Development), Marketing (including Field Trials) and Industry Viability.

Personal interviews with thirty-six individuals involved in the Telidon program in varied capacities were conducted in Ottawa, Toronto and Montreal from which their expert opinions were used to analyze the research propositions.

Research results indicate that the Telidon program was an enormous undertaking during a relatively short period of time. Analysis of the research propositions and literature review have led to the conclusion that the Telidon technology was developed to the extent that a foundation had been laid for future growth and this technology is currently prospering. The industry that the program created is a small and self-sufficient group using the Canadian technology that was established as a national and international standard during the program as a result of a large government/industry effort.

TABLE OF CONTENTS

LIST OF FIGURES

1 INTRODUCTION

> Communications have always played a central role in Canada's history. From the fur trade of the seventeenth and eighteenth centuries, to the canals and railways of the nineteenth, from the broadcasting networks, airlines and highways to the telephone and satellite systems of the twentieth, communications technologies have helped Canadians reach new frontiers, settle and develop the wilderness, and build both a society and culture that are unique in the world for the degree to which they depend on good communications systems. (Communications Canada, Communications for the Twenty-First Century)

The central role of communications in Canadian life has helped make the communications industry Canada's leading area of high technology achievement. More than one quarter of our industrial research and development involves communications, and Canadian firms are known around the world for the excellence of their communications products, systems and services (Communications Canada, 1987).

In spite of the past achievements in communications, Canada has not reacted to changes that are taking place in our own economy and in the larger world in the same way as other advanced industrial nations. Canada's communications system has weaknesses in several key areas. These weaknesses are found in industries that produce the information resources on which economic and social welfare increasingly depend, in the relatively slow rate at which new technologies are adopted and applied and in the uneven development of the national communications research effort. (Communications Canada, 1987)

A telecommunications technology that fell prey to these weaknesses was Telidon: the Canadian videotex system. This thesis will discuss the rise and "fall" of this unique technology developed by Canadian government in the late 1970s and early 1980s.

Generally speaking, videotex is an information service that enables a user to obtain text and graphics information over the public telephone network for display on a viewing device (Department of Communications, Telidon Directory, 1984). For this study, the formal definition is provided by the International Telecommunication Union (ITU): "Videotex is

an interactive service which, through appropriate access by standardized procedures allows users of Videotex terminals to communicate with databases via telecommunication networks." (OECD, 1988). The term videotex is "foreign to most Canadians with France being the country that dominates the field"; however, interest in videotex has been undergoing a renaissance lately in Canada (Globe and Mail, March 13, 1989) as evidenced by Bell's recent videotex development called ALEX.

The videotex concept first arose in the United Kingdom (with Prestel) where it served to increase telephone usage. Three systems are well known throughout the world: Prestel in Great Britain, Antiope in France and Telidon in Canada (Hough and Associates, 1980). At an International Telegraph and Telephone Consultative Committee meeting in Geneva in 1978, Department of Communications (DOC) officials, including Herb Bown, later called the "Father of Telidon" (Telidon Reports, March 1985), saw the Prestel technology and believed that expertise developed at DOC's Communications Research Centre (CRC) could be used to create a Canadian version of the technology (Coll, Strickland and Dieguez, 1982; Telidon Reports, March 1985). A policy was developed to achieve this end and was announced by the Minister of Communications in August 1978 (Telidon Reports, March 1985).

The Telidon program was a cooperative program between the Federal government and industry with the aim of seeding the creation of a Canadian videotex industry (DOC, September 6,1983). Its mission was as follows:

> The Government of Canada intends to assist Canadian industry in the development and launch of a commercial product known as Telidon, which is network-based, interactive and features color graphics. Telidon is aimed at the recreational, educational, entertainment and cultural interests in the consumer market. Its design is to feature the best international technology in hardware, software and serviceware (or applications) in order to displace competition in Canadian and international markets, so that a Canadian advantage is gained in consumer products based on integrated circuit technology. (Hickling Johnston, 1979)

Telidon utilized an alphageometric coding scheme for its graphics versus the alphamosaic scheme present in existing systems world-wide (Booth and Wills, Vol.I, March 31, 1983). The system's name "Telidon" was coined from the Greek words "teli" and "idon" meaning "I perceive " and "from a distance" respectively (DOC, January 1988).

Telidon was unique in its extent of public involvement and social application in field trials (Mosco, 1982). DOC not only funded the standard market viability studies but also analyzed public access and social impacts (Mosco, 1982). The program operated under sunset legislation which meant that the duration of the program was limited to a set period of time. Termination of the Telidon Program occurred on March 31, 1985.

Telidon ultimately failed to develop into a thriving private industry and the question: "WHY?" remains unanswered as no overall explanation was given for Telidon's "failure". Failure in this context implies the inability to achieve the following objectives.

Originally, the Telidon program was viewed as a cooperative industry-government program with the objective "to develop a range of products and ensure market penetration of the Canadian videotex system called Telidon.". As the program developed, the objective was broadened in July, 1982 and was stated as follows (TEEGA Research Consultants Inc, September 6, 1983):

To achieve recognition and domination of Telidon as a national and international standard for the videotex industry.

To foster the development of a complete and commercially viable Canadian videotex industry which will bring to Canada economic benefits from both the use of this technology and the sale of videotex goods and services at home and abroad (TEEGA Research Consultants, September 6, 1983). A "complete" Canadian videotex industry means that the industry has the capability to produce all components of the system in Canada. A

"commercially viable" videotex industry means that this industry does not require government assistance. (DOC, June 1987).

Videotex in general and Telidon in particular may just have been exciting to the technology-push rather than the market-pull side of the equation (Hough and Associates, 1980). Indeed, videotex was described as a solution in search of a problem (Coll, Strickland and Dieguez, 1982; Globe and Mail, March 13,1989). As well, it is interesting to note that Program Assessment reports were written by different consulting firms; thus, no one firm evaluated the Telidon Program in its entirety. This resulted in conflicting statements across the reports. There is no simple answer to explain Telidon's "failure" to meet the goals initially specified in the program; however, a comprehensive attempt to discover the reasons is useful. Hence, the purpose of this thesis.

2 THESIS OBJECTIVE

The purpose of this thesis is to study a past technological "failure" and to use the reasons for its problems to aid in the application of new technologies in the future. Note that the word "failure" is in quotes as the analysis (in a later section) will determine whether or not Telidon was a failure. We can learn from our past mistakes (Atkinson, Bower and Crothers, 1965) by doing such a historical study. The primary research question was simply: Why did Telidon "fail"? Given that considerable analysis has already been directed at various aspects of Telidon and no clear simple answer has emerged, it is unlikely that a simple answer will result from the findings of this research. A chronology detailing the Telidon experience will be conducted. As well, certain problem areas of the Telidon program that possibly relate to its "failure" will be analyzed.

The areas of focus will be Research and Development (which includes the Standards-Setting Process), Marketing (which includes Field Trials, Applications and Benefits to End Users) and Industry Viability (which includes Competition). No research has yet been undertaken incorporating these three major problem areas stated in the Management of Technology literature (Archibald,R.D., 1976; Raffaele, J.A., 1978; and Rubenstein, A.H., 1989) and applying them to the Telidon program. The proposed research will analyze the Telidon program with a focus on the problems in these areas. Overview studies have been conducted in the past dealing with many areas; however, no one firm or researcher has attempted to conduct an overview of the entire program's key components. The studies that were done were contracted out to consulting firms on a piecemeal basis (e.g. one firm wrote the Research and Development evaluation while another wrote the Industry Viability assessment) and this led to conflicting results on what occurred or should have occurred.

Thus, it was proposed that an evaluation of the Telidon program be conducted by one researcher and that the focus be on the issues having the greatest impact on the success or failure of the program. A secondary objective was to clarify the conflicting results proposed in the consultants' reports and thesis interviews.

The end result is the pattern of events which transpired during the Telidon program from its beginning to its termination. The utility of this research is that in providing a framework for analysis, it may be generalizable to organizations that are introducing technological innovations.

3 METHODOLOGY

As the historical case study approach was adopted, documentation forms an essential basis for the analysis. The variety and large number of relevant documents necessitates a summary outlining the exact location of pertinent articles and reports. Further examination of issues contained in these documents will be provided in Section 4.

Department of Communications Research Library

There are three series of evaluation reports assessing various areas of the Telidon program:

The first series was commissioned by the government at the end of the first phase of the Telidon program (1983). The assessment reports covered the following topics:

- Marketing and Economic issues
- Social Impacts Study
- Industrial and Regulatory Issues
- Synthesis Study (a summary): Regulatory, Industrial, Marketing and Social Issues

The second series was commissioned upon termination of the second phase of the Telidon program (1985). The topics included:

- Research and Development
- Marketing
- The Standards-Setting Process
- Industry Viability
- Benefits to End Users

Another series involved Behavioral Research Papers. These papers were written throughout the two phases of the Telidon program.

- Review of Human Factors Issues
- The Design of Videotex Tree Indexes
- A Study of Human Response to Pictorial Representations on Telidon
- Data entry in videotex: keypad design and page number format
- Interactive Query Languages for External Databases
- A Content Assessment Model

Proposals detailing government programs:

- Content Development Program
- Industry Investment Stimulation Program

Other papers involved:

- System Evaluation (Technical issues)
- Field Trials (Technical Issues, Content Development)
- Demand Forecasts
- Applications
- Target Markets
- Government/Private Investments
- promotional material (brochures, booklets)
- media announcements, newsletters, newspaper articles

Moreover, there are a number of files on deposit with the National Archives that have been reviewed and categorized. There is access to the information which dates from 1968 to 1981. It deals with committees, conferences, task forces, study groups, international cooperation and liaison, and the development and use of the Telidon computer communications system.

There are many media articles dealing with the development of the Telidon program which are listed in the Canadian News Index. As well, there are several general information books on videotex and one specifically on Telidon.

A preliminary review of sources indicated that the important documents were in the Department of Communications (DOC) library.

As well, personal interviews were conducted with former industry and government participants to gather expert opinions.

It is important to clarify what information is used for what sections of this thesis as there is a separation between what is utilized for the Literature Review (Section 4) and Analytical Chronology (Section 7), and for the Data Analysis (Section 8). Documents provided the sole basis for the literature review which was used to point out areas of interest that could be analyzed further with research propositions. The same documents and many additional ones were used to develop the analytical chronology part of the thesis. As well, there were

times where statements made in this section were further supported by the personal interviews conducted. The interviews, however, provided the data for analyzing the research propositions.

The purpose of the literature review was stated above. The purpose of using documents for the analytical chronology was to create a comprehensive history detailing what transpired throughout the Telidon program. Documents were the most important source of historical information; thus, this section relied on such sources. The reasoning for using only the personal interviews to analyze the research proposition was that the researcher was interested in obtaining current (1990) information and opinions from the participants. It was felt that this data was more relevant to the research as the participants had had time to reflect on the program and their involvement in it. They were likely to be more objective and frank due to the passage of time. Statements made during the height of the program in the early 1980's were likely to have been influenced by the media and special government attention that was being paid to Telidon, not to mention the participants' direct involvement in the program. Note that some interviewed for this research were also interviewed in the past and used as sources for reports used in Section 7; however, the reports typically focussed on only one area of Telidon and perhaps interviewed a small number of those interviewed in this report. This thesis has used a broad cross section of the many types of participants (both industry and government) involved and has focussed on all aspects.

4 LITERATURE REVIEW

The literature review will first present the background of Telidon and relate it to the Management of Technology literature. Areas of focus will be Research and Development (specifically, the Standard Setting process), Marketing (including Field Trials) and Industry Viability (including competition). These areas have been identified in the Management of Technology literature as the key areas during the development and growth of a new technology (Archibald,R.D., 1976; Raffaele,J.A., 1978 and Rubenstein,A.H., 1989).

Secondly, research propositions will be developed throughout a brief review of Telidon literature. It is important to note that there is repetition between this section (Section 4) and the analytical chronology (Section 7); however, this is intentional due to the length of this thesis. Section 7 entails a long and detailed section describing the Telidon program in its various aspects. This section is suitable for readers interested in a thorough review of what transpired throughout the program. Section 4 offers only a basic overview of the Telidon program and serves to develop the research propositions that were discussed in the interviews. This section should interest readers desiring only a general knowledge of the program. The Management of Technology literature follows:

Assessment of technical programs as a whole remains subjective. In many cases, attention should be directed to improving management planning for technical guidance and for application of new technology rather than harassing the research department. From the point of view of operating departments, what they frequently expect from research is not innovative new products, which entail departure from existing sales and manufacturing patterns, but miracles which will make higher profits with only minor additional effort. (Bass, 1965)

Experience has convinced many that a greater degree of formality needs to be introduced into planning and controlling the segments of the technical program. They find that opportunistic policies of permitting work to expand haphazardly in a technical area initially thought to be attractive, without reference to defined objectives, usually results in considerable expenditure of effort in unproductive directions. Lack of a framework for comparison of one area against another leads to project administration characterized by subjective reactions rather than objective analysis. Lackadaisical administration can easily reduce a system to unproductive discussions and paper work. (Bass, 1965)

When the general outlines of the program have been laid out, a structure must be set up and administrative procedures laid out for the conduct of work. The administrative procedures can be most effectively carried out by means of a project system. This involves breaking the program into appropriate segments. When taken together, the segments comprise the backbone of the program as a whole. With respect to the Telidon program, the three segments in questions are: Research and Development, Marketing and Industry Viability. (Bass, 1965)

An objective analysis of the strengths and weaknesses of a program is a prerequisite for a sound product policy. Such a study reveals its capabilities and liabilities for growth. The scope of the survey includes the following topics: (Bass, 1965)

Marketing: e.g. economic characteristics of product and trade areas served; capability of marketing staff to handle additional areas; special marketing advantages or handicaps. This is a key area of the Telidon program.

Technology: e.g. strength and diversity of professional personnel; areas of technical expertise. This relates to Research and Development area.

Manufacturing: e.g. condition and flexibility of plants, equipment, and process; areas of specialized know-how. This relates to the Research and Development area.

Growth Potential: e.g. future prospects of major product lines; comparison with competitors; outlook for related trade areas which might be considered. This relates to the Industry Viability area.

Some specific comments regarding the three areas of focus for the Telidon program follow: (Bass, 1965)

Research and Development

Industry programs call for effective communications (i.e. a collective effort) with individuals representing a cross-section of the components. This can be obtained through advisory committees with memberships reflecting the range of technical status in the entire group of enterprises. Their major function is to define key problem areas in the industry, and to review project proposals for aiding in their solution.

R&D must not operate in a vacuum. It should be reviewed with representatives of operating and staff groups, including manufacturing, engineering, marketing and finance.

Standards: In international trade, there is increasing reliance on specifications as a means of improving the basis for mutual agreement between buyer and seller. Nations which wish to increase foreign sales should encourage collection of information on formal specifications and informal trade standards of the markets to which they export, in order that these may be interpreted by their manufacturing companies, which in turn may need more technical help meeting the requirements. The standards issue was a critical component of the Telidon program.

Marketing

Market research activities are concerned with the study of the sales potential of new items, new products, or new product lines. It should be distinguished from sales analysis, which is the systematic study of market records of existing products.

In brief, market research employs a combination of business and technical information in a systematic analysis of market opportunities. This relates to the applications aspect of the Telidon program.

The subject is brought up here to emphasize the view that this sort of analysis should be more wisely used to permit appropriate channeling of technical effort in the most promising directions.

Field Trials: Consumer research deals with the commercial introduction of new consumer products is often made through test markets in a few selected centers; the results of these pilot sales tests form the basis for decision regarding the launching of the product on a broader scale. This relates to the field trial aspect of the Telidon program.

Industry Viability

No program can be considered sophisticated unless it is based on awareness of the products the company faces competitively in the market place. And competition must be interpreted broadly as involving other enterprises which serve a similar function, a situation that is often called "inter-industry competition".

DOC's mission statement for the Telidon program incorporated the above issues (DOC, June 1987). It states that the program's goal was the creation of a complete and commercially viable videotex industry; thus pointing to the issue of Industry Viability. A secondary objective was to rely upon the best international technology in hardware,

software and applications using the latest Research and Development. Finally, Telidon was to be targeted to the recreational, educational, entertainment and cultural interests in the consumer market; thus,entailing Marketing. Hence, the mission statement included all three issues outlined in the management of technology literature. To further support this connection, DOC provided considerable technical and financial assistance in the following areas: Research and Development, International Standards Development (related to Industry Viability), Marketing, Field Trials and Applications Development.

The compatibility of Telidon issues with management of technology theories led to the development of the Major Research Propositions with the propositions organised under the three headings discussed. These propositions will be developed throughout this section and will be listed at the end of this section.

4.0 BACKGROUND

Any videotex system integrates four components: 1) user terminals 2) communications linkages 3) computer data bases 4) terminal equipment for information providers to add information to the system (Booth and Wills, Vol.I, March 31, 1983). Telidon was the Canadian version of a videotex system but was unique in that it was the first to incorporate advanced computer graphics techniques (Godfrey and Chang, 1981).

According to the Telidon inventors' philosophy, the key to a system's success was improved graphics capabilities (Gecsei, 1982). The founders of Telidon saw the opportunity to provide greatly superior graphics in a way where the image description was independent of the peculiarities of any certain display. The Image Communication Group at the Communications Research Centre (CRC) drew upon their experience with picture description languages and image communications to do this (Coll, Strickland and Dieguez, 1982). They adapted Picture Description Instructions (PDI's) to alphageometric uses in Telidon (Telidon Reports, March 1985). The difference between the software and codes

developed by the CRC and those of others (the British Prestel system and the French Antiope system) was that the instructions necessary to create the image were transmitted instead of a facsimile of the image itself with the result being that the Telidon terminal included an instruction decoder; thus, it was essentially a graphics processor (Coll, Strickland and Dieguez, 1982). Norpak Ltd. of Kanata was chosen to manufacture the prototype terminals as it had been involved with the construction of image communications and display equipment (Coll, Strickland and Dieguez, 1982).

System design and manufacture was conducted rapidly with no consumer research (e.g. concept testing) conducted (Telidon Reports, March 1985). This was the first sign of the many areas to be overlooked or inadequately researched throughout the existence of the Telidon program.

4.1 RESEARCH AND DEVELOPMENT

The research and development (R&D) strategy of the Telidon program was to support the field trials through evolving prototypes in hardware and software and by working towards lowering hardware costs through innovation (DOC, January 1988). The critical components of the strategy were: (DOC, June 1987)

1. First rate scientists, engineers and other researchers involved which led to the adoption of Telidon in 1984 as the core of the North American standard in videotex.
2. Senior management that was involved directly and was committed to the exploitation of Telidon.

The technology of Telidon developed at CRC was transferred to the private sector through the process of contracting out hardware and software development, the provision of R&D funding and the transfer of expertise and knowledge to the private sector (DOC, January 1988). There seems to be a high level of agreement that the R&D section of the program was successfully implemented and that the Telidon technology was a technical success.

However, problems inevitably arose. As late as 1983, terminals were still too costly ($2000) for a large number of users to justify the expense. A future cost reduction to $600 was expected but it was unclear whether this price was low enough to attract potential users (Booth and Wills, Vol. I, 1983). At the time of this report, the terminals could only be used for information retrieval and data display; yet this was too limited to interest a large base of users to purchase terminals (Booth and Wills, Vol.I, March 31, 1983). Norpak, the firm that manufactured Telidon terminals and decoders, was interviewed to ascertain the eventual market price and the extent of user acceptance.

Another problem dealt with the issue of control. The user should have been able to view information in a manner that he/she deemed appropriate (front to back, random scanning or selection with an index) (Hough and Associates, 1980). However, the data base set up was primitive due to its unsophisticated method of retrieving information (i.e. a tree structure for retrieving data) (Gurstein and Faulkner, 1980). This technique involved a menu-directed tree search procedure activated by the user with a small key pad which required the number of the branch that he/she wished to follow. This allowed a number of users to access single data at the same time; however, one could not move freely through the data base. This restrictive feature made the system inappropriate for mass consumption data bases. (Coll,Strickland and Dieguez, 1982). This was due to cost considerations as a tree structure minimized the number of accesses one would have to make to the storage area to retrieve the data. If this was not done, the size and cost of the required computer would have been prohibitively expensive (Gurstein and Faulkner, 1980). Despite this knowledge, a mass market approach was the ultimate goal of the Telidon program; thus, one questions why the tree structure was not altered or why the marketing approach was not revised to focus on smaller segments. Coll,Strickland and Dieguez report that evidence suggests that technical characteristics of Telidon were not determined through a formal evaluation of

information requirements of potential users; thus, pointing to the lack of focus on the potential users during the field trials. (This relates to the Field Trial Proposition #1.)

A final technical problem concerned the slow response time for image generation. Potential users wanted the information as soon as possible (Globe and Mail, March 13, 1989). Interviews were used to determine if this problem became apparent through field trials and if so, what was done (if anything) to rectify the problem.

4.1.0 STANDARDS SETTING PROCESS

The recognition of Telidon's coding scheme as an international standard was critical to the development of a viable Telidon industry. This opened international videotex markets; otherwise, production and use would have been very limited (DOC, June 1987). Such acceptance eliminated the threat of obsolescence and permitted mass production of low-cost microchips to be used in manufacturing PC's and TV sets (Telidon Reports, March 1985). This was also important to ensure that European videotex technologies e.g. Prestel and Antiope, did not become de facto standards (Coll, Strickland and Dieguez, 1982).

The standards objective was set in 1979/80 and achieved in 1984 which was a relatively short period of time in information technologies and the international world of standardization (DOC, June 1987). The international standards-setting body in telecommunications is the CCITT (International Telegraph & Telephone Consultative Committee) which is a United Nations body (DOC, 1986). The original development group focussed on the promotion of the Telidon technology by securing government funding, supporting equipment development and field trials; however, most efforts went towards the establishment of Telidon's PDI alphageometric approach to videotex as a recognized international standard (Coll, Strickland and Dieguez, 1982).

The standards setting process was not a smooth one due to the AT&T announcement of their own standard based on the Telidon code but possessing enough additional and superior features to be incompatible with the existing Telidon technology. This forced Canadian researchers into a retrofit program to adapt existing terminals to the new standard and to begin production of new terminals/decoders. Much of the technological lead which Canada enjoyed, particularly in the area of hardware was lost as Canadian manufacturers had to adopt their product lines to an everchanging specification, while U.S. and Japanese manufacturers (mainly AT&T and Sony) were in a position to wait until the main NAPLPS issues were settled before producing their NAPLPS equipment. It was this AT&T standard, what is known as the North American Presentation Level Protocol Syntax (NAPLPS), that became the third recognized world standard for videotex along with Prestel and Antiope (Hough and Associates, 1980).

So many resources and funds were allocated to the adoption of Telidon as an international standard. Unfortunately, the announcement by AT&T seemed to have caused irreparable damage to Canada's foothold in the videotex markets. One wonders how Canada could have maintained its competitive edge or at least remained on par with its competitors. Possibly, this could have been less of a problem had the development of hardware not been given to only one firm- Norpak. The R&D Background study stated that Norpak was the sole hardware source due to the competitive race for a large share of the U.S. market and the need to save time in bringing the technology into commercial operation. (This issue comprises the Research and Development Proposition #1).

4.2 MARKETING

There were two marketing phases to the Telidon marketing effort. (DOC, June 1987)

1. 1979 - 1983 - Familiarizing domestic and international markets with Telidon and promoting the Telidon standard.
2. 1983 - 1985 - Telidon Exploitation Program- The goal of this program was to help Canadian firms break into the international market through trade promotion programs.

Field trials were the main research activity to determine Telidon's commercial viability. The trials were viewed as a product development phase which meant that the trials should have had a strong bias towards a successful product launch with the evaluation of the trials focussed on the commercial viability of the product (Hickling Johnston, 1979). The stated purpose of these trials was to ensure technical and operational feasibility and to foster Telidon in Canadian and international markets (Telidon Reports, March 1985). The players involved in the trials were as follows: (Booth and Wills, Vol.I, March 31, 1983)

1. DOC- Federal Government
2. Hardware Suppliers
3. System Operators (SOs)
4. Information Providers (IPs)
5. Sub IPs- small page creation companies, information suppliers such as Dominion Stores in Toronto
6. End Users (Business, Residential, Public)

Two types of field trials were conducted. (Hickling Johnston, 1979)

1. Pilot Field Trials: These were small scale installations of less than 100 units with a technical orientation. There was a limited ability to exploit the features of Telidon like color graphics capabilities; however, they were good for limited testing of serviceware concepts and for identifying product redesign requirements. In short, these trials were an opportunity to experiment with a product concept.
2. Marketing Field Trials: Up to 3000 units were under market test which was better (although not good) at testing consumer acceptance and usage; however, the serviceware remained primitive. If marketing trials are analyzed properly, trials should yield sound judgements on required product modifications, pricing policy in general, special introductory pricing and market share achievable. The fact was that this did not happen and the reasons why will be dealt with in the Field Trial research propositions.

Marketing efforts represented more of an awareness campaign especially during the first four year period than a marketing strategy in the traditional sense. Typical activities for a marketing strategy for developing and marketing new products are the assessment of the new product's feasibility, the assessment of consumer acceptability through market research and the implementation of marketing activities. The reasons given for the lack of a comprehensive marketing strategy were: inadequate resources due to the small size of the

firms or due to a lack of expertise in marketing technical products. In sum, neither government nor industry provided a fostering environment of providing marketing targets, ensuring product/organizational compatibilities or developing industry marketing capabilities. (DOC, June 1987).

The Abt Associates report stated that too much of the marketing focus was on the international arena. DOC promoted Telidon within Canada to 1981 after which External Affairs initiated its advertising campaign focussing on the U.S. and overseas markets. After 1981, the mandate for marketing within Canada disappeared. Telidon's potential was not sold to possible Canadian users. Government entered highly competitive arenas instead of concentrating on establishing a solid Telidon base in Canada. (This issue is dealt with in the Marketing Proposition #2.)

There were many problems in attempting to assess Telidon that possibly had negative impacts on its promotion. Some were outlined in the Coll, Strickland and Dieguez report. To begin, it was difficult to predict Telidon's potential impact on users as no one had experience using the system. As well, the technology and services involved in videotex were very new; thus, it was difficult to develop guidelines for their assessment. Having no history meant that there were no past specifics to rely upon or to use as criteria for success which could have been applied to applications assessment. Therefore, the research that was conducted through the implementation of field trials relied on the guess-work that was used to ascertain the factors that prospective users would be interested in. It was believed that the precise capabilities of Telidon should be clearly established in order to properly assess a potential application. Having a clear idea of the system's capabilities would have assisted greatly in Telidon's promotion.

Despite the recognition of these problems, little effort was directed towards assessing the applications desired, features required, pricing and more generally, the aggregate benefits

expected from the Telidon system. Applications development suffered as a result. Too much of the focus of field trials was on the technical and human resource requirements issues (Hickling Johnston, 1979). The Booth and Wills Synthesis study stated that trials enabled the successful evaluation of technical capabilities of Telidon equipment and modes of service delivery; however, information on potential target markets remained unclear even after a year and a half of trials activities. Moreover, the time frames of observations in field trials were extremely short in most cases, ensuring that patterns of behavior were not established.

Since little useful market research was derived from the trials, it was very difficult to ascertain which applications had the most potential. Initially, the field trials had a narrow focus concentrating on the Home Services sector but even in 1985, the Home Services sector still required three things to occur before it would become a viable market: 1. cheaper hardware 2. cheaper software 3. broader content. Thus, due to the lack of useful information regarding potential applications, the trials should have been focussed from the beginning on more than one sector and then progressed through a pruning procedure to narrow the applications that users would desire.

The importance of high quality and diverse data base content was known at an early stage and emphasized by field trials; however, government focussed its energies on this area too late (January 1984) as the trials' initial focus were on technical issues only. Disillusionment with Telidon had already begun to occur.

The overall lack of knowledge regarding potential applications, market segments and users needs and wants along with the minimal amount of cooperation between field trial operators presented a large problem in demand estimation. Unfortunately, the trials were unlikely to provide reliable assessments of future demand for Telidon as they did not provide all the relevant choice sets that condition the actual acceptance or rejection of Telidon in the

marketplace (Hough and Associates, 1980). Important potential uses were probably overlooked. However, data from field trials was used in demand forecasts for videotex despite the limitations stated (Booth and Wills, Vol.I, March 31, 1983). This resulted in market projections that were wildly inaccurate in most reports. One report by Hough and Associates (1980) attempted to present a reasoned analysis and discussion of market prospects as little had been done previous to this. Unfortunately, these results also proved to be very inaccurate. (A possible reason for such results relates to the Field Trial Proposition #1.) This proposition addresses the biggest shortcoming in the literature resulting from the Telidon program involving the relatively informal and speculative evaluation of market advantages and disadvantages of Telidon (Booth and Wills, Vol.I, March 31, 1983). Field trials were responsible for fulfilling this evaluation; however, due to their one-sided focus on technical issues, marketing issues were ignored.

A Socioscope report was the first paper to present users' qualitative responses to various operating or projected applications. The fact that the study was conducted in 1983, four years after Telidon's introduction, supports the proposition that field trials were not focussed enough on the user (that aspect which provided information critical to the promotion of Telidon). Although this was a focus group study that assessed both future applications as well as existing ones and the questions posed concerning a mature system may not have been appropriate given the stage of the system's development, it was a step in the right direction (i.e. to focus more on the user's wants and needs). Yet another study by Ekos Research Associates dealt with the benefits to end users. Six major issues were dealt with using three different applications; however, as only three applications were tested, the results were not generalizable. As with Socioscope's report, this research was conducted rather late in the program (1985). (These issues relate to the Field Trial Proposition #1.)

Some research was conducted to determine market trends. A 1983 report by Booth and Wills (Vol. I) stated that the most effective way to sell Telidon would be to blend it with

other technologies that are competing or complementary as there was more interest in Telidon as an addition versus a stand-alone unit. It was suggested that large businesses would probably want stand alone systems; whereas, small businesses would be interested in integrated systems (i.e. Telidon capability in PC's and work stations). The Booth and Wills Synthesis study stated that a likely success scenario for Telidon would involve it being bundled into a number of office services; thus, suggesting it be part of integrated office applications. OECD report stated that in 1985, the trend in videotex services was becoming less distinguishable from other computer-communication applications. (The previous statements support Industry Viability Proposition #3 that dealt with the issue of whether or not Telidon should have been promoted as a separate system and industry or as an addition to other industries.)

In addition, other research recommended new market segments. Peat Marwick and Partners stated that the focus of Canadian efforts was the U.S. market where Canadians faced stiff competition from American companies such as IBM, AT&T, Knight-Ridder, Times Mirror and CBS which had entered the videotex industry through inter-corporate joint ventures as a means of achieving rapid access to markets. The strength of Canadian firms was in Closed Loop Services and Public Access Services which did not have as good long term growth potential as with Business and Home Services. The U.S. was superior in the Business and Home markets and Canada should only have competed in these markets in specialty market niches (Canadian industry should have carefully analyzed these niches before proceeding). The Peat Marwick report stated that Canadian firms were unlikely to play a significant role in the mass Business or Consumer-oriented videotex services in the U.S. The competitive forces that had entered these markets were already too well financed and too well positioned to give most Canadian firms any serious prospects of gaining a significant foothold. The only firm recommended as possibly possessing the

capability to compete with the U.S. based organizations was Infomart and this firm went out of business in May 1986. (One year after this report was written).

The Booth and Wills Synthesis study reported that in the business environment, Closed User Groups were initially thought of as the main audience but experience had already shown that the capabilities for Telidon were really no match for personal computers and existing information retrievai technologies for these types of applications. This report was written two years before the Peat Marwick report where Closed Groups were recommended; thus, one sees conflicting information. The Marketing Background report by Abt Associates, stated that the primary opportunity for commercial expansion was in the U.S. which was yet another conflicting view. Hickling Johnston's study also reported that the potential market applications recommended in the various market evaluation reports often conflicted. (This relates to Industry Viability Proposition #2.)

4.3 INDUSTRY VIABILITY

As early as the Hickling Johnston report in 1979, it was stated that there was much disagreement regarding the commercial viability of Telidon. There was rigorous competition from competing technologies such as PC's, work stations and graphic design terminals and a number of very good and competitively-priced information retrieval services already existed, operating mainly in the U.S. (Booth and Wills, Vol.I, March 31, 1983). The Hickling Johnston report also noted that some reports advised that Canada not attempt serious product development but to adopt new devices as they became available in the U.S. market. The analytical chronology and research propositions analysis will identify those who doubted Canada's ability in product development. (The idea that the government should not have attempted to create a commercially viable industry relates to Proposition #3 set forth in the Industry Viability section of the Propositions.)

To achieve the objective of creating a Canadian videotex industry around Telidon, technology had to be transferred to the private sector (DOC, June 1987). This was facilitated through substantial government assistance in the initial years. DOC provided technical and financial assistance in the following areas: (DOC, June 1987)

1. Research and Development
2. International Standards Development
3. Marketing
4. Field Trials
5. Applications Development

Government funds were used to start the process of producing and marketing Telidon-based information systems (Hough and Associates, 1980). As of 1980, government involvement had been to encourage and assist in the process, leaving private industry to create economically feasible market opportunities; however, continued support was still required as Telidon was far from market maturity (Hough and Associates, 1980).

Overall, the government chose five avenues to fulfill the goal of full commercialisation. They were as follows: (Telidon Reports, March 1985)

1. FIELD TRIAL ASSISTANCE

In the first four years of the Telidon program, more than forty trials and services presenting Telidon applications were conducted in Canada and abroad. They were intended to aid the government and industry in decisions as to the most beneficial and commercially viable uses of Telidon. However, the Booth and Wills Synthesis study states that due to lack of centralized coordination in the trials, cross comparisons of results were difficult. This minimized the utility derived from the trials, emphasizing once again the limited usefulness of the field trials data. (This will be analyzed in the Field Trial Proposition #2.)

2. INDUSTRY INVESTMENT STIMULATION PROGRAM (IISP) - FEBRUARY 1981

The IISP invited Canadian firms, Crown corporations, non-profit organizations, educational institutions to compete for $10 million in Federal funds used to offset up to 50% of their Telidon terminal costs. Applicants had to purchase a matching value of Telidon terminals.

The IISP was the first major activity where an evaluation scheme was set up before the fact to assess the merits of applications submitted by sectors of the economy (85 were received). All previous applications which were field trials (as per DOC officials) were started without any formal evaluation of their merits or of alternatives that could have been implemented (Coll,Strickland and Dieguez, 1982).

Despite its good intentions and proper setup (i.e. an evaluation scheme was established), the IISP was introduced (Summer 1981) a mere few months after AT&T's announcement of a superior standard based on the Telidon code. This caused the government to return to the drawing board to upgrade their standard to the level of AT&T. Thus, the IISP stimulated the demand for and production of Telidon terminals and decoders during a time when it was still undecided exactly how a Telidon terminal was supposed to perform. (Peat Marwick and Partners, April 22, 1985). (This idea relates to the Research and Development Proposition #2.)

3. PUBLIC INITIATIVES PROGRAM - APRIL 1982

Non-profit organizations were given $1 million to develop services for consumers, the disabled, Inuit, natives and women. The program encouraged these organizations to learn more about how Telidon could be used to improve the services they provide. This ties in well with the IISP objective of stimulating the development of videotex services in Canada

which address social needs, cultural and regional realities. The research proposes to ascertain which applications (if any) were successfully developed as a result of this initiative.

4. CONTENT DEVELOPMENT PROGRAM (CDP)- JANUARY 1984

In 1980, there were 450 data bases accessible across Canada (OECD, 1988). In 1984, the main objective of the CDP was to increase the amount of high quality and useful content while stimulating immediate investment and employment in the Telidon industry. The amount of $4.95 million was given to 27 Canadian organizations to develop commercial data base content and services in both French and English. The problem with this program is that it was late. The main problem with the Telidon applications was the lack of useful, diversified and valuable content within the data bases. This was apparent from the results of the field trials, yet, it took the government until 1984 (4 years after the program began) to focus its energies on the development of content. (This problem is dealt with in the Field Trial Proposition #1.)

5. INTERNATIONAL MARKETING AND DIRECT PROCUREMENT FROM CANADIAN FIRMS

Expectations for the penetration of international markets were high during the initial phases of Telidon development (OECD, 1988). External Affairs was active in selling Telidon to foreign countries with significant sales made to the US, Venezuela, Australia and Japan. As well, External Affairs and the Department of Regional Industrial Expansion (RIE) provided marketing assistance to Canadian entrepreneurs. Another responsibility of External Affairs was to regularly brief journalists on Telidon's capabilities. Finally, every embassy or consulate abroad was equipped to assist with Telidon sales with over forty posts actually possessing Telidon equipment. (Telidon Reports, March 1985).

However, the main problem was the inadequate amount of government funding allocated to the marketing of Telidon along with the shortage of staff to carry out the marketing activities. The Abt Associates report stated that apart from the Information Services Branch (ISB) of DOC, resources allocated to marketing in the Telidon program, on average, consisted of one or two full-time staff. The ISB relied largely on media relations as opposed to advertising. Departmental information staff kept close contact with journalists on the premise that they understood the potential of information technology. Also relating to the staffing issue, the Telidon marketing staff at External Affairs stated a lack of resources in the program constrained efforts to keep more constantly in touch with the trade officers in the consulates and embassies. (This relates to Marketing Proposition #1.)

The Abt Associates report stated that the competition (i.e. Great Britain and France) had mounted heavily subsidized, world-wide marketing efforts. In contrast, the Canadian government provided very little in the way of funding. Between 1978 and 1982, 12% ($2.5 million) of the Telidon budget was reserved for marketing which largely included efforts to have Telidon accepted by various international bodies as an international standard. Thus, little funds were applied directly to the promotion of Telidon sales. Between 1983 and 1985, the Telidon Exploitation Program received an additional $3.7 million in funds. In comparison with the 1978-1984 expenditures of the French government ($26.5 million- U.S.) and the British government ($32.5 million- U.S.) on international marketing, Canada devoted an extremely small amount to achieve the difficult task of establishing the new Telidon technology both domestically and internationally.

While marketing funding suffered, government subsidization focussed on covering user and information provider terminal costs instead of helping with other significant costs such as software development (applications), data management (content development) and engineering costs.

The Industry Viability report by Peat Marwick states that the issue of whether or not the Canadian "Telidon industry" is profitable without government assistance remains unclear. Three firms accounted for 60% of total government financial assistance and were each in a loss position. ($22.6 million out of $37.7 million funded between 1979-1983).

Government support was assessed in the same report and it was stated that industry was counting on government sustaining and possibly increasing its industry support through direct procurement of Telidon-related products and services. Other support requests were as follows:

- more support for content development
- market research and development efforts
- standards development efforts
- government coordination of conferences
- funds for support of travel expenses, attendance at trade shows
- investment tax credits for international marketing and lower corporate tax rates for companies generating most of their income from Telidon-related activities
- forgivable loans for new initiatives
- matching grants with government where some investment must have first been made by the firm
- new features R&D

It was evident that continued government assistance (both technical and financial) was required for the continuance of Telidon's development and eventual establishment as a complete and commercially viable industry; however, government ended its support in March 1985 (the same year this report was written).

As well, in this Industry Viability report, it was stated that the right combination of price and content was still three to five years away (Peat Marwick and Partners, 1985). Knowing that improvements still had to be made and these were not minor but vital and fundamental improvements, the government terminated the program. Since most applications in Canada (and most countries where videotex is promoted) resulted from government initiatives, it was necessary to continue this assistance (Coll, Strickland and Dieguez, 1982). The adoption of technology process also supports the idea that government support ended too soon. The Peat Marwick report states that consumer

electronics products and communications services typically go through a 15-20 year evolution in the following stages:

1979 - 1983 • Introduction - First five years; average unit price still high; penetration less than one percent.
1984 - 1988 • Acceptance - Next three to five years, average unit price begins to fall; penetration rises to five to ten percent.
1989 - 1993 • Rapid Growth- Next three to five years, penetration increases rapidly to 60 to 70 percent
1994 - 1998 • Saturation- Next five years; slow steady growth in penetration; replacement accounts for the majority of sales.

Telidon government support was ended only one year into the Acceptance phase. There was still much to be achieved at this time. (The Industry Viability Proposition #1 dealt with this issue.)

Although the adoption of technology process indicates that Telidon should have been in the Acceptance phase at this time (1985), the program more closely resembled the Introduction phase. Data collection attempted to prove this proposition. (As this related to the above Proposition #1, it was labelled as Proposition #1a.)

On the other side of the coin, the concept of Telidon as an industry may have been inappropriate. The Peat Marwick study stated that some participants even objected to being considered part of a "Telidon industry". They insisted that their business was publishing, advertising, information provision, etc., and that they were using Telidon because it was an effective medium for communicating with their intended audience. It was also pointed out that Telidon could be compared with ASCII or COBOL. Noone speaks of an "ASCII" or "COBOL" industry. (This relates to the Industry Viability Proposition #3.)

4.4 RESEARCH PROPOSITIONS LIST

Case study research dictates the use of research propositions whose purpose are to direct attention to something that should be examined within the scope of the study. The eventual data collected is linked to these propositions through the idea of "pattern matching"

whereby several pieces of information from the same case may be related to some theoretical proposition (which are the following propositions). The criteria for interpreting the study's findings involved matching patterns of what actually happened with what is stated in the theoretical propositions. Where more than one idea is presented in a proposition, the idea that best matches the pattern resulting from the research will be chosen. (Yin, 1989). Expert opinions will be used to provide the data for pattern matching.

The major reasons for the possible "failure" of Telidon are proposed as follows:

4.4.0 RESEARCH AND DEVELOPMENT

The establishment of the Telidon code as an international standard was seen as vital for the creation of a commercially viable industry; thus, tying in with the mission statement of the Telidon program.

PROPOSITION #1: A sole hardware firm was responsible for adapting Telidon equipment to the AT&T standard. It was proposed that an industry effort would have sped up the process and allowed Canada to maintain its technological lead.

PROPOSITION #2: Government R&D efforts were not properly focussed on the resolution of the NAPLPS standards issue. The introduction of the IISP stimulated the purchase of existing Telidon terminals at a time of confusion regarding standards. It was proposed that the government did not appropriately focus its energies on resolving the standards issue as evidenced by the introduction of the IISP.

4.4.1 MARKETING

Marketing activities were essential to achieve sales of the Telidon technology on the domestic front and in international markets. The technology would not sell itself; thus, marketing was required to aid in the goal of creating a commercially viable industry.

PROPOSITION #1: It was proposed that government funding was not properly allocated across all the areas important for growth. The areas that suffered from lack of funding included: Marketing and Field Trials with respect to content development, applications development and user assessment.

PROPOSITION #2: It was proposed that the Telidon people should have first established Telidon in the home market before attempting to enter the international arena. The reason being that Canadian industry would have been more receptive to Telidon as it was a home grown technological effort. Once a solid base had been established in Canada, Telidon people could have focussed their energies on international markets with the strength of a Canadian base to support their efforts.

4.4.2 FIELD TRIALS (MARKET RESEARCH)

PROPOSITION #1: It was proposed that the focus of Telidon field trials was concentrated more heavily on technical issues (technical capabilities of Telidon equipment and modes of service delivery) than on user issues (content development, benefits to users, potential applications, market segments, users needs and wants).

PROPOSITION #2: The greater the centralized coordination and cross comparison in trials, the greater the usefulness of the trial results.

4.4.3 INDUSTRY VIABILITY

The title of this section clearly points to the mission statement of the Telidon experience. The following issues directly relate to the creation of a complete and commercially viable Telidon industry.

PROPOSITION #1: Further government assistance may have proven useful in establishing Telidon as a commercially viable industry. It was proposed that government should have continued its support another 6-9 years to allow Telidon to enter the rapid growth phase described in the adoption of technology process. It was assumed that at this phase, private industry would have been capable of continuing on without government assistance.

PROPOSITION #1a: The Telidon program more closely resembled the Introduction phase in the adoption of technology process than the expected Acceptance phase.

PROPOSITION #2: It was proposed that the lack of consistency in the recommendations stated in the government reports on Telidon resulted in confusion when establishing marketing strategies. This confusion, in turn, resulted in the marketing strategies being ineffective.

PROPOSITION #3: It was proposed that Telidon should have been promoted as a communications medium to be integrated with other systems in various industries instead of government attempting to isolate it as a separate product and industry.

5 RESEARCH DESIGN

A single case study methodology was selected for the proposed research. A combination of both exploratory and descriptive research has been conducted. The methodological basis was drawn primarily from Yin's Case Study Research: Design and Methods (1989).

Exploratory research was required to investigate the technological innovation: Telidon. What factors led to the program's controversial results are documented in this research.

Descriptive research involved finding out what transpired throughout the development of Telidon. A comprehensive descriptive study of the Telidon technology had not been done before. This research served to collect and record data before it disappeared so that it could be used in the future for similar programs.

5.0 VARIABLES

As the proposed research sought to determine the causes of Telidon's "failure", the outcome variable was thus, "failure". The variables affecting this outcome variable were discovered as the research is conducted.

5.1 SAMPLE

The sample can be described as follows:

Element:	People who worked for or on Telidon.
Unit:	Government departments, private industry and committees involved with Telidon.
Extent:	in the Ottawa-Carleton, Montreal and Toronto region
Time:	May, June and July 1990

5.2 SAMPLE SIZE

Through a personal referral type methodology, a referral sample of 36 interviewees were contacted. Appendix 1 contains the list of names of those interviewed.

5.3 SAMPLE METHOD

The method of data collection was personal interviews. Telidon, itself, was the major unit of analysis with the smaller units of analysis being the individual people being interviewed. This Personal Referral type methodology functioned as follows:

Candidates' names for interviews were obtained first by contacting Carleton University professors with knowledge of Telidon. Professor Ian Lee and Professor Roland Thomas were approached and names were obtained. As well, industry and government directories were useful sources. These contacts were approached for an interview. After this point, further references were requested and these references were then contacted for interviews. This procedure continued until the same names were repeated.

This was a referral sample. People who worked for or on Telidon who were isolates in the organizational structure may have been missed with this procedure.

Interviews were recorded on a mini-cassette and transcribed afterwards. In addition to personal interviews, there are a large number of documents regarding Telidon located at the research centres mentioned in the Methodology section. These documents were reviewed as they involved various background reports, evaluation reports, application and program proposals, investment programs, etc. They provided the basis of the literature review and analytical chronology of this thesis. It is important to note that these reports were often contracted out to various research and consulting firms with different methods of analysis; thus, results were not always consistent across reports. Discrepancies will be highlighted and explained in the Data Analysis, Section 8.2. Interview results were used to analyze the research propositions.

5.4 SURVEY INSTRUMENT

The survey instrument used in this research was an unstructured questionnaire that was administered through personal interviews where possible or telephone interviews. This instrument comprised of open-ended questions. The questions asked were tailored to the individual's involvement in the Telidon program.

The personal interview was scheduled at the executive's convenience. The ordering of the data collection was determined during a pretest of the questionnaire.

5.5 PRETEST

Before the questionnaires were administered in the field, they were pretested on a sample of five respondents that were similar to the target respondents of the proposed research. The purpose of the pretest was threefold: (1) to modify the questionnaire in areas deemed either redundant, unnecessary or awkward in conducting the interview, (2) to determine the ordering of the questions, and (3) to provide some interview experience to the researcher.

5.6 FIELDWORK PLAN

The operational procedures for gaining the cooperation of the respondents and conducting the interviews were as follows:

1) The executives were contacted and an interview date was agreed upon;
2) The interview was conducted and the questionnaire was administered;
3) An expression of gratitude was mailed to the respondents after the interviews were completed.

6 LIMITATIONS

There is the limitation of the subjectivity problem. The objective of the interviews was that the information obtained in the interviews would be candid and accurate; however, there was the possibility of bias or caution regarding certain topics. The risk of the latter aspect was minimized due to the fact that government officials no longer felt the need to be diplomatic regarding the Telidon experience as it had been terminated for some time. It has been out of the government's hands for five years and is no longer an active program; thus, interviewees were more objective and at ease to openly discuss the problems that occurred. Regarding the potential bias of the interviewer, only a professional attitude towards the research resulted in an objective analysis of the data. According to Professor Macdowell of the History department at Carleton, it is reasonable to begin the research with preconceived notions of what should have occurred to ensure the research is not directionless. However, it is extremely important to remain open minded throughout the data collection and analysis. The interviewer feels that this was successfully accomplished.

The research propositions guided the data collection and the resulting data (which is mainly composed of expert opinions) was utilized to resolve the stated propositions. A limitation exists where the data may not prove to be sufficient to make conclusions on a proposition.

As well, there was the factor of selective recall. With the personal interviews, one was relying on the memory of the interviewee of a program that began in the 1970s. Recall of events was not always complete. To compensate, there was an abundance of documentation to consult when memory failed or facts seemed dubious.

A final limitation rests with the method of analysis of pattern matching. As the outcome relies on expert opinions rather than statistical data, pattern matching cannot involve precise comparisons as each person interviewed focussed on a variety of issues of which

not all would be the same as other interviewees. Thus, certain issues could be pattern matched across interviews with this not possible for others. Another point regarding pattern matching dealt with the question: How close does a match have to be in order to be considered a match when dealing with propositions having contrasting ideas? As there are no statistical tests to use to interpret the findings, one will have to hope that the patterns will be sufficiently distinct that the findings can be interpreted in terms of comparison of rival ideas (Yin, 1989). An attempt was made and the results of this are presented in the individual summaries of the Research Propositions (Section 8.1). The findings of this thesis follow in the next two sections: Section 7: Analytical Chronology and Section 8: Data Analysis (of the Propositions).

7 ANALYTICAL CHRONOLOGY

7.0 INTRODUCTION

7.0.0 HOW DID TELIDON BEGIN?

August 15, 1978 marked the official beginning of Telidon, Canada's videotex program.

7.0.0.0 POLITICAL ASPECT

The government's involvement in activities leading to the Telidon program began in 1969 shortly after the formation of the Department of Communications (DOC) with a group of studies collectively called the Telecommission. These studies constituted one of the most ambitious and thorough reviews of the present state and future prospects for telecommunications ever conducted. The general report called *Instant World* was an international best seller (Parkhill, September, 1981).

As well, one set of studies dealt with the possibility of using combined computer communications systems to provide universal access to the storage and processing capability of electronic data banks and computers. At the time of the Telecommission, the Communications Research Centre (CRC) of DOC was already engaged in computer communications research (Infomart,March 1980).

Originally, the technology was conceived as having military and educational applications; however, the development of Prestel in Great Britain caused Herb Bown of the CRC, a man later known as the Father of Telidon, to conclude that Canada's technology in this area was superior (Foote, 1984; Infomart, March 1980).

At this time, France and Great Britain were substantially subsidizing and promoting their own videotex systems (Thomas,1983). Bell Canada was undertaking a videotex system

using British technology and Ontario's educational TV network, TVOntario, had plans to test France's Antiope teletext system (Thomas, 1983). As well, Roy Bright, now head of the French Antiope marketing policies but formerly in charge of international promotion and marketing for the British Post Office, offered to sell the rights to the British technology to DOC (Parkhill, September, 1981). The option Canada faced was to either support a Canadian system which was superior or to allow industry to purchase French and British equipment (Thomas, 1983). The decision to go with Telidon was not only a matter of technical superiority but of national pride and the latter factor made the decision politically driven as well (Thomas, 1983).

The authors of the Telecommission Report saw many benefits flowing from widespread access to the various services made possible by Telidon. These included major increases in the quality of life, the productivity of industry (especially the service sector), the decentralization and new opportunities for individual development. They also saw education, transfer of funds, trade practices, culture, public administration and transportation all becoming more efficient and responsive to human needs (Parkhill, April, 1981).

7.0.0.1 TECHNICAL ASPECT

The nature of the Canadian telecommunications industry favoured the early development of videotex services. Canada is one of the most intensive telecommunications and computer users of all the major industrial nations. Canada's highly developed voice, data and video communications infrastructures made Canada fertile for the superimposition of value added services such as videotex. Canada has one of the world's highest levels of telephone penetration. Furthermore, cable television in Canada has the highest penetration level found in any major country (Stothers and Dietrich, 1984)

The graphics protocol (Technical Note 699) for Telidon was developed by the CRC Telidon technical group by building on work carried out prior to 1979 (TEEGA Research Consultants Inc., 1985). This technical group included: Herb Bown, Douglas O'Brien, William Sawchuk and John Storey.

Basic research and development of interactive visual communications systems at the CRC of the DOC began in 1969 after a number of years of experience with computer-aided design and computer graphics techniques in support of Canada's space satellite applications (Bown and Sawchuk, January 1981).

From 1969-1973, CRC built special hardware and developed software required for interactive graphics communications. This work gave rise to the initial definition of a picture coding scheme. (TEEGA Research Consultants Inc., 1985)

In 1973-1976, refinements were developed on the premise that terminals would contain their own intelligence and that the picture coding scheme would be independent of hardware configurations and communications delivery systems (TEEGA Research Consultants Inc., 1985).

Finally, from 1976-1978, further refinements led to the formal definition of the Picture Description Instructions (PDIs) which are the key to the Telidon system (TEEGA Research Consultants Inc., 1985).

7.1 GENERAL AND BACKGROUND INFORMATION

7.1.0 WHAT IS TELIDON ?

Telidon was the name of the Canadian technology which can be employed in either videotex or teletext mode (Parkhill, September, 1981). This was also the name given to a government program within DOC which represented the practical results of applied

research and development (R&D) in microelectronic computing and communications, high technology transfer from government to industry, public information applications, private sector opportunities creating both jobs and revenues and cooperation amongst government and industry. (Foote, 1984)

People view Telidon in many different ways which is indicative of its broad range of applications. Telephone company people see the system as a way of entering into a telephone conversation with a computer. Newspaper people view the system as a form of electronic newspaper. Computer people see Telidon as a form of time sharing system for the masses. Advertising people see it as a means for distributing advertising messages. Television people see it as a somewhat limited and eccentric form of television broadcasting. Finally, sociologists view Telidon as a way of electronically stimulating and reinforcing social networks.

7.1.1 BROAD VIEWPOINT

This new technology has come to epitomize Canada's push into the information age and the electronics markets of the twenty-first century (Foote, 1984). Francis Fox,then Minister of Communications, stated that along with satellite communications, Telidon is an international symbol par excellence of Canadian capabilities in high technology (House of Commons, April 20, 1982).

This government program has been a prototype for cooperation amongst government and diverse industries (Foote, 1984). It has brought together the software and hardware, the artist and the technologist (House of Commons, May 28, 1981).

The motives for government involvement concern the assumption that a videotex communication revolution was inevitable and that without a Canadian product available, Canada would once again be relegated to "branch plant" status as a net importer of

technology. Economically, the government had determined that Canadian technological leadership in videotex development would be translated into the plus column for the GNP and thus, balance of trade (Foley and Hurly, 1980). Another motive expounded by then Director General, John Madden, was that Telidon could enhance democracy itself. The major social benefit was access to information and this implies an opening up of society. Hence, people would have a better idea of what was happening and change things in a more informed and enlightened way (Thomas, 1983).

7.1.2 TECHNICAL VIEWPOINT

The technical view of Telidon portrayed it as the marriage of the distance annihilating powers of telecommunications with the storage and intellectual powers of computer technology to make reality of a dream. This dream being a future where computer based services would no longer benefit the few but would be available to everyone via terminals that would be common place as telephones are today. Interestingly enough, Douglas Parkhill spoke of this dream in his book written in 1966, The Challenge of the Computer Utility. (Parkhill, September, 1981)

7.2 GOVERNMENT INVOLVEMENT

7.2.0 THE ROLE OF GOVERNMENT

From the beginning, Canada's history has been one of imaginative use of public and private resources to develop institutions, especially in communications, which are vital to this country with its small population scattered over vast differences. Canadians have believed they could use public resources to serve the national interest but without the state monopolies and without compromising liberty and enterprise. Bernard Ostry, Deputy Minister, believes the Canadian government has been successful in doing so. (Infomart, March 1980)

The Japanese, British and French but not the US, developed their own videotex systems either directly by government or with its support. These countries aggressively marketed them at home and abroad with government assistance. This government investment was necessary as there is a huge cost associated with the development of new computer-communications technologies. Videotex was one of these powerful technologies; hence, the federal government's role in developing a Canadian videotex system. (Infomart, March 1980) However, this high development cost can only be met by cooperation between the public and private sectors. (Infomart, March 1980)

Since 1978, Ottawa's active support of this high technology was the principal catalytic ingredient in the government/industry program of cooperative investment, research and marketing (Foote, 1984). Government's role, like industry's, was to launch and maintain a national strategic effort with a view to securing an enduring place for Telidon in the emerging new media marketplace (Foote, 1984). Various government programs were developed to facilitate this effort: Canadian Videotex Consultative Committee, the Industry Investment Stimulation Program, the Public Initiatives Program and the Content Development Program (Maria Cioni & Associates Inc., 1985). They will be examined in greater detail under the "Program Components" section.

Suggestions for the role that government should have fulfilled in the future are as follows: (Maria Cioni & Associates Inc., 1985)

1. In the area of research, the government should have encouraged industry evaluation of market research studies and provide more checks and balances in the government programs to counter self-interest and bias on the part of the researchers.
2. Government Procurement: Support the adoption of videotex use within the various government departments. (Stothers and Dietrich, 1984) This would have provided support to Canadian industry and acted as an incentive to other organizations potentially interested in Telidon (TEEGA Research Consultants Inc., 1985).
3. Stimulated the industry through financial policies such as tax incentives. (Stothers and Dietrich, 1984)

These suggestions represent issues that were not addressed throughout the program.

Without the technical and financial support provided by DOC, many of the successful applications would not have been implemented. Grassroots and Marketfax are examples of two services that received funding and are still operating today. DOC created an umbrella under which a variety of innovative ideas and concepts were experimented with. (Stothers and Dietrich, 1984)

7.2.1 STRATEGY - PROGRAM FOCUS

The promotion of Telidon as a national, North American and international videotex standard was the cornerstone of the strategy by DOC to achieve the following program objectives (TEEGA Research Consultants Inc., 1985).

7.2.3 GOALS AND OBJECTIVES

The Telidon program was intended to help shape the videotex/teletext environment by offering the technology to private and public organizations, financial assistance at $67-70 million by 1983 and enabling expertise (e.g. negotiation of standards) to facilitate the private sector's own investment in many areas of the new industry. (Foote, 1984)

Short term objectives were stated by Bernard Ostry, Deputy Minister of DOC as follows: (Infomart, March 1980)

1. To ensure that the Telidon alphageometric standards were internationally among videotex standards.
2. To coordinate industrial activities towards the commercialization of Telidon. This dealt with the development of hardware and software for trials.
3. To encourage the transfer of Telidon technology to the private sector as quickly as possible so that it could develop its own systems in response to the market.

The overriding idea was to provide the essential impetus following which Telidon would be self-sustaining (Madden, 1981). The goal was to strengthen the private computer-communications industry, not to establish a publicly-owned industry in competition with it (Infomart, March 1980). DOC attempted to persuade organizations (once they showed interest in a videotex service offering) that it was in their interest to opt for Telidon and to

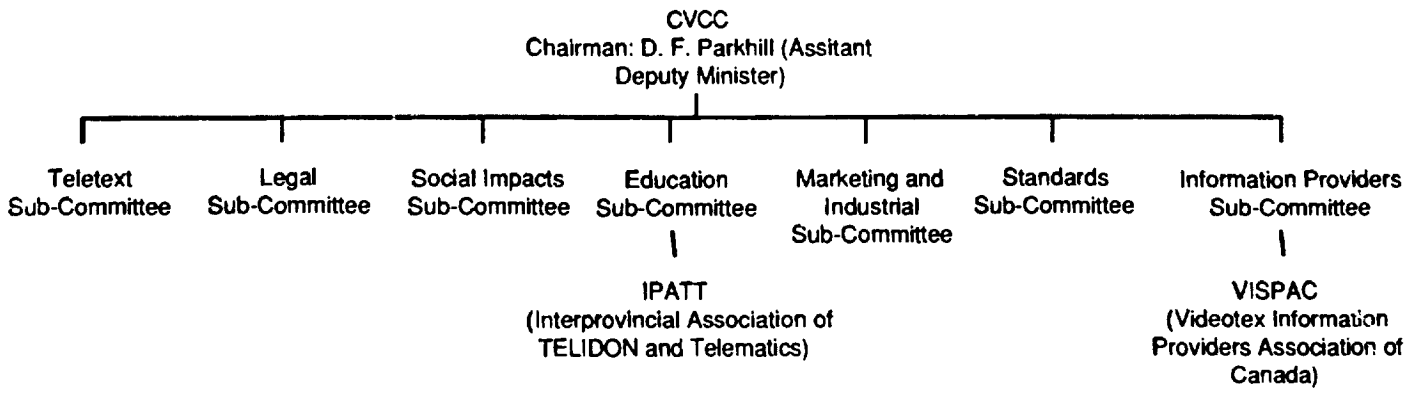
convince them, certain program elements were put in place (Madden, 1981). These are product development activities, field trial activities, standards activities and Information Provider activities. (Madden, 1981)

7.2.4 PROGRAM COMPONENTS

7.2.4.0 CVCC- CANADIAN VIDEOTEX CONSULTATIVE COMMITTEE

In May 1979, the Toronto Gamma Group meeting recommended the creation of a joint industry/government consultative committee (House of Commons, November 23, 1983). Hence, the CVCC was set up in November 1979 as an industry/government advisory forum intended to foster and advance the domestic and international exploitation of the technology (Foote, 1984). Membership was set for a two year period and grew to 30 organizations chosen by the Deputy Minister, Bernard Ostry (Foote, 1984). Total CVCC plus Sub-Committee involvement numbered regularly over 200 participants (Foote, 1984) with the Assistant Deputy Minister, Douglas Parkhill as the Chairman (House of Commons, November 23, 1983). Refer to Figure 1 for the organizational hierarchy of the CVCC and its Sub-Committees.

Figure 1: Canadian Videotex Consultative Committee (CVCC)



SOURCE: TELIDON Reports Newsletter, July 1981.

This body played an early and essential role as the central forum for interaction amongst government, industry and the public (Foote, 1984). This included people who normally do not cooperate and as Mr. Parkhill observes, "tend to almost hate each others' guts": broadcasters, cable operators, telephone companies, manufacturers, publishers, consumer groups and labour (House of Commons, May 26, 1983).

The CVCC was influential during 1979-1982; however, afterwards it seemed to stall as videotex/teletext began to assume a different profile than originally forecast (Foote, 1984). The most practical results were gained from Sub-Committee meetings and initiatives (Foote, 1984). As well, there were other industry groups which developed from the CVCC's structure. These were VISPAC: Videotex Information Service Providers Association of Canada which developed from the CVCC idea of an Information Provider (IP) Sub-Committee, CVIA: Canadian Videotex Industry Association and IPATT: Interprovincial Association for Telematics and Telidon which was the Educational Sub-Committee.

7.2.4.1 CONTENT DEVELOPMENT PROGRAM (CDP)

On January 13, 1984, the Minister of Communications announced $4.95 million to be allocated to 27 selected firms (Foote, 1984). The funds were to be used to develop sophisticated and innovative software and content for Telidon systems (DOC, Telidon Reports, March 1984). As with most government programs, one of the criteria in evaluating proposals was the maintenance of a reasonable geographical distribution (based on the population in each province) for the projects funded; however, the resultant allocations were concentrated in Ontario and Quebec (22/27 projects in these two regions) (Foote, 1984).

7.2.4.2 INDUSTRY INVESTMENT STIMULATION PROGRAM (IISP)

The IISP represented the solution to the problem of industry's hesitation to risk investment (production or purchase) without the simultaneous availability of both hardware and software which was retarding market penetration (Foote, 1984). This program represented the basic cornerstone of the Telidon effort and was designed to be a 2 year federal undertaking to end on March 31, 1983 (Foote, 1984). Ten million dollars was allocated to stimulate an equal or greater investment from the industry recipient (Foote, 1984). IISP was regarded mainly as government subsidies to industry for Telidon terminal acquisition (Foote, 1984)

In the summer of 1981, IISP Requests for Proposals (RFP) were sent to over 1500 possible applicants resulting in some 80 proposals of which 52 were awarded funds (Foote, 1984). It is interesting to note that the actual amount ($7.2 million) spent on the proposals originally selected was lower than the funding approved (Foote, 1984). This is indicative of the industry's embryonic nature at the time. As a result, an additional $2 million was awarded to other projects in early 1983 so that unused funds could be put to use (J, Piskor). As with the CDP, the IISP recipients were skewed to favor two provinces, in this case, Ontario and Manitoba. (Foote, 1984).

The objectives of the IISP were as follows: (Coll,Strickland and Dieguez, 1982; Foote, 1984)

- to aid in the commercialisation of Telidon through the development of applications
- to achieve critical mass in both data base content and audiences needed for a viable videotex market
- to reduce the price of Telidon terminals through volume production to facilitate end user participation
- to improve the price competitiveness of Telidon in foreign markets with the focus on the United States (which was promoting its technology based on its low cost)
- to stimulate new private sector expenditures of over $100 million in the first year (1981), as estimated by industry
- to stimulate the development of videotex services which address social needs, cultural and regional realities

Clearly, not all the objectives were met. By 1984, only 600 terminals were in place (Foote, 1984). An explanation for this low level was the standards change that resulted in terminals requiring upgrading. The changes took between one year and eighteen months to complete which caused delays in the IISP terminal delivery as well as some capital investment procrastination (Foote, 1984). Regarding the price of terminals, this was lowered only after the development of the VLSI (Very Large Scale Integration) chip by Norpak. The IISP did not stimulate enough volume to cause a drop in terminal price. However, social objectives were pursued through educational and public service applications (TVOntario and Cantel) (Foote, 1984). There were 15 out of 50 IISP projects that were non-profit (mostly educational) (Foote, 1984). Grassroots, Teleguide, Infopress and Marketfax received the highest levels of funding and Grassroots and Marketfax still have operational services today (Foote, 1984).

Overall, the IISP did serve to stimulate the industry, albeit to a lesser extent than originally expected. Many IISP recipients are still in the business although only a select few are still operating the same service as under the IISP. Finally, the IISP acted as a major precedent on the content side to the CDP (Foote, 1984).

7.2.4.3 PUBLIC INITIATIVES PROGRAM (PIP)

As the public service applications in the non-profit category were considered unlikely to develop without focussed government support, the PIP was created to facilitate this development (Foote, 1984). The PIP received $1 million that was distributed to 12 Telidon projects in early 1982 which were focussed on the following groups: women, Natives, consumers, the Inuit and the disabled (Foote, 1984).

The PIP was evaluated and given a rather mixed review in 1983. On the negative side, the projected page creation totals were not reached as of March 1983 and user feedback was close to nonexistent. However, it allowed an assessment of the capabilities (or lack of) for

Telidon with closed user group non-profit applications (Foote, 1984). The scarcity of money was a major constraint facing the PIP as relatively small amounts were allocated to each project (Foote, 1984). The interviews and document review found no applications that were developed under the PIP that are operational today.

7.2.4.4 TELIDON MARKETING SECRETARIAT (TMS)

When the Telidon program was augmented with an additional infusion of $27.5 million in February 1981, a small Telidon Marketing Secretariat was established within the Trade Commissioner Service of Industry,Trade and Commerce (ITC), the secretariat then forming part of External Affairs. At the time it began to function (September 1981), A **Telidon Systems Inc.** was to be established as a private sector organization involving Torstar, Southam and Infomart and supported by government to do the promotion for Telidon in export markets. The initial capitalization was to be $50 million with a staff of 65 people. This never materialized and the main responsibility for Telidon marketing remained with the federal government (Abt Associates, 1985). According to David Carlisle of Infomart, Cabinet had approved this vehicle but at the last moment, Torstar and Southam backed out of the deal (Carlisle, June 8, 1990). Douglas Parkhill, former Assistant Deputy Minister of DOC stated that perhaps this idea would not have worked in reality as companies such as Systemhouse, Genesys Corp, Microtel and Northern Telecom who were strong competitors were supposed to work together in this new chosen instrument (Parkhill, June 7,1990). The structure would have been comparable to the marketing efforts of the Europeans. This was very unfortunate as there was widespread belief throughout the interviews that the government has no marketing expertise and this should be left to the private sector.

The TMS was assisted by the CVCC Sub-Committee on Marketing and Industrial Strategy (Abt Associates, 1985); however, lacking large scale funding and acting on the

presumption that Telidon Systems Inc. would become a reality by 1982-1983, the TMS's main activities were mainly promotional (Foote, 1984).

In January 1982, The Telidon Systems Section of the Special Marketing Division of External Affairs took over the mandate and responsibilities of the TMS to devise and implement a worldwide marketing plan for Telidon and to coordinate the activities of the industry and other federal and provincial departments and agencies. The objective was to keep the US, Europe and Japan at bay. (Abt Associates, 1985)

7.2.5 TECHNOLOGY TRANSFER

Telidon technology was developed in the laboratory at DOC's CRC and was transferred through licensing agreements to the private sector for product development (hardware). Licenses were obtained through Canadian Patent and Development Ltd. (CPDL) (Peat Marwick and Partners,1985). Beginning in 1979-1980, there were few systems analysts/programmers on staff at the CRC; thus, to develop the software, CRC contracted programmers and analysts to work on-site to develop this. This brought about the transfer of technology and the creation of a Telidon software and consulting industry in Canada (DOC, Program Evaluation Branch, 1988).

The only firm to receive a transfer of technology for manufacturing hardware was Norpak in 1978. Norpak sub-licensed the technology to AEL Microtel and Electrohome (Peat Marwick and Partners,1985). As well, royalty-bearing and royalty-free licenses on Telidon database software were granted. The technology transfer was not achieved only by the transfer of information by license to Norpak but in a repeated and continuing interchange of information between DOC and Norpak engineers over a long period of time starting in 1969. (DOC, Newsletter, March 1981)

The importance of technology transfer was emphasized by Minister of Communications, Francis Fox who stated that technology transfer implied a high degree of cooperation between government and industry. He believes that the successes- Telidon, fibre optics and satellite technology- could not have been achieved without the close and continuing government-industry cooperation that the government nurtured and encouraged. (House of Commons, April 20, 1982).

A good example of a combination of technology transferred from both the information area, the Telidon area and the fibre-optics program was the Elie Optic field trial in Manitoba. This was a joint venture between the Manitoba Telephone System (MTS), the Canadian Carrier Association, DOC and Northern Telecom to build the world's first rural switch distribution system (House of Commons, May 26, 1983). Project Elie will be dealt with in further detail in the Field Trial section.

The technology transfer aspect was a major goal of the Telidon program and of most government programs in general. The government provided the initial impetus for the private industry to develop and implement this technology with the hope that the private sector would grow to accept full responsibility for continuing Telidon's development. This wish was fulfilled although to a much lesser extent than originally expected. The aspect of Industry Viability will be discussed in the Industry Infrastructure section.

7.2.6 GOVERNMENT ASSISTANCE

7.2.6.0 FOCUS

It is generally considered by new media experts that continuing government assistance at the early stage of technology, product and application development is necessary for the early establishment of viable commercial services (Foote, 1984).

Between 1978-1982 (the heyday years), R&D constituted almost 40% of the annual budgets for Telidon, industrial stimulation and support initiatives accounted for more than 25%; however, marketing which largely involved efforts to establish Telidon as an international standard was allocated a mere 12%. This breakdown highlights the technical focus of the program. The focus was almost entirely on meeting the requirements of the trials as DOC restricted its funding to user and information provider terminals (hardware area) leaving software, database management and engineering to the system operators (Booth and Wills, August 1983).

7.2.6.1 FINANCIAL

To begin, government financial and administrative support to marketing Telidon has not been on a scale remotely close to France, Great Britain or Japan (Foote, 1984). Canada's need to compete with other foreign government-supported promotional efforts was well recognized; however, Canada could not afford to provide massive ongoing public subsidies (Foote, 1984). Cabinet and Treasury Board conducted three major funding operations for Telidon in 1979, 1981 and 1983 but there was much uncertainty expressed over the extent and the intended longevity of the government's support (Foote, 1984). This could have caused a sense of insecurity in the Telidon industry as it was highly dependent on government funds.

Initial funding of $9.5 million was approved on March 29, 1979 by the Treasury Board Secretariat (TEEGA Research Consultants Inc., 1985). In early 1979, Telidon lagged an estimated three years behind the first-generation European systems; thus, the government announced this modest funding to support a 4 year program to help establish field trials and further technical refinement of the system (Infomart, March 1980). Highly developed technologies are not sufficient as the world markets are very competitive. Consequently,

government took steps to get the technologies out of the labs for industrial and commercial purposes in order to introduce them to these markets (House of Commons, May 28, 1981).

Additional government funding was announced February 6, 1981 to the amount of $27.5 million. With this, DOC continued its goal of creating a commercially viable industry with the capability of competing in export markets (House of Commons, May 28, 1981).

The final round of funding was allocated in March 1983. The $23.5 million represented funds for the final part of the program, the Exploitation phase and was allocated as follows: (TEEGA Research Consultants Inc., 1985)

$ 5.91 M -	Content Production Stimulation
5.25 M -	Research and Development
2.5 M -	Marketing
4.37 M -	Applications and Engineering Support
1.05 M -	Impact Assessment and Evaluation
.42 M -	Technical Standards

The justification for continued funding dealt with many events which served to make the outlook for Telidon less optimistic. These events included: The competition from other systems for the US market and for the establishment of a standard acceptable to the American market caused a lot of effort to be diverted to this cause. As well, the standards upgrade to include AT&T's changes to the protocol hindered Canadian manufacturers in their marketing in the US until the North American standard had been developed. Because of the soft market, government felt that continued industry support beyond the development of the technology and the program to stimulate the production of hardware (IISP) was required. The world recession hurt the industry as videotex was often perceived as a luxury item. Thus, in part because of the economic slow down, this sector of the economy was hit harder than other sectors as it was a new product with a luxury label (House of Commons, November 23, 1983).

An alternative approach to government's role in supporting industry was suggested in the Telidon Marketing report by Abt Associates. They suggested government should not

become too directly involved in industrial development as the rules and conditions attached to support packages can act as a disincentive to industry (Abt Associates, 1985). The best suggested approach was to provide direct assistance to a few specific firms with a clear focus on some part of the market allowing them to proceed how they chose. The problem inherent to many government activities is they inadvertently encourage industry to distort their activities to meet the funding criteria (D.Coll). The suggested approach was followed with the creation of Canada's successful space program (Carruthers, June 26, 1990). As well, government should promote sales abroad where government-to-government negotiations are quite important (Abt Associates, 1985).

A final suggestion was for government to continue vehicles such as the Scientific Research Tax Credit for investments in R&D (Abt Associates, 1985; Booth and Wills, August 1983). However, regarding the tax credits, there was a great deal of abuse which led to this credit program being cancelled. Between 1981-1984, firms conducting R&D could receive funds from investors and the investors in return would receive a tax credit for an amount greater than that invested to fund R&D activity. This attractive program attracted people who would borrow the money, the investor would receive his credit but no R&D activity would be conducted.(Deaks, 1990) Thus, such tax incentives for the Telidon program should have been well structured to avoid abuse.

7.2.6.1.0 Return on Investment

Who owns Telidon? This is a difficult question to answer as no one entity owns Telidon. Telidon was initially a coding structure that permitted the transmission of pictorial information very efficiently over communications lines. From that, DOC developed an industry to exploit the technology. The various components are owned by a host of companies plus a number of patents which are held by the federal government (House of Commons, May 26, 1983). Thus, returns are earned accordingly.

By the end of 1985, government had invested $63 million in the Telidon program. The return on this investment was earned directly through royalties. DOC officials were rewarded for the royalties on the various patents which were licensed by CPDL. There was a policy that the responsible inventors whose work had been patented and turned over by the CPDL received a small percentage of the royalties that were paid by the licensees to the government (House of Commons, May 26, 1983).

7.2.6.2 FUTURE ASSISTANCE REQUESTED

Expectations from industry for future financial support were low to nonexistent in one report (Industry Viability, Peat Marwick and Partners) which directly contradicts another report where industry's plans depended on how much money they could receive from DOC (Lane, Videotex Canada, 1983). The first report was written in 1985 which was the year the program ended which could explain the lack of expectations for future assistance. The latter report was written in 1983 at a time of continued government support which could be indicative of the dependence of industry at this time.

Despite the lack of agreement on financial support, there was great importance placed on government increasing its support through direct procurement of Telidon-related products and services. The industry was relying heavily on all levels of government for significant support through product and services purchases (Peat Marwick and Partners,1985).

7.3 INDUSTRY INFRASTRUCTURE

There is considerable debate whether or not an infrastructure was properly established for Telidon. A comment at a conference in 1980 was made to the effect that if this technology was to amount to anything, the technical problem of simultaneous use of the system would have to be solved. This consultant continued to state that a network did not exist with which to do this and that the Telidon people had not yet identified the kind of infrastructure

required (Faulkner and Gurstein, 1980). The lack of infrastructure topic has arisen in many interviews as well (Bown, May 24, 1990; Dworkin, June 5, 1990; Juneau, August 1990; Lax, May 30, 1990; Norton, June 13, 1990; Parkhill, June 7, 1990; Piskor, June 1, 1990).

On the positive side, there are some who believe an infrastructure was built. Notes from a 1982 seminar stated that Telidon received government support at the cabinet level as the Canadian entry in the Information Revolution and an infrastructure was set up to promote it. It comprised technical directorates, an extensive advisory committee structure (the CVCC), contracts with industry (Norpak), a field trial program (IISP) and a high profile promotional campaign (Coll, 1982). The Telidon Reports newsletter is an example of government attempting continuous communication throughout the infrastructure- between IPs, hardware manufacturers and developers of new features to Telidon (Infomart, March 1980). Douglas Parkhill, the Assistant Deputy Minister in 1981 described a viable industrial structure as follows: (Parkhill, September, 1981)

1. Manufacturing Industry: The firms involved were to be competitive and non-regulated; however, they would build their equipment to common standards.
2. The Distributors: Telephone carriers, cable companies and broadcasters who supply communication links are in this category. They are regulated with the telephone companies (the telcos) and cable companies being natural monopolies.
3. The Information (Sub-Information) and Service Providers (IPs, sub-IPs and SPs).
4. The Public Data Base Operators: They store information and programs and run programs on behalf of those IPs and SPs who do not own computers. Unregulated.
5. System Operator (SO): Firms such as Infomart which ran the Bell Vista system and Department of Supply and Services (DSS) Cantel service.

The program did have representation from each of the above elements; however, the effectiveness of such a structure was examined. The manufacturing industry had not built their equipment to common standards due to the documentation of the standard allowing for different implementations of the standard. This resulted in hardware from the three main manufacturers (Norpak, Electrohome and Microtel) being incompatible with each other (Carlisle, June 8, 1990). Telephone companies were restricted by CRTC regulations on the

separation of carrier and content (to be presented in the Policy Issues section) which served to lower their interest.

Regarding the relationship between the SO,IP and the sub-IP, the infrastructure was not clearly defined and difficulties arose with large service and small companies attempting to define roles for themselves in a nascent industry. The structural model of the service and information element of the industry can be described as: Service Provider, umbrella Information Provider, other Information Provider and sub Information Providers (Booth and Wills, August 1983). This type of approach evolved from: (Booth and Wills, August 1983)

1. The reluctance of some telephone companies to become providers of information (mainly for regulatory reasons).
2. The efficiency of segmenting the tasks for providing a prototype service and thus, minimizing risks to individual participants.
3. The need to develop service offerings in a variety of locations across the country in a short period of time.
4. A lack of any one firm with a degree of vertical integration to provide all services necessary.
5. The nature of government support for a variety of companies to participate in the industry in various locations.

Finally, the fate of the Public Database Operators is unknown. Through interviews and literature review, there is little mention of such creatures.

In sum, the effectiveness of this infrastructure seems limited due to the problems presented. An overview of the basic structural characteristics of the industry are: (Peat Marwick and Partners,1985)

1. The majority of firms are 100% Canadian-owned. Thus, the sovereignty issue is pacified here.
2. These firms are located mainly in Toronto and Ottawa region.
3. In terms of products and services, few firms manufactured hardware (Norpak, Electrohome and Microtel). Many firms developed software and did page creation (Information Providers activity). The reason being the capital investment required for manufacturing hardware did not allow easy market entry whereas the large number of page creation operations indicated a lower barrier to entry.
4. The financial backing available to different organizations varied. Most of the firms were independent ventures; however, a few were subsidiaries of major publishing (Infomart), advertising, mining (Norpak) or communications parent organizations.
5. There appeared to be a high degree of intra-industry employee migration among Canadian participants both from government to industry (part of the technology transfer objective) and within the industry itself.

7.3.1 THE ROLE OF INDUSTRY

It appears that the structure that developed was partly the result of reacting to events that occurred at a rapid rate during the program. Industry invested approximately $4 for every $1 invested by the government; thus, there was a good ratio of government to private spending (Foote, 1984). Suggestions for what industry should have done are presented below: (Cioni and Associates, March 1985)

1. Industry should have concentrated on producing the product, providing the service, developing the expertise and creating more job opportunities.
2. Industry should have left the problems associated with implementing the standard and moved on to other concerns such as producing a critical mass of content to attract subscribers, improving the tools of content production and developing quality communications at lower costs to foster interactive transactions.

An overview of the program's activities reveals that most of these suggestions were dealt with, some with more depth than others. Product development was a major focus and many new jobs were created as a result. Expertise was developed through the technology transfer program. It is true that industry was very involved with the time-consuming standards process and this detracted from other critical areas such as content development and marketing. The Content Development Program whose goal was to focus on improving the quality of databases content was not introduced until very late in the program and this is indicative of the technical thrust of the efforts. Tools for content production were improved later on with page creation software packages developed by firms such as Microstar. However, the initial equipment was termed as painful to deal with (Carlisle, June 8, 1990).

Finally, a fibre optics trial was attempted with Telidon to experiment with a new mode of communications and ISDN (Integrated Systems Digital Network) is currently spoken of as the high speed transmission media that will solve line loading problems.

To conclude this section, it appears that an infrastructure was set up by the government that involved participation in the key areas mentioned above. The overall effectiveness of this structure was affected by many factors pointed out but the underlying reasoning behind the setup was reasonable and thorough.

7.3.2 COMPANY CASE STUDIES

7.3.2.0 INFOMART

Infomart was a major commercial player in the Telidon program. Formed in 1975, it was one of Canada's leading electronic publishers being a partnership of two of Canada's largest publishing and communications companies- Southam Inc. and Torstar Corp. In Canada, a team of over 200 people with offices in Toronto, Ottawa and Winnipeg was established. (Infomart Brochures)

This venture, with the help of a $600,000 grant from Ottawa became the leading international supplier of videotex software and systems (Thomas, 1983). David Carlisle, the President, hired a crew of 40 programmers to improve CRC's original Telidon software which was then marketed worldwide (Thomas, 1983). By 1980, Infomart had computer and page creation terminals in operation (Thomas, 1983). As well, Infomart was the system operator for many ventures not directly created by itself- Bell Vista system and DSS (Dept. of Supply and Services) Cantel system as examples. Services created and operated by Infomart include the agricultural service, Grassroots and the tourism service, Teleguide. These ventures will be described in the Field Trial section.

7.3.2.0 NORPAK CORPORATION

Norpak in the mid 70s responded to an open Request for Proposal from CRC; thus, Norpak found itself doing development work in pre-Telidon prototypical equipment (Feeley, 1983). In 1976, a technology transfer agreement was signed with Norpak whereby it was licensed to use the CRC technology for the development and sale of commercial graphics terminals (Madden, 1981). The CRC developments were primarily in software as they related to concept development, and the required computer programs which allowed graphical images to be rapidly and easily created and efficiently transmitted. Norpak designed and developed the hardware in which this software was clothed (Madden, 1981). By 1979, with Telidon receiving international attention, Norpak decided to enter this new field (Feeley, 1983).

The Noranda Group invested $30 million in Norpak and this investment was made through Noranda's wholly-owned subsidiary, Maclaren Power and Paper Ltd. The funds were used to further develop and produce display systems and other equipment (DOC, Telidon Reports, August 1981). Noranda is known for being an industry builder; thus, the reason for its involvement with Norpak (Norton, June 13,1990).

7.3.3 SKILLS BASE

There was no apparent lack of qualified people in the Canadian labour force for Canadian videotex firms. This was due partially to the fact that there was currently a high level of unemployment and many highly educated and skilled people were looking for work. In other cases, it appears that people with experience in similar media can be easily trained to use Telidon technology. One major source of skilled and experienced employees seems to be from within other companies in the industry. Several of the newer, small firms were built around former employees of Infomart, Norpak and DOC (IDON Corp is an example).

True of an immature industry, many of the key personnel moved quite readily from one firm to another as companies closed and others were created in response to new markets and evolving technology (Abt Associates, 1985). Note that part of the movement had to do with the government's technology transfer objective whereby many CRC Telidon people were transferred to industry.

Initially, the skill emphasis was on technical aspects for development of the Telidon systems and many of the industry participants were involved at the technical level (Peat Marwick and Partners,1985). Areas requiring increased personnel were marketing and sales and management (Booth and Wills, August 1983). With respect to marketing, aside from the Information Services staff, resources allocated to marketing consisted mainly of one or two full time staff (Abt Associates, 1985). Unfortunately, the program lacked the resources necessary to hire the appropriate staff and to implement a carefully developed marketing plan (Abt Associates, 1985).

7.3.4 CRITERIA FOR ASSESSING INDUSTRY VIABILITY

The Peat Marwick and Partners report on Industry Viability developed criteria for assessing viability. The concept of adequacy was applied to four areas:

1. To what extent are the potential Telidon market sectors adequate in terms of being accessible, rational and growing (rationality seen in terms of market growth as price decreases and the range and quality of services increase)? The Marketing section will deal with market segments in detail.
2. To what extent are the industry's products adequately suited for and adaptable to the present and anticipated needs of Canadian and foreign markets? The Technology section deals with the basic design characteristics that ensure the protocol is flexible and adaptable. Also noted by Jim Carruthers, President of Norpak, was the fact that it takes ten years to form an industry and with the videotex hardware stabilized and the introduction of the Rockwell/Norpak VLSI R6549 chip, hardware prices have greatly reduced (Maria Cioni & Associates Inc., 1985). The market required a low cost terminal to survive; thus, improvements in technology are paving the way.
3. To what extent does the industry have the investment capital and/or operating profits adequate to meet its financial requirements? Profits have been an elusive commodity to this industry during the Telidon program's duration. Government assistance created a buoyant market that collapsed after the funding terminated with only a select few firms surviving. These firms are currently prospering (Microstar, Com:Port International, Norpak as examples).
4. To what extent are the technical and managerial skills and experience within the industry adequate to meet its present and prospective requirements? As stated in the Skills Base section, the supply of technical personnel is not a limiting factor; however, expertise in marketing and management is required to offset the technical focus of the program.

7.4 THE TECHNOLOGY

7.4.0 BASIC DESIGN CRITERIA

Herb Bown and his team at CRC were asked by DOC to demonstrate the British Prestel system. This was the opportunity to introduce the Canadian version of the technology which was superior graphically. Herb constructed a picture logically: it was sent down a communication line to a computer. The computer recognized and decoded the logical information and sent it out to a display generator. In turn, the display generator drew on a bit plane memory and the bit plane memory was the last thing before one saw the picture. (Abt Associates, 1985)

Altogether, Telidon was a system of a television set, key pad, decoder/terminal, some form of communication media (telephone lines, cable, fibre optics, satellite channels) and a computer system with a data base of information (Faulkner and Gurstein, 1980).

The researchers who invented Telidon had 4 basic principles in mind: (DOC, Telidon Today, 1982)

1. Maximum independence of the terminal, the data base and the transmission medium to ensure that those who use the system can choose the type of equipment and transmission methods best suited to their needs. Telidon pages have been transmitted by television signal, telephone line, coaxial cable, optical fibres, laser beam and satellite broadcast.
2. Simple and flexible information creation procedures to ensure that all users, whether they are individuals with simple messages or large corporations with highly detailed information programs, can have access to the system with minimal cost or technical training.
3. Efficient data transmission and storage techniques ensure maximum use of computer and terminal memory space and reduce costs and time required to transmit the information. This was not the case with very detailed graphics.
4. Flexibility to accommodate technological advances. The concept of forward and backward compatibility is of central importance. Forward compatibility means that the communications codes must be designed in such a way that future terminals will be able to access old data. Backward compatibility, which is much more difficult to achieve, means that an installed inventory of terminals can receive and decode all future command formats in an intelligent manner (Bown, Kukulka, Lum, O'Brien, Smirle; 1982). As will be explained in the Hardware Development section of the Field Trials analysis, the upgrade from the original Telidon standard to the currently used, North American standard, NAPLPS caused many delays and problems; thus, diminishing the claim of backward and forward compatibility.

NAPLPS is now a standard which is not tailored to any particular hardware configuration and can be used with equipment from different manufacturers, and is compatible with ASCII. Part of the reason for NAPLPS' popularity in North America is the fact that it is not only a graphics protocol but an information exchange language as well. (TEEGA Research Consultants Inc., 1985)

7.4.0.0 PICTURE DESCRIPTION INSTRUCTIONS (PDIS)

The key to the Telidon system is the specially designed code, better characterized as a communications protocol called PDIs that are stored in data banks. The PDIs describe an image in terms of elements that are basic geometric primitives. The PDIs mathematically define the structure of the entity to be drawn (Bown and Sawchuk, January 1981).

7.4.0.1 CODING PHILOSOPHY

The standard for encoding text and graphics information is but one of a number of interconnected standards required to provide a videotex or similar communications service. In terms of the architecture defined in ISO's multilayer reference model of Open Systems Interconnection, the Presentation Level Protocol forms the sixth or Presentation layer. The layered systems architecture allows Open Systems Interconnection (OSI). (Bown, Kukulka, Lum, O'Brien, Smirle; 1982)

The most fundamental standard for the information industry is the Presentation Level Protocol because it forms a common coding scheme for describing all text and graphic information regardless of the service or application. The universal, long standing ASCII standard encodes textual information in a manner independent of the terminal device or the application. The Presentation Level Protocol builds upon the existing ASCII standard by including a supplementary character set and a Dynamically Redefinable Character Set (DRCS) and includes the PDIs and block mosaics of the European systems to encode pictorial graphics information. (Bown, Kukulka, Lum, O'Brien, Smirle; 1982)

7.4.0.2 PATENTS

With Telidon being a communications protocol, it is not patentable. The topic was debated internally at DOC before publically introducing the PDIs as a proposed standard at the international level in the fall of 1978. It was decided the penalties of silence (which could have resulted in the adoption of an inferior world standard) were worse than the loss of lead time which resulted from revealing CRC's methods. However public the PDIs were, the important software which enabled data pages to be created, stored and transmitted on demand and then recreated in the receiving terminal is the property of the Crown. It was made available to Norpak under licensing agreement via Canadian Patents Development Limited (CPDL). (Madden, 1981)

7.4.1 ALPHAMOSAIC VERSUS ALPHAGEOMETRIC (TELIDON BROCHURE, 1980)

Alphamosaic meant that the image was composed of an array of characters with each character being specified by a code word which was transmitted to cause the display of that character on the receiving terminal.

Alphageometric meant that the content of images were described in terms of basic geometric elements such as points, straight lines, arcs, rectangles and polygons.

The advantage to the latter method is it allows for efficient construction of images of very high resolution and complexity. The main difference between the two methods is with alphageometric, the instructions necessary to create the image were transmitted instead of a facsimile of the image itself. The result being the Telidon terminal included an instruction decoder.

7.4.1.0 IMPROVEMENTS OF TELIDON OVER EUROPEAN SYSTEMS

Telidon represented a second generation technology that was far advanced from the first generation technologies typified by the British and French systems. Unlike the latter which were basically textual systems with a cumbersome addition of basic graphical capabilities, Telidon employed modern computer graphic techniques. The improvements are summarized in the following set of 7 basic parameters which were believed to be essential to the general acceptance of videotex/teletext services: (Parkhill, April, 1981)

1. Terminal/database/transmission independence: This relates to backward and forward compatibility and has important implications for the IP business as it means that regardless of how technology may change, information stored today will still be accessible. The marketing advantages are that systems having varying resolutions can be tailored to meet different user needs and budgets.
2. Artistic Flexibility: An ideal system should have the capability to handle any alphabet. Now, NAPLPS is being used to represent Japanese, Chinese and Korean languages which are called JNAPLPS, CNAPLPS and KNAPLPS respectively.
3. Simple, flexible information generation procedures.
4. Efficient data transmission and storage: Data storage and transmission tend to be expensive and the PDIs give Telidon the highest overall storage and transmission efficiency.
5. Open-ended service capability: The system should allow for more applications than just information retrieval e.g. interactive services.
6. Delivery system flexibility
7. Open-ended Growth: As technology advances, it should be possible to incorporate improvements as desired without being constrained by some limitation inherent in the original specifications.

7.4.2 TELIDON'S TECHNICAL EVOLUTION

The Telidon evolution was characterized by four stages: (Foote, 1984)

1. Initial innovation and intensive R&D 1976-1978
2. Technological transfer and early field trials 1979-1980
3. Continued technical improvements and the drive towards standardization 1981-1983 *
4. Rekindled Telidon enhancement 1983-1985

* There was the belief in the wake of ongoing competition with the Americans (AT&T) that Telidon would have to be refined and improved technically if it were to achieve and retain markets internationally (Foote, 1984).

McLuhan believes that technology goes through four stages of application called the Tetrads. They are as follows: (Maria Cioni & Associates Inc., 1985)

1. New technology amplifies what already exists. Videotex amplifies computer information with color, graphics, real-time access. It amplifies communications by having the potential to link mass audiences with each other as well as with information sources.
2. New technology makes obsolete existing methods. Videotex makes obsolete older ways of presenting information e.g. information is presented in graphics rather than numbers.
3. New technologies retrieve aspects of former technology. Videotex retrieves the concepts of: mainframe-terminal communications, the global village network concept, the old forms of banking and buying.
4. New technology flips from its originally-conceived use into its real role. The big question is: What will videotex "flip" into? At present, there is no strong certainty as to what videotex will be become. The mass consumer market is still a target with

Bell Canada's ALEX videotex service, specialized niche applications are still successful as with Faxtel's Marketfax and NAPLPS on PCs are proliferating, most notably with the IBM/Sears Prodigy service in the US.

7.4.2 DATABASE CHARACTERISTICS

7.4.2.0 CONTENT

The main sources of content were SOs, IPs and Sub-IPs with Sub-IPs being the main contributors of content in all field trials. Their information ranged from one page of static information to hundreds of constantly changing pages (Booth and Wills, Vol.I, March 31, 1983). Content quality and satisfying user expectations ensured not only a large number of subscribers but a large number of dedicated (repeat) subscribers (Booth and Wills, Vol.I, March 31, 1983). As well, trials have shown that content should be highly directional, inexpensive and offer utility to the user (Booth and Wills, August 1983). However, the assessments of the content provided in the trials revealed that a significant amount was commercially oriented and was heavily biased towards advertising (Booth and Wills, Vol.I, March 31, 1983). Content was often too broadly based and of only general interest as opposed to more detailed and specific information. The latter offers greater utility to the user who is the target of this information (Booth and Wills, Vol.I, March 31, 1983). The Content Development Program (CDP) was the major content initiative proposed to improve and augment the existing content in application databases.

7.4.2.1 ACCESS METHODS

The chosen method for accessing information was a tree-structured search technique, often called a menu-based approach. This approach was initially proposed and implemented by the British Post Office. Its primary advantage was that it consumed the least computing resources while servicing a request for information. This is important when thousands of users are connected to the computer at one time. The more the computer is required to do,

the longer the user has to wait to receive the desired page and the less interactive the system appears to the user. (Booth and Wills, Vol.III,1983)

The way in which the content is organized clearly affects the way in which users respond to the system. The indices and menus in theory should be written to aid users in their search for information, but in many cases, in practice only served to frustrate . The problem was magnified when users would go through the lengthy search only to find the information incomplete or unavailable . However, improvements in the quality and depth of the content will be of little value if users cannot locate information easily and quickly. From a user's point of view, greater utility can be made of the databases if search procedures are similar, particularly if gateways to other databases were to become a standard feature to all Telidon systems. (Booth and Wills, Vol.I, March 31, 1983)

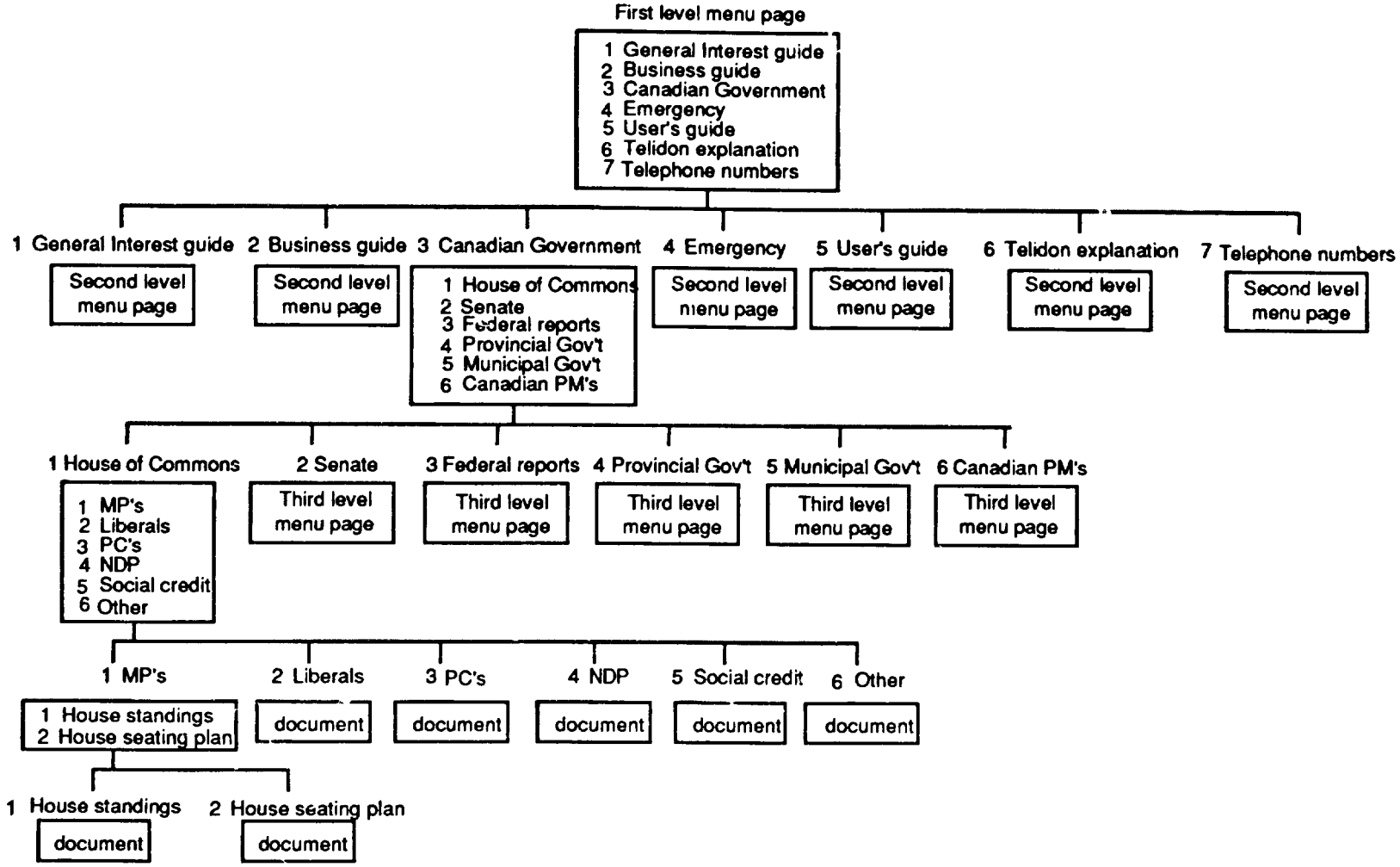
Studies of field trials in North America and Europe showed similar problems when accessing information. The major sources of frustration were: (Booth and Wills, Vol.I, March 31, 1983)

1. Fragmentation of the databases between different IPs.
2. Poor database design, incorrect indexing and infrequent updating.
3. Long access paths from the menu selection search methods.

Very often, the indexes were determined by Sub-IPs involved in the trials. If SOs would have started with an approach whereby a comprehensive index was designed and then, information to accommodate the design was found, a better organized system would result. With the method actually used, SOs had to invent categories to best suit the types of Sub-IPs that become involved. Thus, growth of the database was unpredictable and management of the database difficult. The suggested approach despite being more difficult, would have resulted in a more usable service. (Booth and Wills, Vol.I, March 31, 1983)

Refer to Figure 2 for a diagram of a sample tree search procedure.

Figure 2: Example illustrating part of the TELIDON tree.



SOURCE: Behavioural Research on TELIDON I, 1980

7.4.2.2 TELETEXT VERSUS VIDEOTEX CAPABILITIES

The main distinction between the two forms has to do with the medium by which the information is transmitted to the user (generally phone lines for videotex, broadcast signals for teletext) and where the data selection occurs (in the host system for videotex, in the user terminal for teletext) (Alexander, 1981).

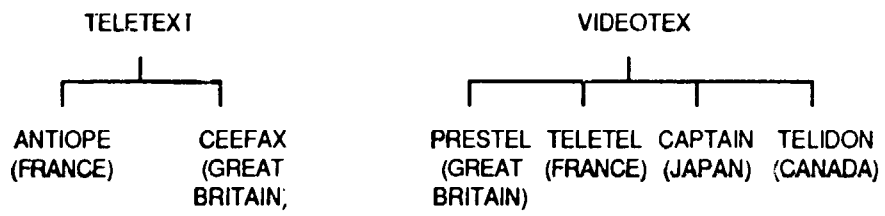
In general, a videotex system sends a particular page to a particular user and a teletext system constantly broadcasts all available pages to all users and relies on the intelligence built into the receiver to select the page to be viewed. Typically, the entire database is broadcast in a repeating cycle lasting from 10-30 seconds (Alexander, 1981). The data is carried as an ancillary signal on a broadcast TV channel where the packets of data are inserted into the otherwise unused lines of the video signal called the Vertical Blanking Interval (VBI) at the transmitter (Bown and Sawchuk, January 1981).

Videotex systems in theory can be concerned with almost any service or function which can be related to the processing, storage, collection or distribution of information (Parkhill, September, 1981). The size of the database can be hundreds of thousands of pages.

The problem with teletext is the practical upper limit of less than 300 pages of information due to the length of time the cycle takes. A TV station cannot meet all the demands for service from IPs; thus, an open access system would not be possible. Similarly for full channel systems, whether cable, satellite or TV broadcast, the capacity even though much higher is still finite and does not approach an open access situation. (Parkhill, April, 1981)

Refer to Figure 3 for a summary of videotex and teletext systems throughout the world.

Figure 3: VIDEOTEX/TELETEXT SYSTEMS WORLDWIDE



SOURCE: The Application of Telidon Technology to Continuing Education, October 8, 1980

7.4.3 MICRO-BASED TELIDON

The original focus of the program was to develop hardware to display the technology; however, in 1981, IBM introduced the PC and this was to have a major impact on Telidon in the upcoming years. Douglas Parkhill stated that this was a tremendously significant and unexpected development- software that enabled micros to decode and create videotex format information was developed (Maria Cioni & Associates Inc., 1985).

The range of micro-videotex applications included: (Maria Cioni & Associates Inc., 1985)

1. Page creation software packages for both the micro and the mini computers.
2. Software which enabled the display of Telidon videotex pictures (Booth and Wills, August 1983).
3. Micros provided effective terminals for videotex services in specialized markets. For example, Grassroots and Marketfax sell their information service to an installed base of micros rather than requiring the subscriber to have a dedicated videotex terminal. With ALEX, the consumer can rent an ALEXTEL terminal or have the service provided on a PC. Microstar provides software to the Prodigy consumer service that is all PC-based.

It is interesting to note that during the tedious standards upgrade, the software industry had an advantage over the hardware firms as it was much simpler to upgrade a software package than an actual piece of hardware. (Jordan, July 31,1990)

Interviews pointed out the opinion that users will want to purchase or rent a terminal as they will view it as another appliance that serves a function in the home or office. Its

function is viewed as different from what is done on a PC; thus, the preference for a videotex terminal. Only time will prove this prediction right or wrong.

7.5 THE COMPETITORS

7.5.0 GREAT BRITAIN

The first attempt to marry the technologies of telecommunications and computers for information dissemination to the public was made by the British in a system termed Viewdata which was later to be called Prestel meaning Press Telephone (Larratt, 1981). Prestel is an interactive system which operates over phone lines. With the introduction of the Prestel system, Great Britain pioneered the development of public access information systems. The first systems to emerge were the broadcast videotex systems known as teletext. These were one-way information retrieval systems broadcast over existing television networks. (Bown and O'Brien, 1983)

7.5.0.0 TELETEXT

In 1966, Peter Rainger from the British Broadcasting Corporation (BBC) began to examine the use of the vertical blanking interval (VBI) for the transmission of data other than a conventional TV picture. The name Teledata was being used. The name CEEFAX, "see facts", was announced in 1972 along with the testing in early January 1973 and commercial launch in April 1974. (Gilles, 1990; Mayne,1981)

At the Independent Television Authority (ITA), now the Independent Broadcasting Authority (IBA), research into teletext had begun independently of the BBC. It was called ORACLE for Optional Reception of Announcements by Coded Line Electronics and testing began in April 1973. (Gilles, 1990)

Although the UK was now testing two different teletext services, the BBC and IBA cooperated to achieve a common technical standard by September 1974. In 1976, the BBC and IBA and the British Radio Equipment Manufacturers Association (BREMA) issued a joint statement setting out specifications for teletext. Both CEEFAX and ORACLE went into service in 1976 and continue to operate. Since 1984, all television receivers built for the UK have a teletext receiving capacity. (Gilles). As of March 31, 1984, there were 1.6 million teletext decoders in UK households (Lane, Videotex Canada, 1983).

It is important to note that these services are provided free of charge and in addition to the normal TV services. Thus, the only costs to the users are that of the TV set being equipped or adapted to receive teletext and the annual TV license fee. (Mayne, 1981)

7.5.0.1 VIEWDATA

A man from the private sector who joined the British Post Office, Sam Fedida, shared a dream that most people involved in telecommunications share about bringing the power of computers to everyone. Mr. Fedida developed the technology- the serial alphamosaic system that became the basis of the viewdata system.(Parkhill, June 7, 1990)

From its beginning, Prestel was intended to provide for the total information needs of business and homes. There was also the practical problem of increasing line usage of the telephone system that this technology could solve (Feeley, June 11, 1990). A pilot trial began in March 1979 which was turned into a world videotex service in July 1981. It is a more comprehensive service than the teletext systems as the page capacity of the database is much higher than the teletext broadcast cycle. However, unlike the teletext service, Prestel charges for information. (Mayne, [illegible])

The British government supported the industry as a matter of national pride and technological health by underwriting the development costs for the consumer and ensuring

the success of teletext and to a lesser degree, videotex. (Truxal, 1982) The UK subsidized the system up to 1985 and Prestel is currently a spin-off operation of British Telecom (O'Brien, July 9, 1990).

7.5.1 FRANCE

France had one of the poorest communications systems in the world up to the 1960s and it hampered business efforts. Since France would not import technology from the Americans, they built up a telephone system as a result of government policy (O'Brien, July 9, 1990). France invested some 30 billion dollars in the modernization of its telephone system and the development of a range of products based on the convergence of telecommunications and computers. This is known today as the "Telematique Programme". (Advertisement, France 1980).

In 1975, a report written by two civil servants, Simon Nora and Alain Minc called "L'informatisation de la Societe" provided the basic idea of the Telematique program and led eventually to the largest videotex program in the world. (Maria Cioni & Associates Inc., 1985)

The Telematique program consists of four distinct product groups: (Intelmatique, 1980)

1. Videotex: Teletel
2. Electronic Directory
3. Mass-Fax
4. Telewriter

The French announced their own videotex and teletext systems to which they applied the name Teletel and Antiope (Acquisition Numerique et Televisualisation d'Images Organisées en Pages d'Ecriture) (Foley and Hurly, 1980). Antiope uses basically the same technology as the British systems called parallel alphamosaic but includes a number of refinements which make Antiope more flexible and in some respects more advanced than the UK system (Parkhill, September, 1981).

The first commercial service using Antiope was opened in May 1977 and Teletel trials began in June 1981 (Mayne, 1981). The government's strategy was to subsidize the terminals which were called Minitel. Today, some 3.4 million Minitel terminals have been distributed for the most part free of charge (Marsh, 1989). Through the phone lines, French households have direct access to a 24 hour electronic marketplace offering more than 12,000 consumer services (Cutler, 1990).

It is interesting to note that the French insist they did not give away the terminals for free as they claim the price of the Minitel terminal was bundled into the price of the telephone system. The regions of France where Minitel was not available had a different pricing structure. However, the French are so tied into this telecommunications industry that they are probably subsidizing it somewhere (O'Brien, July 9,1990).

The main difference between the French and the British systems was that the French had a real problem to solve i.e. a very inefficient telecommunications system, whereas, the British did not possess the same incentive in the form of such a pressing problem. (O'Brien, July 9,1990).

7.5.2 JAPAN

In Japan, videotex was developed as an information medium in conjunction with the computer industry to provide a wide range of consumer and business services. The videotex system is called CAPTAIN (Character and Pattern Telephone Access Information Network) and the experimental phases of CAPTAIN were conducted in 1979 and 1981 by the Ministry of Posts and Telecommunications. (OECD, 1988).

CAPTAIN uses special high resolution graphics techniques to enable it to present the Japanese language (OECD, 1988). This system is not a true competitor to Canada in the

sense that the French and British are as they had not yet attempted to aggressively market their technology worldwide.

7.5.3 UNITED STATES

The United States was seen as THE market for Canada to enter and establish the Telidon technology. The US had no indigenous systems of their own; thus, it would have to rely on foreign suppliers. (O'Brien, July 9, 1990). However, in 1981, AT&T announced their version of the Telidon protocol that included the basic PDI coding plus a number of enhancements. AT&T developed its own terminal and conducted a consumer trial in Miami, Florida called Viewtron in conjunction with Knight-Ridder which was considered a failure. Shortly after the AT&T announcement, the company was broken up, economic times were harsh and their interest in videotex was laid to rest. (Smirle, June 12,1990) Thus, the US did not present a threat in the sense of being developers of the technology.

7.6 STANDARDS

7.6.0 IMPORTANCE OF STANDARDS

When countries agree on a standard for a particular product, this simplifies production, broadens the market for each country as non-tariff barriers to trade are eliminated and export potential is improved (e.g. Third World countries buy CCITT or CCIR approved equipment and services) (Maria Cioni & Associates Inc., 1985), and makes the product produced by one country interchangeable with the product produced by another country. Interchangeability and interconnectibility mean significant economies resulting for the producers which in turn could be passed on to the consumers. (TEEGA Research Consultants Inc., 1985) CCITT is the International Telegraph and Telephone Consultative Committee of the International Telecommunication Union which is part of the United Nations body and is responsible for telecommunications standards. CCIR stands for the

International Radio Consultative Committee, a committee of the International Telecommunications Union responsible for radio transmission standards.

Until a universal standard is adopted, mass production of equipment for display is not likely to occur. The adoption of standards gives assurance to equipment manufacturers and users that products will not be made obsolete by future standards changes. (TEEGA Research Consultants Inc., 1985)

When Canada arrived on the scene, the rival technologies were already competing in the commercial arena and standards competition was closely linked to this competition. Canada's only viable option was to actively participate in the world standard-setting forums and attempt to gain acceptance of the Telidon standard as an equally valid alternative to the competing systems. (TEEGA Research Consultants Inc., 1985)

7.6.1 PROBLEMS ESTABLISHING STANDARDS

The establishment of standards, particularly in the international arena, has problems that should be considered. They are as follows: (TEEGA Research Consultants Inc., 1985)

1. The costs of developing standards could be extremely high especially if the competing technologies end up supporting their approach with trial applications. This actually happened with videotex.
2. The time required to adopt a standard is long as most standards organizations require peer review and public comment and contain many checks and balances to prevent abuse of the process. Lengthy delays which are justified in the interest of developing a good standard could prove costly to an industry ready to grow but hindered in anticipation of the standard. Again this is what happened with Telidon after the AT&T announcement of its standard based on Telidon and the subsequent upgrading of the Canadian protocol to include the enhancements.
3. By the time a formal agreement on a standard has been reached by an international organization, participating countries could have invested so heavily in their own systems that they are unwilling to compromise and the standard becomes a ratification of a number of alternatives. This is the case with the "three-in-one" international videotex standard.

An amusing comment on the politics of international standards was stated by Dr. Yun-Foo Lum who was heavily involved in the standards negotiations. He comments on the development of the color television standard:

The first standard, the North American NTSC is said to mean 'Never the Same Color Twice'. The next standard, the French SECAM system is often referred to as a 'System Entirely Contrary to the American Method' and finally, the German PAL standard is called 'Peace at Last'. (Maria Cioni & Associates Inc., 1985)

7.6.2 OPEN SYSTEMS INTERCONNECTION (OSI) MODEL - GENERAL STRUCTURE FOR STANDARDS

The reference model which has gained wide acceptance for standard setting in the computer communications industry is the Open Systems Interconnection (OSI) model. This model which was first proposed by the ISO (International Organization for Standardization) in 1979 describes the general structure and relationships in a proposed system of standards whose goal, when implemented and followed, is to enhance interworking within distributed systems. It contains seven independent functional layers of standards. Each layer defines a set of functions and not all layers have to be present in all systems. They are: (TEEGA Research Consultants Inc., 1985)

1. The Physical Layer- provides mechanical, electrical and procedural functions in order to establish, maintain and release physical connections.
2. The Data Link Layer- provides a data transmission link across one or several physical connections. Error correction, sequencing, and flow control are performed in order to maintain data integrity.
3. The Network Layer- provides routing, switching and network access considerations in order to make invisible to the transport layer how underlying transmission resources are utilized.
4. The Transport Layer- provides an end-to-end transparent virtual data circuit over one or several tandem network transmission facilities.
5. The Session Layer- provides the means to establish a session connection and to support the orderly exchange of data and other related control functions for a particular communication service.
6. The Presentation Layer- provides the means to represent and interpret the information in a data coding format in a way that preserves its meaning.
7. The Application Layer- this is the highest layer in the reference model and the protocols of this layer provide the actual service sought by the end user

7.6.3 STANDARDS DEVELOPMENT

The Canadian strategy for standardization of Telidon was focussed on competing with the rival schemes in the standard-setting organizations, on conducting promotional and marketing activities and on conducting trials at home and abroad. This was necessary as

the UK and France had large, well-financed organizations (the government Postal, Telephone and Telegraph (PTT) administrations) promoting their systems. A national public service of Prestel had already begun in 1979 in the UK and in 1982, France also had a national public videotex service. (TEEGA Research Consultants Inc., 1985)

The main standpoint adopted by the Canadian delegations at the various international standards meetings was to have Telidon accepted on an equal basis with other competing videotex technologies. (TEEGA Research Consultants Inc., 1985)

The specification in the CRC Technical Note 699, the reference document detailing the construction of the first Telidon terminals, was accepted by the CVCC as the national videotex field trial standard. (Brochure, Videotex Standards) This coding scheme was presented to the CCITT Study Groups I and VIII and resulted in the alphageometric model being included in the coding recommendations S.100 and the service recommendation F.300 titled International Information Exchange for Interactive Videotex in 1980 by the CCITT VIIth Plenary Assembly. (Brochure, Videotex Standards)

During the deliberations leading to this decision in 1980, there were three competing videotex schemes at the international level from the UK, France and Canada. A fourth scheme from Japan was recognized in the Recommendations but the details were to be worked out and studied during the 1981-1984 CCITT study period. (TEEGA Research Consultants Inc., 1985)

The process leading up to the 1980 decision was not without problems. In the final meeting of Study Groups I and VIII, June 2-4, 1980 in Montreal, the British maneuvered against Canada's standpoint. Without prior warning, the UK submitted a Delayed Paper which proposed deleting the alphageometric coding from the Draft Recommendations and making their alphamosaic coding the international system. Canada, as a result of previously established alliances, received the support of other countries and this proposal

was rejected. However, the UK never quite retracted their stance but they did agree to support, without amendments, the Draft Recommendations S.100 and F.300 at the CCITT VIIth Plenary Assembly in October 1980. (TEEGA Research Consultants Inc., 1985)

The final result of the 1981-1984 study period was that three videotex systems were included as integral parts of the new CCITT Recommendation T.101 as Data Syntax I (CAPTAIN), Data Syntax II (CEPT- to be discussed below) and Data Syntax III (NAPLPS) which was ratified in October 1984 by the CCITT VIIth Plenary Assembly. (TEEGA Research Consultants Inc., 1985)

7.6.3.0 NAPLPS - NORTH AMERICAN PRESENTATION LEVEL PROTOCOL SYNTAX - FROM 699 TO 709

In May 1981, a most significant development occurred at the Videotex 81 conference (TEEGA Research Consultants Inc., 1985). AT&T announced the publication of the Bell System Videotex Standard Presentation Level Protocol (PLP) which combined all the functions of S.100 with more complete graphical and color capabilities and provided a unified coding syntax (included alphamosaic capability) (ANSI/CSA, 1983).

In February 1982, a functionally equivalent version of the PLP titled Telidon Videotex Presentation Level Protocol: Augmented Picture Description Instructions was published in Canada as CRC Technical Note 709. (ANSI/CSA, 1983; Lane, Videotex Canada, 1983) After the publication of the Bell System PLP and the CRC Technical Note 709, the North American strategy of DOC was to support a joint US-Canada initiative to have ANSI (American National Standards Institute) and CSA (Canadian Standards Association) accept Bell and CRC documents as the basis for the North American standard. The technical work towards the publication of the joint standard was carried out by a joint CVCC/CSA Working Group. This process culminated in the ANSI/CSA NAPLPS standard. (TEEGA Research Consultants Inc., 1985)

At Videotex 82, the CSA and ANSI announced their joint agreement on a common North American standard called Videotex/Teletext Presentation Level Protocol Syntax (Tenne-Sens, July 1982). ANSI's designation for this standard is X3.110 and CSA's designation is T500 (ANSI/CSA, 1983). North America thus had a consensual unified standard with the full support and committment of the private industries and government agencies of Canada and the US (TEEGA Research Consultants Inc., 1985).

The AT&T PLP was a wide-ranging flexible standard. It was impossible to implement in its entirety with the technology at the time (1981). It was to be seen as a framework within which various subsets could be considered for implementation. Telidon vendors had to deal with the trade-offs between the desirability of features and the feasibility of implementation as they designed their next generation of equipment. The PLP did not give them any guidance; however, Technical Note 709 provided more implementation guidance with the Service Reference Model specifications (to be presented later on in this section). (Alexander, 1981)

7.6.3.0.0 Clarification of Terminology for New Standard

The North American standard is known by many names; thus, they are presented here to aid anyone reading videotex documents. All are functionally equivalent. (Brochure, Videotex Standards)

- American National Standards Institute (ANSI) X3.110
- American Telephone and Telegraph Company PLP
- Canadian Department of Communications TN 709
- Canadian Standards Association (CSA) T500
- North American Presentation Level Protocol Syntax (NAPLPS)
- North American Broadcast Teletext Standard (Presentation section)
- Telidon Plus (Videotex Canada, August 1982)

7.6.3.1 SERVICE REFERENCE MODEL (SRM)

The NAPLPS standard allows for a degree of interpretation and implementation dependency which has proven frustrating to IPs and SOs (Peat Marwick and

Partners,1985). In order to further define sets of specific implementation parameters for videotex and teletext, 2 SRMs for videotex and teletext were included in the standards document (ANSI/CSA, 1983). The SRM was proposed as a means of resolving most of the incompatibility problems which the basic NAPLPS standard allowed. SRM defines a minimum level of NAPLPS implementation to be implemented voluntarily by terminal/decoder manufacturers and the level which may be assumed by information providers (Peat Marwick and Partners,1985). While the SRMs are not part of the standard, an implementation which meets the requirements of an SRM also conforms to the standard (ANSI/CSA, 1983).

7.6.3.2 RETROFIT PROGRAM

The switch to PLP from 699 meant that all existing Telidon user terminals, IP systems, databases and retrieval systems had to be altered in order to be fully compatible with PLP (Videotex Canada, August 1982). User terminals and IPs required hardware changes while the databases and retrieval systems needed software changes (Videotex Canada, August 1982). To make this transition as smooth as possible, the CVCC developed a Retrofit Program as follows: (Peat Marwick and Partners,1985)

1. Upgrade the existing 699 terminals so that they could handle both the 699 protocol and a minimum subset of the NAPLPS protocol which was evolving at the time.
2. Convert the existing databases and software services to NAPLPS using only the minimum subset of features until the retrofit program was completed.
3. Replace or upgrade the "retrofit" terminals with full NAPLPS terminals.

The first two stages were successful despite being plagued by difficulties and delays. However, the physical retrofitting of widely dispersed terminals was a time-consuming and costly process which offered users nothing in improved functionality (Peat Marwick and Partners,1985). This was due to the fact that terminal manufacturers (Electrohome, Microtel and Norpak) insisted that retrofit for 699 would only allow the terminals to handle PLP pages up to the level of 699 functionality;thus, none of the plus would be displayable

on retrofitted terminals (Videotex Canada, August 1982). As well, some equipment and database incompatibilities were experienced (Peat Marwick and Partners,1985).

7.6.4 NORTH AMERICAN BROADCAST TELETEXT SPECIFICATION (NABTS)

NABTS is the teletext standard that is an excellent single-point to multi-point packet distribution system on which to build applications (Maria Cioni & Associates Inc., 1985).

Both Canada and France modified their proposals for the broadcast format and together with the American TV network, CBS developed a unified asynchronous transmission format called NABTS (Bown and O'Brien, 1983). The Teletext Sub-Committee of the CVCC and the Electronic Industries Association (EIA) in the US jointly published the Recommended Practice for Teletext: NABTS (Marsh, 1989). Most importantly, in September 1981, the International Radio Consultative Committee (CCIR) included in Report No.957 a system description of the broadcast-teletext specifications for international adoption (Tenne-Sens, July 1982).

7.6.5 EUROPEAN COMPETITION

7.6.5.0 EUROPEAN CONFERENCE OF POSTAL AND TELECOMMUNICATIONS (CEPT)

After the 1980 decision of the CCITT to ratify the three videotex standards as international standards, the Europeans became more unified in the face of the threat of a Canadian Telidon scheme (TEEGA Research Consultants Inc., 1985). In June 1981, several European administrations presented on behalf of themselves and the CEPT, a proposal for a joint European Videotex Standard called the European Unified Standard (EUS) (Bown, H.G. and C.D. O'Brien, February 1983; TEEGA Research Consultants Inc., March 1985). This proposal unified the British serial and French parallel mosaic systems previously standardized by the CCITT in 1980 and brought the British and French videotex

systems together at the basic mosaic level. The CEPT proposal was not a new standard but a clarification of the result when the two pieces are fitted together (Bown and O'Brien, 1983). Note that the EUS is multi-layered with each layer a self contained standard in its own right. This caused problems for European countries in the interchange of videotex information amongst themselves (TEEGA Research Consultants Inc., 1985) because of the need to maintain compatibility with their earlier hardware-dependent proposals for videotex coding (Bown and O'Brien, 1983).

Since then, several European countries on behalf of CEPT have proposed the introduction of extensions to the basic unified mosaic system. These consist of Dynamically Redefinable Character Sets (DRCS) code to allow the definition of higher resolution small shapes and the introduction of several features such as smooth mosaics and pastel color shades, effectively duplicating some of the features presented in the superior NAPLPS protocol (Bown and O'Brien, 1983).

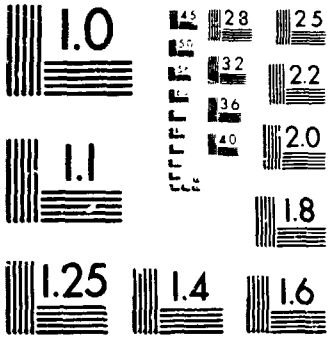
7.6.6 WORLDWIDE UNIFIED VIDEOTEX STANDARD (WWUVS)

In 1983, under the auspices of the CCITT, a series of meetings of experts were held to explore the possibilities of a worldwide unified videotex standard. Compatibilities were to be worked out considering the three existing systems described in Recommendation T.101 (Mosaic,Geometric and Photographic [Japanese system]) on an equal status (TEEGA Research Consultants Inc., 1985)

The US, Canada and Japan interpreted this to mean that all parties should work together so that extensions to the three systems would be compatible; however, the Europeans intended to replace NAPLPS and CAPTAIN with their new scheme based on the CEPT standard (TEEGA Research Consultants Inc., 1985). Many of the people interviewed believe that this world standard will never become a reality as there is too much invested by each country involved in their own system. The aspect of vested interests prevents this from

2

PM-1 3½" x 4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT



happening. Time will tell, however, for the recent Videotex '90 conference in Toronto (May, 1990), Alcatel of France announced that it would include the NAPLPS capability in its system (Carruthers, June 26. 1990). This was a major vote of confidence for Canada's technology.

7.6.7 STANDARDS SUB-COMMITTEE OF THE CVCC

The main responsibility of this committee was to examine standards identified by DOC and to reach decisions on specifications for the field trials (TEEGA Research Consultants Inc., 1985). The 699 standard was chosen for the field trials.

7.6.8 OVERALL EFFECT OF STANDARDS ACTIVITY

The net effect of the standard development process was to produce a better standard (compared to the 699) and a better competitive position in the US for Telidon vs Antiope and Prestel as Canada had the backing of AT&T which led to a unified North American standard. However, this was achieved at the cost of a considerable setback to the growth and strength of the Canadian industry's development. Much of the technological lead which Canada enjoyed, especially in the hardware area, was lost as Canadian manufacturers had to adapt their product lines to an ever-changing specification (Peat Marwick and Partners,1985). Meanwhile, the US and Japanese manufacturers were given a chance to get their mind around the Canadian standard and wait until the main NAPLPS issues were settled before producing their own NAPLPS equipment (Peat Marwick and Partners,1985; Thomas, 1983).

It is believed that Canadian hardware and software interests were set back one year to eighteen months (Foote, 1984). The challenge was to implement the changing technical standards in a way that was least disruptive to the subscriber (end user); thus, the Service Providers and the Information Providers bore the brunt of the change working with

terminals and databases of various technical formats (Maria Cioni & Associates Inc., 1985).

As well, conversion to NAPLPS delayed the expected drop in Telidon terminal/decoder prices in three ways: (Peat Marwick and Partners,1985)

1. The standard was inherently more complex than the 699 and thus, required a more complex processor and more memory in the decoder.
2. Additional engineering costs were incurred which needed to be recovered through equipment sales.
3. The evolving specifications during the standards definition process delayed the technological steps (such as the VLSI chips development) which would significantly lower the manufacturing costs of large scale production.

This change in standard also delayed marketing because of the need to give top priority to terminal retrofitting and software revisions (Foote, 1984). It is also believed that the lack of a WWUVS (Worldwide Unified Videotex Standard) has constrained international marketing efforts (Foote, 1984).

It is interesting to note that the Canadians had previously considered making the improvements that AT&T demanded but as their system was already the most sophisticated in the international standards competition, they went ahead with the 699 format (Thomas, 1983). However, in order to secure a place in the US market, Canada agreed willingly to make the changes suggested. Many people interviewed believed that this was a strategy AT&T used to set back the Canadian industry so that the US could catch up. Such an argument is quite reasonable considering AT&T went so far as to manufacture its own videotex terminals and attempt a field trial which failed.

Overall, the result is that NAPLPS is the undisputed North American videotex standard. The publication of NAPLPS in December 1983 by ANSI/CSA was a signal to the Europeans of a truly unified standard. NAPLPS is also officially ratified by the CCITT in its Recommendation T.101 along with CEPT and CAPTAIN standards; thus, the objective

of establishing a national and international standard was achieved. (TEEGA Research Consultants Inc., 1985)

7.7 POLICY ISSUES

7.7.0 POLICY OBJECTIVES IN TELECOMMUNICATIONS

During the early 1970s, the Trudeau government had already developed policy objectives in three major areas of telecommunications: (Foote, 1984)

1. Development of a viable Canadian hardware industry.
2. Plurality and competitiveness of Canadian content.
3. Equitable access to communication services throughout Canada.

Each objective was reflected in the government's August 15, 1978 decision to assist and promote Telidon actively. The Telidon program turned out to be the beneficiary of considerable faith and funding during tough economic times. (Foote, 1984)

7.7.1 POLICY SPECIFIC TO TELIDON

Historically, there has been little need for a national telematics policy to promote and facilitate the development and diffusion of new information technology applications throughout Canada. The new technologies were still relatively underdeveloped in the early 1980s having only tentative penetration of the home and business market (Foote, 1984). In 1981, industrial policy was stated as simply the government was doing and would continue to do all it could to assist Canadian manufacturers to obtain and maintain a lead over foreign videotex competition. Such a statement left many questions with respect to government policy, probable structure of the industry and market projections (Madden, 1981).

As videotex and teletext applications began to grow, first in the business sector and eventually in the home sector, public policy issues arose. These are grouped into three general categories and will be discussed in further detail below: (Foote, 1984)

1. Regulatory Issues such as content-carrier separation
2. Economic Development Issues such a unemployment
3. Socio-Cultural Impacts such as equitable access

Many of these issues were not properly dealt with during the program. At a conference in 1985 (the same year government funding ended for the program), industry expected an outline of some government policies that would help the videotex industry, policies regarding government procurement, copyright to protect Canadian databases and software and financial tax incentives as examples. These expectations were unfulfilled, which was by this time a familiar story. There are reports as far back as 1979 that dealt with policy recommendations on many of the same issues that still required study six years later. (Maria Cioni & Associates Inc., 1985)

7.7.1.0 REGULATORY ISSUES

7.7.1.0.0 Cable Advertising

Advertising appears essential for mass consumer acceptance as it appears subscription payments alone are unlikely to yield SOs sufficient revenues. Often, advertising revenues subsidize the subscription rates. In Canada, cable's prohibition from carrying advertising on non-programming as well as the community programming channel remains a disincentive to introduce cable-delivered broadcast VBI or cable-originated full channel teletext. (Foote, 1984). This matter had to be dealt with if a national teletext service was to become a reality.

7.7.1.0.1 Content-Carrier Separation - CRTC Regulation

This issue first came to prominence in the late 1960's and early 1970's when it was argued that a carrier should not be allowed to compete with its own customers in providing remote data processing services (Parkhill, April, 1981). The separation of carriage and content principles arose in the context of videotex/teletext industrial competition since, in many

cases, firms which provided the communications networks to distribute videotex could also be the IPs or at least the SOs (Booth and Wills, August 1983).

It is generally felt that singular control of operation of content, operation of systems and the delivery of services of the new industry would constitute a non-competitive situation. Competition and diversity were deemed desirable policy (Foote, 1984). Unlike the conventional print media where a multitude of delivery alternatives exist, the distribution methods for Telidon were natural monopolies: telephone and cable companies. Thus, without proper policy, the operators of such monopolies would be able to control both the content of the information delivered over their networks and also decide whose information would be carried (Parkhill, April, 1981). Hence, by enforcing a strict separation between carriage and content, as many IPs as possible may compete for the user market (Infomart, March 1980).

The separation principle has not been applied to cable, broadcasters or newspapers in Canada- only telephone companies (Booth and Wills, August 1983). A policy was developed that stated telephone companies should be permitted to originate and offer videotex/computer-based information, data and transaction services utilizing an arms length relation without rate regulation but with the provision that they be required to provide equivalent access to SOs and IPs who want to develop their own videotex services (Booth and Wills, Vol.II,1983). This is currently being done with Bell Canada's ALEX system that is operated under an arms length relation called Mediatel, a new unit within the company responsible for the future development, marketing and support of ALEX and three intelligent communications services: iNET 2000, Envoy 100 and TradeRoute (Bell Canada, September 1989).

7.7.1.1 EMPLOYMENT IMPACTS

There was a great diversity of opinion about Telidon's effects on the economy with some viewing it as the saviour in the area of manufacturing. Labour showed strong opposition and great fear that Telidon would eliminate jobs. To pacify these worries, the CVCC included the voice of a labour representative from the International Union of Electrical Workers so that such matters would not be ignored at the meetings of this national forum. (House of Commons, May 18, 1982)

7.7.1.2 PRIVACY ISSUES

Teleshopping, telebanking and information retrieval profiles are subject to the dangers of tracing and identification of individual choices, of home and office surveillance and of content "piracy" which is a branch of proprietary rights and copyright obligations (Foote, 1984). These are real concerns that must be dealt with, especially due to the introduction of Bell Canada's consumer videotex service, ALEX . These issues were not dealt with before due to the apparent lack of teleshopping trials and the limited extent of the telebanking trial with the Bank of Montreal.

7.7.1.3 TRANSBORDER DATA FLOWS - CANADIAN CONTENT ISSUES

Sovereignty would be compromised if the new technology were developed outside the country. Vital economic and social information had already begun to move to data banks beyond Canada's borders. This had dangerous implications for the personal privacy of Canadians and the security of classified information. If all the information carried into Canada by these new technologies were created and shaped beyond our borders, Canadians could find themselves living in an invisible country where we have no representation. (Infomart, March 1980). This was a worst case scenario but the federal government's

strong support of Telidon was one example of their efforts to prevent such a gloomy scenario from being realized. (Infomart, March 1980)

It was proposed that foreign-owned subsidiary companies in Canada should be given only limited assistance, if any, by the federal government in the development of these new services. Otherwise, the Canadian market may only serve to be an efficient and subsidized test market with the long term benefits accruing to a US, Japanese or European parent company (Booth and Wills, Vol.II,1983).

7.7.1.4 USER SENSITIVE PRICING- CRTC REGULATIONS

With the Bell Vista trial, Bell was not allowed to charge for data calls just as it does not charge for voice calls. Thus, the introduction of a data transmission service would have increased the load on the telephone lines requiring more plant maintenance with no payback available to Bell. Thus, Bell did not proceed to make Vista an operational service. Now, with ALEX, Bell can charge. The way around this regulation is they charge fees for certain numbers that represent data calls. This charging method was approved in the US in the mid-1980s and then, the CRTC approval followed in 1986. After the US ruling, ALEX started almost immediately. It was purely an economical decision to end Vista as they had no way of charging. (O'Brien, July 9, 1990)

7.7.1.5 MEMORANDUMS OF UNDERSTANDING (MOUS)

MOUs are non-binding agreements used by the government to signify a cooperative effort between certain parties. MOUs were utilized for certain areas during the Telidon program.

The most important MOU was negotiated by DOC with France in 1979. It was an agreement in which the two countri[illegible] ould mutually support each other's standard. The French system was developed more in accordance with modern design principles which meant that it had a better future as it could be expanded in different directions. This was

very much how the Canadians developed their system; thus, the French were chosen as an ally over the British as there was a common technical/philosophical viewpoint. There was disagreement on the sophistication of the graphics with Canada supporting a higher capability for graphics generation. France wanted to commercialize their system and upgrading the graphics would have slowed this process down. While the MOU was still in draft form, cooperation was good and better standards were designed as a result. Then, the strategists from France overruled their researchers who supported upgrading the graphics and working with Canada to establish one standard. The strategists wanted to commercialize an intermediate version and establish themselves in the market. Then, when they were prepared to profit from the Canadian version, they would add it on top of their system and Canada would represent only a minority part. After the agreement was signed, the French became more competitive and they started attempting to enter the US, their main target. The French attempted to get the Americans to adopt their technology before the Canadian version. (Smirle, June 12, 1990)

Another area of the above MOU dealt with the Behavioural Research area of DOC. In May 1981, behavioural researchers from telecommunications labs in France and Canada met in Ottawa under the auspices of the MOU made between the two countries in 1979 to share their work related videotex development. In both countries, work was undertaken for about three years on problems related to the design of videotex technology and systems to suit the individual users and the society more generally. (France-Canada Seminar, 1981)

Another MOU was signed dealing with CBC's Project IRIS. To manage the project, an Order in Council under the Broadcast Act provided for the CBC to act as the agent of the Minister of Communications in the conduct of the trials. To implement this relationship, an MOU was signed by the Minister of Communications and the President of the CBC on November 26, 1981. Implementation of the MOU was overseen by a joint committee co-chaired by CBC and DOC. (CBC and DOC, 1986)

7.8 SOCIAL IMPACTS ISSUES

From the beginning of the Telidon program, government recognized the importance of social impacts of technology. As the Minister of Communications, Francis Fox stated in a House of Commons standing committee meeting:

> Communications is already an important sector of the economy. It will be important to strengthen Canada's position of leadership in the research, development and manufacture of telecommunications equipment. Equally important, we must be fully aware of and prepare for the impact which these technologies will have on our social and cultural life in the broadcast sense. I am convinced that these two concerns cannot and should not be separated. (House of Commons, June 26, 1980)

Social and cultural impacts were reflected in the PIP, the CVCC Sub-Committee on Education (now the Interprovincial Association for Telematics and Telidon [IPATT]) and Social Impacts, and DOC's Behavioural Research and Evaluation (BRE) program. (Foote, 1984)

Social effects of a new technology such as videotex are usually unanticipated because there is virtually no real means of predicting them (Booth and Wills, Vol.III,1983); however, technology will clearly affect the user's behaviour either individually or in group settings (Foote, 1984). The social impacts of videotex are divided into short term and transformative social impacts, the latter comprising the long term impacts which may alter the way society is organized at its basic level. Such transformative social impacts become apparent only after the widespread diffusion of the technology. (Booth and Wills, Vol.III,1983) Thus, as videotex had yet to proliferate throughout society, any research on these effects was purely speculative. Attempts to measure such effects included examining the ways previous information technologies had transformed society, at what rates these transformations occurred and then utilizing these lessons to assess the potential long term effects of Telidon (Booth and Wills, August 1983).

7.8.0 BEHAVIOURAL RESEARCH AND EVALUATION (BRE) COMPONENT OF DOC

Technology in general and information technology in particular should be treated not as deterministic but rather as a force that can be shaped and directed by human intention (Social Impacts Subcommittee, 1983). This belief provides the justification for behavioural research. Initially, this research began when Telidon was still the New Home and Business Services program (DOC, Program Evaluation Branch, 1988). As well, behavioural research grew under the pressure to provide advice to designers of technology and to policy and decision makers who had to respond to public concerns (Phillips, Hearty, Latremouille, Treurniet and Whalen; 1985).

In the experience of the BRE, the psychologist's role in telematics developments was both important and difficult. The research often began with nebulous and poorly formulated questions posed by non-social-scientist professionals or the public about the design and impacts of new technology. The behavioural scientist's initial task was to define the questions or to provide models with which empirical research could be conducted (Phillips, Hearty, Latremouille, Treurniet and Whalen; 1985). Three basic questions about Telidon were asked: (Foote, 1984)

1. What information should be presented on Telidon for home users?
2. How should a page of Telidon information be designed?
3. How should a tree structure or hierarchical index be designed?

These questions led to research conducted mainly by academics under contract to the DOC. The results of the studies were published by DOC in a series of reports: (DOC, Program Evaluation Branch, 1988)

no. 1 Telidon Behavioural Research
no. 2 Tree Structures
no. 3 Graphics
no. 4 Keypad Design
no. 5 Query Languages
no. 6 Information Retrieval

These reports have had direct impact on such aspects of the product as: (DOC, Program Evaluation Branch, 1988)

1. keyboard, keypad design
2. screen content design
3. character sets
4. graphics/character mix

Overall, the BRE did not receive the level of attention or funding that the hardware and software area received. Initially, BRE was not identified as part of the program which is interesting considering the above statement by the Minister of Communications, Francis Fox, that emphasizes the importance of social impacts. Unlike product and software R&D which had a definable end product or involved person days, behavioural research remained at a fairly steady level of effort prior to and since the beginning of Telidon and has continued to address some of the same subject areas e.g. information access methods. (DOC, Program Evaluation Branch, 1988)

7.8.1 SOCIAL IMPACTS SUB-COMMITTEE AND EDUCATION SUB-COMMITTEE OF THE CVCC

These Sub-Committees acted as the conscience of the Canadian videotex effort. Potential dangers such as social isolation, technophobia, the gap between the information rich and the information poor and inequitable user access exist and several have been addressed by these committees. (Foote, 1984)

7.9 MARKETING

Marketing a new technology is evidently more problematic than launching a new improved version or model based on a traditionally diffused and accepted product or service (Foote, 1984). Publicists associated with the Telidon program were seen as instrumental cogs in the bullish promotion of Canadian accomplishments (technical and marketing) in videotex.

This strategy was designed to encourage domestic and international belief in Telidon at a time of high risk for new services coupled with economic recession (Foote, 1984).

7.9.0 MARKET RESEARCH

Most meetings concerned with videotex start with questions concerning the potential market. Phrased in that way, the question is easily answered. The potential market is every household with a TV set and every place of business. A much harder and more useful question to answer is how and when that market might develop (Madden, 1981). A common element throughout the majority of the reports written on this subject dealt with what Telidon COULD do and not with what it DID do at the time sales were attempted. This led to increased expectations of the system's capabilities which resulted in disappointment once the system was used.

No matter how revolutionary the product or how convinced the developer is of the product's usefulness, the marketplace will often not accept it until an application has been demonstrated to fit the buyer's needs. Thus, good market research is crucial. Many innovations have failed because developers assumed the product would sell itself. However, products do not sell, only the perceived solutions to problems sell. (Abt Associates, 1985) Such was definitely the case with Telidon as a common theme throughout the interviews was that Telidon's applications would be the key to the system's success, not the technology itself.

Failure to conduct effective market research has increasingly been linked to new product failure. Given the high level of risk frequently associated with such ventures and the complex organisation adoption process, market research is a way to reduce situational uncertainty. (Abt Associates, 1985).

With respect to Telidon, neither the private nor the government sector implemented the expected steps in the product development and market research process either on a generic or product-specific basis. (Abt Associates, 1985) A particular area that was crucial to profitability (which proved to be an elusive factor of the program) was the pricing structure of Telidon services. There were no detailed studies conducted describing the way consumers would respond to various price configurations (Booth and Wills, Vol.II,1983).

A possible reason for ignoring the more traditional marketing approaches was the complexity of the market. It changed so rapidly that it was impossible to capture an enduring snapshot of its characteristics. (Abt Associates, 1985) However, the overall result of the market research was a minimal amount of useful and conclusive information that could guide the development and marketing efforts of Telidon applications.

7.9.0.0 MARKET SEGMENTS

A Telidon market profile identified four principal market sectors: Business Information services, Public Access systems, Closed Loop services (Closed User Group) and Residential services. The Public Access and Closed Loop markets were regarded as being Canada's strength. (Peat Marwick and Partners,1985) Many questions remain unanswered about the potential in the various market sectors of residence and business (Booth and Wills, August 1983).

The US market was seen as the main opportunity for commercial expansion and was considered vital for the survival of the Telidon standard to ensure that competing systems with alternate coding schemes did not gain a foothold (Abt Associates, 1985). This viewpoint is heavily supported throughout the majority of the research interviews and documentation; however, an 1985 Industry Viability report stated that with the exception of Infomart and its suppliers, Canadian firms were unlikely to play a significant role in mass business or consumer-oriented videotex services in the US. The reason given was that the

competitive forces already present in these markets were too well financed and well positioned to allow Canadian firms any chance of gaining a significant foothold. Firstly, Infomart is now no longer in business. Secondly, other Canadian firms have been quite successful in the US market. Microstar, for example, provides the NAPLPS software for the IBM/Sears Prodigy consumer videotex service (Jordan, July 28, 1990).

Based on the optimistic forecasts of rapid penetration in North American by mid- 1980, government and industry directed its marketing efforts to the mass consumer (residential) market as opposed to the business or specialized niche market. When it became clear that these early forecasts were wildly inaccurate, the focus was redirected to an extended field trial positioning for eventual mass markets without actually conducting one. (Foote, 1984). Europeans attempted to address the mass market as well;however, they had the strength of the government-controlled telephone and broadcast utilities. North America does not have such support; thus, the strategy that became the most viable was to identify a specific market, develop appropriate applications and implement systems testing the market with a small number of users which sounds very much like a field trial. Each application was designed with the eventual prospect in mind of integration into the mass market as the application developed. (Abt Associates, 1985). Such was the basis behind Infomart's Teleguide application. Teleguide was conceived and implemented as a way of creating a public audience first for the Service Providers, then content development would be augmented to the point where it would be sufficient to entice home users to use this in their homes. (Carlisle, June 8, 1990).

Thus, a strategy based on specialized product development and marketing was appropriate for Canadian companies (Peat Marwick and Partners,1985). This view was also supported by CSP International consultants who believed that videotex in North America would only reach mass penetration in such a migratory evolution (Foote, 1984).

The following two sections will deal with the residential market segment which represented the initial focus of the program and with the business market segments which became the main focus of the program. The Closed User Group and Public Access segments will be represented in the Field Trial Case Studies section.

7.9.0.0.0 Residential

In attempting to ensure a Canadian industrial presence to compete with Great Britain and France, DOC adopted the same general market perceptions of these countries which was the home consumer (Abt Associates, 1985). Thus, the Canadian strategy towards the development of the mass market was to convince mass communications and media companies (television and radio broadcasters, cable companies, publishers and telecos) to use the Telidon standard to introduce videotex services and when possible, to purchase the equipment and services from Canadian firms (Abt Associates, 1985). As of the program's end, the home services sector was still in the developmental stage. Many of the field trials in the US targeted the mass consumer market; however, it was difficult to offer a service to attract enough consumer and advertising revenue to cover the minimum capital and operational costs. Three things were required before the mass consumer market would be viable: cheaper hardware, broader content and cheaper service rates. (Peat Marwick and Partners,1985). Today, ALEX provides reasonable rates based on a tiered pricing structure so that varying amounts are charged for certain services. It also has a broad level of content and terminals can be rented for a mere $7.95/month or inexpensive software can be obtained for running the service on PCs (Bell Canada, September 1989).

However, at the time of the program, videotex was labouring under the weight of subscribers' high expectations (Maria Cioni & Associates Inc., 1985). The media had presented what Telidon could do, not what it did do so users were disappointed when their expectations were not met (Dworkin, June 5, 1990). Another problem in satisfying these

expectations dealt with the fact that one needs to know what the consumer wants long before a new medium leaves the courtrooms and laboratories (Cutler, 1990). Neither government nor industry had precise ideas of Telidon's capabilities; thus, field trials were a method of ascertaining which applications had the most potential. However, it will become clear in the Field Trial section that results of the trials were often inconclusive.

To sum up the potential of this segment, it is believed that the average consumer will not perceive the advantage of interactive telecommunications until late 1990. That is when most analysts predict the proliferation of optical fibre lines, threads of glass through which rapid-fire pulses can transmit text, sound and animated graphics over the phone line to the home. (Cutler, 1990). At this point, the complaints of slow image generation, boring display of content and the need to keep graphics simple will be eliminated due to the speed at which data can be transmitted (Bown, May 24, 1990).

7.9.0.0.1 Business

Although the focus of marketing efforts was initially on the home sector, the opinion that the business segments would lead the short term videotex market was accepted in the early 1980s because the business community values information more highly and is less price sensitive than the home market (Booth and Wills, Vol.II,1983). Evidence that this was the proper focus is seen with business applications that began as a result of the program and are still operating today. Grassroots, the agricultural service for farmers; Marketfax, the stock charting service and TABS (Total Aviation Briefing System), the pilot weather and flight information service, are examples of such systems (Carlisle, June 8,1990; McLauchlin, June 5,1990; Marsh, June 4,1990).

7.9.0.1 APPLICATIONS

The determination of specific applications within the market segments was important as it was the appropriateness of the applications rather than the technological capabilities- the much touted graphics capability, that sold Telidon (Booth and Wills, August 1983). Telidon products and services tended not to focus on one particular target market (Abt Associates, 1985). Instead, the market was driven by special purpose applications that targeted various types of users depending on the application (Abt Associates, 1985). Applications development was often the result of a specific opportunity arising from a government program such as the IISP (Abt Associates, 1985).

Telidon's suitability for transactions and messaging applications (the residential segment), was well-known; however, they did not emerge as field trials (Booth and Wills, August 1983). According to many of the people interviewed, they were too costly to set up and operate. Another suitable application area was where material could be most effectively communicated via graphics and pictures (Booth and Wills, Vol.II,1983) such as Infomart's public access system installed in Venezuela where the literacy rate was very low and graphics were used to communicate effectively with the general public (Carlisle, June 8, 1990). As well, frequently updated information utilized Telidon very well as the print media would have problems updating the material continuously (Booth and Wills, Vol.II,1983).

Overall, the specialized niche type applications were successful and enduring uses of Telidon technology as the information demand was present in the particular segments targeted.

7.9.0.2 MARKET DEMAND FORECAST

Government drew from a series of market forecasts for its expectations of industry growth. Both government and industry eventually recognized that these estimates were unrealistic and based on a vaguely conceived notion of what the product and market would be, particularly with respect to the home market. (Abt Associates, 1985). Virtually every market forecast done (Hickling-Johnson 1979, Hough and Associates 1980, Cavalier 1981 as examples) proved overly optimistic and misleading even with the conservative scenarios (Foote, 1984). These optimistic predictions were not properly tested in the market place (Abt Associates, 1985).

Much of the theory and historical precedence for forecasts of terminal placements in the Telidon program appear to have been based on a review of the evolution of some consumer electronic products (Color TV, VCR). (Peat Marwick and Partners,1985). As well, market forecasting was attempted in field trials; however, results provided little direction to aid in forecasting new services (Booth and Wills, Vol.II,1983). A refinement of economic modelling used in videotex forecasting was sorely needed if statistically significant and useful data on the trials was to be obtained; however, this was not done (Foote, 1984).

Even with liberal allowances made for normal forecast variations, the variations among reports were abnormally large. Projections over the past three years (1980-1983) have ranged from 40,000 terminals up to 500,000 by 1984 with the actual figure being 6,000 (Booth and Wills, August 1983). This was attributable to two main factors: (Piskor, 1982)

1. Definitional inconsistency- inclusion/exclusion of delivery medium (cable, telephone) or protocol (alphanumeric, alphamosaic) varied across reports.
2. Market Definition- inclusion/exclusion of market segments, applications areas differed across reports.

A justification for some of the hyperbole associated with the projections may be attributed in part to the government and industry's concern that potential users could not be expected to adopt a new technology without positive and continuous explanations, demonstrations

and forecasts (Foote, 1984). This view is supported by the fact that two forecast reports that were pessimistic (now called optimistic) were held back from the press and industry for a period of time after they were written due to the candid projections that were less than government and industry wanted to admit (Hough, June 13, 1990; Piskor, June 1, 1990).

7.9.0.2.0 Terminal Placements- North America and Worldwide

A 1983 worldwide census of videotex, teletext and cabletext (teletext via cable) terminals by CSP International found 2.3 million terminals with the following breakdown by protocol. ASCII terminals were not included: (Peat Marwick and Partners,1985)

98.07 %	Prestel (Great Britain)
1.33	Antiope/Teletel (France)
0.25	Pre-NAPLPS Telidon (699)
0.22	Proprietary
0.10	Captain (Japan)
0.03	NAPLPS (North America- 709)

7.9.1 MARKETING STRATEGIES: GOVERNMENT AND INDUSTRY

The formulation and coordinated implementation of a comprehensive marketing strategy tied to specific applications was only sporadically engaged in by the government and less so by industry (Foote, 1984). A single Telidon marketing strategy fit neither the rapidly changing media environment nor the specific market segments within this environment (Foote, 1984). Most firms felt they were too small to dedicate the time and resources required to follow a formal marketing plan; thus, they functioned in a largely ad hoc manner (Booth and Wills, August 1983).

However, to begin with, marketing took second place to improving production economies, to the transfer of Telidon technology to the private sector and for the negotiation of standards (Foote, 1984). Marketing became more of the focal point during the Exploitation Program of 1983-1985 but marketing plans were no more concrete than before.

7.9.2 GOVERNMENT INVOLVEMENT

Until 1983, DOC was mainly responsible for both domestic and international marketing (Abt Associates, 1985). DOC/Telidon program staff undertook a number of marketing oriented activities but without a formal marketing plan or strategy and this was geared towards promoting awareness and having the Telidon standard accepted (Abt Associates, 1985). To DOC, marketing and standardization were deemed to be mutually supportive efforts (TEEGA Research Consultants Inc., 1985).

The promotional strategy relied heavily on media relations as opposed to advertising. Departmental information staff kept in close contact with journalists under the assumption that these people understood the potential of information technology (Abt Associates, 1985). Information Services used the immediate impact of creating the media perception of an international videotex battle to stimulate enthusiasm among Canadians (Abt Associates, 1985). This did indeed work as Canada was seen as the underdog that proudly came up with a superior system; however. this superiority complex could have led to some of the unrealistic expectations developed by potential users and journalists promoting Telidon. Other methods of publicity for Telidon included Minister of Communication speeches, program publications, seminars and public meetings and most importantly, the CVCC and its various sub-committees as well as the off-shoots of the CVCC- the CVIA (Canadian Videotex Industry Association) and VISPAC (Foote, 1984).

Other forms of government marketing were the IISP and the government's own use of the technology in a public access application called Cantel by DSS (Abt Associates, 1985).

In 1981, an audit of the Information Services Bureau recommended that a marketing plan be done for Telidon. Turnover in senior management prevented this from happening. (Abt Associates, 1985)

Approval of the Telidon Exploitation Phase from 1983-1985 allocated funds to External Affairs and DOC to help ensure a place for Canada in videotex through mainly export-oriented activities (Abt Associates, 1985). The informal marketing plan developed by the Telidon Systems Section of the Special Marketing Division (which took over the TMS) attempted marketing with the following activities: (Abt Associates, 1985)

1. Brochures
2. Trade Publications
3. Trade Show coordination
4. Seminar Programs
5. The embassy and consulate project- Teleglobe
6. Advertising in trade journals
7. Demonstrations of the system

This range of activities resulted in a strategy that targeted hardware and software developers and IPs on the supply side and corporate buyers such as IBM and networks such as CBS in the US on the demand side (Abt Associates, 1985).

Industry Perspective on Government Marketing of Telidon. (Abt Associates, 1985)

The positive aspect of government involvement was represented by the solid and reliable information networks it established that enabled Telidon to be more effectively marketed as there was a network through which information could flow . On the negative side, industry felt that government should have employed personnel that demonstrated a clearer understanding of the technology and the existing and potential markets for it to be applied. The government tried to create a market that did not exist in 1980. Although their motivation was evident, they did not have the right skills to administer the program and did not understand the high risk and entrepreneurial nature of the industry.

7.9.2.0 DOMESTIC FOCUS

There was little focus given to the domestic market in terms of government marketing. The potential of Telidon was not sold to possible Canadian users (Abt Associates, 1985). Field trials seemed to be the only vehicle for Telidon's promotion in Canada. When Industry

Trade and Commerce assumed the responsibility for international marketing in 1981, the mandate for marketing within Canada seemed to disappear (Abt Associates, 1985).

7.9.2.1 INTERNATIONAL FOCUS

Activities involving international marketing plans in terms of specific applications were sporadic by both government and industry (Booth and Wills, August 1983). Overall, DOC's strategy in North America was focussed on winning the US market. The absence of a US standard was both a danger and an opportunity at the same time for Canada. The danger was the possibility that US organizations would opt for the European technologies. If this happened, a de facto alphamosaic standard would have been established with pressure on the US government and US standards bodies to formally adopt it. (TEEGA Research Consultants Inc., 1985). Thus, representations were made to the Federal Communications Commission and the Electronics Industry Association (EIA) and promotional presentations were made to a number of US companies such as AT&T, IBM and GT&E (TEEGA Research Consultants Inc., 1985).

To compete internationally, marketing thrusts were launched in Austria, Australia, Belgium, Brazil, Germany, Mexico, Switzerland and the US in coordination with the External Affairs and Industry Trade and Commerce (TEEGA Research Consultants Inc., 1985). DOC originated the idea for the Embassy and Consulate Project called Teleglobe and provided the terminals and training, then handed the project over to External Affairs (Abt Associates, 1985). Finally, trade shows and presentations were used to create an image and presence that confirmed the government's backing of the industry (Abt Associates, 1985).

7.9.3 COMPANY INVOLVEMENT

The detailed analysis of the competitive environment was left to the individual firms as the rationale was that they were better equipped to analyze the competitive nature of this environment given their product offerings. This, however, was difficult because firms had to develop their own product, identify and/or create the market and overcome competition from other firms which may be operating in centres with lower production and labour costs. (Abt Associates, 1985)

The majority of firms did not have adequate resources to implement a traditional marketing strategy. They did not develop reliable targets or specific expectations, instead they were guided by forecasts endorsed by the federal government and the previous section does not speak highly of these forecasts. As well, mass market promotion through the media was not feasible due to the absence of large, general purpose Telidon markets. Rather, marketing was conducted and still is, by the principals of the firms who were most often technical in their backgrounds. (Abt Associates, 1985)

7.9.4 MARKETING PROBLEMS

After looking through the various reports, there were two major marketing problems that were consistently identified.

1. The high price and unreliability of the decoders were a major deterrent to market acceptance.
2. The continuing lack of awareness among potential buyers of the specific benefits of videotex as a cost-effective tool.

In addition to the above, when the Telidon Systems Section at External Affairs was developing a marketing approach, it identified marketing problems in the Canadian Telidon industry. These are presented below: (Abt Associates, 1985)

1. Distribution Channels- Most Canadian Telidon firms lacked an established distribution and marketing network to sell in North America or internationally. No international marketing efforts will succeed until Canadian companies develop local sales and service capability.
2. Marketing Skills- Most Canadian companies were new and rapidly growing firms. As a result, their marketing personnel were few in number and poorly trained in marketing skills.
3. Cash Flow- Most Canadian companies were experiencing serious cash flow difficulties as many had heavily invested in R&D which they were not recouping due to slow market development.
4. Market Development- As of 1984, there was only a small installed base of terminals. The terminal prices expected to fall rapidly did not because of the standards difficulties and slow development of the VLSI chips required to bring down the manufacturing cost.
5. Costly Sales Process- Canadian companies found that selling Telidon required face-to-face demonstrations to have the technology understood. This labour intensive process resulted in high sales costs and slow sales.

Each of the above factors increased the difficulty that government and industry experienced with marketing and establishing Telidon with businesses, both in Canada and internationally.

7.9.5 COMPETITORS

Canadian companies faced stiff competition for the sale of videotex products and services. Great Britain and France had mounted heavily subsidized, worldwide marketing efforts and Americans and the Japanese were becoming more visible (around 1981). Penetration of the US market was considered vital for the survival of one's standard; thus, both Europe and Canada mounted campaigns to convince this market to adopt their standard. The following sections present the efforts of the British and French to market their systems worldwide.

7.9.5.0 GREAT BRITAIN

Overall, the British government allocated approximately $32.5 million (US) to international marketing. About 90% was spent to establish their technology in the US; however, the British achieved minimal success after seven years presence in the US (Abt Associates, 1985).

The following table lists the British government's expenditure on marketing videotex internationally between 1978-1984 (This is almost the entire duration of the Telidon program; thus, it is a good comparison). All firms were entities of the British marketing effort.

Where Spent	Amount Spent (US$)
Prestel Intl	$ 4 mill
Aregon	10
GEC	1
BVT	4
Ameritex	0.5
BT's own int'l marketing *	11
DOI teletext marketing **	2
Total	$ 32.5

* BT = British Telecom
** DOI = Department of Industry

Source: Abt Associates, 1985.

The British government, through British Telecom, implemented two different marketing strategies. The first involved contacting other public telecommunications interests in Europe and the Commonwealth nations to generate sales. The second marketing strategy attempted to sell Prestel software on a worldwide basis by licensing the product to a British firm. Of the two marketing plans, the first was somewhat successful but the second effort was not. Prestel was sold to Australia and three former British colonies in Asia. Other international marketing efforts, especially in the US, were a failure. The British misjudged the US market and more importantly, chose to market a product that was not fully portable to US hardware. These two problems severely hampered the British government's attempts to sell Prestel abroad despite great sum of funds spent to do so. (Abt Associates, 1985)

7.9.5.1 FRANCE

Overall, the French government spent $26.5 million over 1978-1984 with the major focus, as with Great Britain, being on the US market. The French had minimal success as well after seven years in this market. (Abt Associates, 1985)

French government expenditures on marketing videotex internationally were as follows. All firms listed below were entities of the French marketing effort.

Where Spent	Amount Spent (US$)
Antiope Videotex Systems	$0 .5 million
Antiope & Telematique	2
Alphatel	2
VSA*	4
Intelmatique	16
Sofratev	2
Total	$ 26.5

* VSA- Videographic Systems of America

Source: Abt Associates, 1985.

The French government experienced similar results as the British. However, the French used a more diversified marketing strategy. Specifically, the French lobbied the US government to accept their standard as THE official standard. The U.S. government did not do as the French wished, instead letting the marketplace decide. The French also offered free Antiope equipment to potential clients. (Abt Associates, 1985)

7.9.6 FUNDING

Direct marketing support was allocated through DOC and External Affairs. Until 1983, DOC was responsible for both domestic and international marketing. Specifically, $2.5 million was allocated to "Market Development and Standards" which included aggressive marketing by DOC, Industry Trade and Commerce and External Affairs to fight the competition. A further $3.7 million was allocated to External Affairs and DOC to support

export oriented activities under the Telidon Exploitation Program in 1983-1985. (Abt Associates, 1985)

The most common form of assistance received by industry was financial in the form of grants to underwrite some costs of travel to trade shows and conventions (Abt Associates, 1985).

In comparison with the amounts spent by the British and French, Canada's $6.2 million spent achieved greater market impact and acceptance as a standard. (Abt Associates, 1985) Telidon was adopted and enhanced by AT&T which led to Canadian technology being the core of a North American standard. As well, there were a number of field trials conducted in the US in both teletext and videotex applications. Finally, today, some US operations are using Canadian videotex/teletext products for their services (e.g. IBM/Sears venture called Prodigy).

7.10 FIELD TRIALS

During 1978 and early 1979, several developments occurred in Canada regarding the adoption of competing videotex systems for technical trials; notably, Bell Canada's Vista trial was based on British Prestel technology and Alberta Government Telephone was in the process of deciding to buy the Prestel system. The threat of foreign competition was quite real. (TEEGA Research Consultants Inc., 1985)

Field trials supported by the Telidon program offered various firms the opportunity to test specific products and services using the Telidon technology but only in a limited context (Abt Associates, 1985). Canadian companies had a test ground of manageable proportions in terms of the required amount of information and the population size. This is supported by the statement about Grassroots in Manitoba that this service was tested first and improved in Canada for the introduction of the service to the American market (Maria Cioni

& Associates Inc., 1985). At that time, the trials were the most extensive and diversified undertaken anywhere in the world and were characterized by the fact that they: (Parkhill, April, 1981)

1. covered the entire country from coast to coast
2. involved many different transmission media; namely telephone, switched optical fibre, satellite, cable and over the air blanking interval TV.
3. included both rural and urban environments
4. included material in French and English
5. involved dozens of different information providers from both the private and public sectors
6. were jointly funded by the Canadian government and the sponsors

Overall, field trials were dominated by the telephone companies (Booth and Wills, August 1983).

7.10.0 GOALS

7.10.0.0 BROAD GOALS

Canada's field trials operated largely between 1980 (in the case of IDA) and 1983. The field trials were expected to provide reliable indications of the domestic and international market prospects of videotex and teletext and were also expected to yield initial user profiles and stimulate videotex/teletext content volume and diversity. (Foote, 1984).

Trials initially had four purposes: (Booth and Wills, August 1983)

1. To promote the introduction of Telidon terminals in the field trials. This was done through the IISP.
2. To stimulate the services which might take advantage of Telidon's inherent capabilities. Examples are messaging and transactions services but applications were not developed as Telidon was mainly used for information retrieval and display.
3. To demonstrate the superiority of Telidon over competing systems. This was demonstrated in the standards forums and with the establishment of the North American standard, NAPLPS.
4. To create a government/industry vehicle which might take Telidon to the marketplace. This became the CVCC.

7.10.0.1 SPECIFIC GOALS

More specific goals for the trials were as follows: (Booth and Wills, August 1983)

1. To have operational Telidon services in all major urban centres utilizing telephone and cable by 1985. (Failure)
2. The instigation of 2 national Teletext services in French and English. (Failed-Attempted with CBC- Project IRIS trial but project was cancelled)
3. To eventually have Canadian manufactured Telidon terminals and adapters available as standard over-the-counter retail products in stores across the country. (Failure)
4. To make Telidon the North American standard of videotex. (Successful)
5. To develop an operational mobile videotex service. (Failure)
6. To provide public information services. (OC Transpo has an existing service)
7. To instigate a viable electronic publishing industry. (Failure)
8. To develop export industries supplying Telidon software and hardware. (Successful for software and consulting industry)

7.10.0.1.0 SERVICE PROVIDER GOALS

1. The assessment of Telidon's technical capabilities. (Successful)
2. The encouragement of spin-off activities and evolution in new types of applications. (Successful but number of applications is minimal)
3. To assist in the development of a marketing plan for service providers which would result from the assessment of the user pilot trials. (Failure)
4. To understand what market segments exist for the consumer, the business sector and the public and to gain some notion of how much consumers would be willing to pay for videotex and teletext services. (Failure to obtain significant results)
5. To know how quickly market sectors such as retail, banking, travel, electronic mail will view videotex/teletext services as worthwhile and cost effective media. (Failure)
6. To gauge some sense of mass market appeal of videotex services. (Successful-discovered there was no mass appeal at the time)
7. To establish standards in sectors such as education. (Failure)

Overall, the majority of the specific goals set have not been met; however, the four basic goals were met to some degree of success. Thus, one could say Telidon required further improvements in the details of the systems but had established a foundation represented by the broad goals being met on which to strengthen the Telidon offering.

7.10.1 FIELD TRIAL STUDY BY HICKLING JOHNSON - OVERVIEW

This report assessed an ideal field trial (pre-marketing trial) at an early date (1979). Its predictions of rapid mass consumer adoption of Telidon were clearly proven wrong. However, at the start of the program, it provided the first suggestion of a structure to be used for field trials and other components of the program. Most notable was its suggestion that a Telidon Consortium be formed jointly by the government and industry linking product development and market delivery for Telidon. This was significant as this 1979

idea returned in 1982 with a proposal from Infomart to form a consortium of companies called Telidon Systems, Inc. that would be a government/industry venture. (Foote, 1984).

7.10.2 HARDWARE DEVELOPMENT

The advantages of Telidon being developed in Canada were the advanced Canadian networks, the network software technology, the advanced state of cable penetration, competent engineering know-how, emerging large scale data bases and competence in consumer electronic markets (analog). However, the disadvantages involved no know-how in digital consumer electronic manufacturing which was needed for the mass market that Telidon was hoping to enter. (Hickling Johnston, 1979)

The hardware evolved throughout the duration of the field trials as a result of the standards negotiations and technical testing in the trials. There were three phases identified and the hardware evolved with each phase. They are described below:

7.10.2.0 FIELD TRIAL PHASE (1980 TO MAY 1981)

Hardware was very experimental and was mainly hand-made as well as consistently unreliable at this time. Decoder specifications were constantly changing and there were MarkIs, MarkIIs, IIas and MarkIIIs. Each new version seemed to be entirely incompatible with its predecessor which prompted sarcastic comments from those affected by the changes whenever someone expounded the virtues of the "upward-compatibility" and "hardware independent" features of Telidon. (Lane, Videotex Canada, 1983)

7.10.2.1 PRODUCT DEVELOPMENT PHASE (JUNE 1981 TO DECEMBER 1982)

Hardware products had evolved considerably in 1981 and 1982; however, hardware manufacturers still had a cautious attitude towards the videotex market (Lane, Videotex Canada, 1983). No manufacturer had expressed a major committment to build the large

numbers of Telidon terminals required to achieve a mass market price of $200-$300. This reluctance was due to the lack of a solid technical standard and the large up-front committment needed for large-scale production. The apparent strategy was to respond to the market as it developed, not to lead it (Ash and Quelch, 1982).

7.10.2.2 ROLL-OUT PHASE (1983-1985)

Terminals were still very expensive at $2000 and were restricted to information retrieval and display (Booth and Wills, August 1983). One of the main aims of the R&D strategy was to reduce the cost of the Telidon terminal in order to be competitive in international markets. This was to be accomplished with the development of the VLSI chip. (DOC, Program Evaluation Branch, 1988) Norpak developed and engineered and Rockwell International fabricated the first VLSI chip in September 1984. Norpak did not manufacture the chips or the terminals as they are like TVs- commodities that require too costly an infrastructure (mass production and distribution channels) to manufacture (DOC, Program Evaluation Branch, 1988). Norpak has an agreement with Samsung Electronics Company of Korea to mass manufacture teletext decoders based on Norpak's engineering expertise (Carruthers, June 26, 1990).

Norpak is a prime example of the opinion of Canadian manufacturers that they should not attempt to compete internationally with AT&T and Japanese companies for the mass consumer decoder market. The reasons are as follows: (Peat Marwick and Partners,1985)

1. Canadian firms have a shorter planning horizon (perhaps 3-5 years) whereas firms such as AT&T and Sony take a longer (10 year) view of the market. The large US and Japanese firms can afford to take larger losses up front in order to establish a strong long-term market position.
2. Canadian firms generally do not have the vertical integration necessary to manufacture the units which are component intensive, at competitive prices. Many of the components used in the Canadian products are manufactured in the US and must be purchased through distributors.
3. Japanese firms tend to work more effectively than North American firms in cooperative efforts such as mass manufacturing; while North American firms generally excel in the more individualistic areas of innovation and design.

In sum, Canadian manufacturers believed that they could compete internationally with hardware products which were more design intensive and which were manufactured in smaller production runs with customized features. An example is broadcast teletext systems of which Norpak is the world leader.(Carruthers, June 26, 1990).

Overall, the trials have enabled the successful evaluation of technical capabilities of the equipment and modes of service delivery. Hardware was evaluated, networks were assessed and the carrying capacity of optic fibres versus copper wires and broadcasting are all well known and established (Booth and Wills, August 1983).

7.10.3 SOFTWARE DEVELOPMENT

7.10.3.0 FIELD TRIAL PHASE (1930 TO MAY 1981)

Software was at a very early stage of development at this time. Software from DOC provided the starting point for all videotex software in Canada and it worked intermittently and was haphazardly documented (Lane, Videotex Canada, 1983). Evaluation of field trials was underway in this time frame and a software package was designed to collect and collate usage data for subsequent analysis (Phillips, 1975-1981). This statistical software was used in a select few trials (e.g. BC Tel); however, results were not significant enough to properly ascertain usage patterns and compare across the trials.

7.10.3.1 PRODUCT DEVELOPMENT PHASE (JUNE 1981 TO DECEMBER 1982)

The introduction of the PC to the market had a great impact on videotex. This led to the development of software that enabled NAPLPS page creation and presentation on PCs (Lane, Videotex Canada, 1983). Canadian firms such as Microstar and Voila Software (formerly Microtaure) are examples of firms that developed NAPLPS software for PCs when they were first introduced and went against the trend of hardware development and are still in business doing very well (Lane, Videotex Canada, 1983).

7.10.3.2 ROLL-OUT PHASE (1983-1985)

Proliferation of PCs continued and events continued along the same lines as in the previous phase.

7.10.4 PAGE CREATION DEVELOPMENT

7.10.4.0 FIELD TRIAL PHASE (1980 TO MAY 1981)

Regarding page creation terminals, much attention had gone into the graphics capabilities of these terminals but totally at the expense of any consideration being given to the text creation functions of the terminal. Most were using Norpak's IPS equipment which was on the 699 standard. Editing was so difficult that at Infomart, they decided it was easier to recreate an entire page rather than try to correct one typographical error or spelling mistake (Lane, Videotex Canada, 1983; Booth and Wills, Vol. II, 1983).

7.10.4.1 PRODUCT DEVELOPMENT PHASE (JUNE 1981 TO DECEMBER 1982)

Page creation terminals were more robust and user-friendly. Infomart and TVOntario developed their own Telidon system software that was an improvement over software developed by the CRC in the early days. Both Infomart's IPSS version 2 system software

and TVOntario's videotex page creation software, CREATEX-C, were marketed worldwide and were very well received.(Carlisle, June 8, 1990; Read, June 7, 1990).

7.10.4.2 ROLL-OUT PHASE (1983-1985)

NAPLPS page creation software was developed for the PC market (Jordan, July 31, 1990). As with software development, events continued along the same lines as in the previous phase.

7.10.5 CASE STUDIES

As the field trials represented the most significant usage of the Telidon technology in Canada, a summary of the larger trials is presented below. A review of the participants gives one a better idea of who was involved i.e. the telcos, government, banks, television, private industry, and of what the various trials attempted to accomplish. The following case studies were chosen as they were a representative sample of the different types of trials involved which were also relatively large and thus, had documented results.

7.10.5.0 ALEX - BELL CANADA

ALEX is Bell's mass market consumer information and transaction service. It allows customers to obtain information on a broad variety of subjects. The links to ALEX are provided over the public switched telephone network (Bell Canada, September 1989). There are many reasons for the current acceptance of an interactive consumer-oriented videotex offering. Lifestyle changes such as the growing number of dual-career families have placed a greater emphasis on the need for fast, personal and convenient service. Another fact is that consumers are far more comfortable today with adopting and using new technologies such as ATMs, VCRs, microwaves and programmable stereos (Bell Canada, ALEX Brochure).

ALEX emulates the French Minitel service as it handles all the billing and encourages the establishment of a large number of independent database operators. ALEX also provides networking which makes accessing the different databases very simple for the user. (Marsh, 1989). To access the service, customers can either rent an ALEXTEL terminal from Bell or they can buy ALEX emulation software and use their PC equipped with a modem (Bell Canada, September 1989). Software packages prices range from about $30 to $100, while terminals rent for $7.95 per month. Usage charges vary from no charge to 6 cents per minute to 45 cents per minute, depending on the nature of the database being accessed (Bell Canada, September 1989). It is interesting to note that this tiered pricing method was suggested in a 1983 DOC report on pricing suggestions for Telidon services (Booth and Wills, Vol.II,1983).

Bell chose NAPLPS as they felt it provided greater speed and higher resolution than other standards. The software used in the ALEX gateway is based on iNET 2000 software developed by BNR, the ALEXTEL terminal was developed and manufactured by Northern Telecom and the emulation software packages were developed by several Canadian companies. (Bell Canada, September 1989). All components of this service were developed by Canadian firms of which many were involved in videotex in the Telidon days.

7.10.5.1 BANK OF MONTREAL (BOM)

The BOM's participation as a service provider in Infomart's Grassroots service represented a belated Canadian step in the direction of developing commercial home banking services utilizing Telidon. This telebanking service was announced in June 1983. (Maria Cioni & Associates Inc., 1985)

Bank involvement was phased in. First, it sponsored access to: the commodities exchange, bank product and service information and interest rates. Next, BOM offered

online banking services- checking account balances, transferring funds and getting account statements via a BOM gateway from Grassroots to the bank's real-time banking system. (Maria Cioni & Associates Inc., 1985)

Results of the trials indicated that consumers' concerns about security and confidentiality were very real and that low cost technical solutions remained unresolved (Maria Cioni & Associates Inc., 1985). As well, different pricing structures and consumers' reactions to the various prices were researched; thus, BOM obtained some important research on possible pricing structures for such a service (Irwin, June 8,1990).

7.10.5.2 BELL VISTA II

Note that Bell originally started a Vista I trial using British Prestel technology which it later abandoned to cooperate with DOC using Telidon technology (Bell Canada, Brochure, May 1989). Ironically, the first trial was introduced two days after DOC's announcement of the Canadian videotex system in August 1978 (DOC, Program Evaluation Branch, 1988).

Vista was an $11 million consumer videotex service effort ($8.5 from Bell, $2.5 from DOC). The principal attraction for phone companies was the opportunity to increase line usage. Bell's strategy focussed on the residential market as presumably, home viewers' usage would occur mainly on weekends and during weekday evenings. This usage pattern would help to equalize the telephone line load imbalance that existed. (Ash and Quelch, 1982).

Vista began in May 1981 with terminals installed in Cap Rouge, Quebec and Toronto and was operated by Bell until April 1982 when Infomart took over as System Operator. The trial ended in October 1983 (DOC, Telidon Trials & Services, 1983).

The purpose of the trial was to provide feedback to Bell, DOC and the various IPS on the general reactions of users to the system (ABM Research, 1983); however, one IP noted

that during the trial, their agreement with Bell prohibited them from having contact with the residential users (Booth and Wills, Vol.II,1983). The only feedback they received was the number of hits (accesses) to their page set (Booth and Wills, Vol.II,1983). This limited the amount IPs could learn from their participation in the trial. Bell conducted extensive user research at the start and midway through the trial; however, these results were proprietary (ABM Research, 1983). Overall, this was a learning experience for Bell and they decided the market was not ready for a commercial offering at the time (Bell Canada, Brochure, May 1989).

7.10.5.3 BC TELEPHONE

The BC Tel public access trial began in November 1981 and ran for 19 months. The trial was designed to identify a market for a Telidon service in BC and to determine how to best serve users' needs.(DOC, Telidon Trials & Services, 1983)

BC Tel stands out as one of the few trials that examined the user aspect in a serious manner. BC Tel used a statistical software package that tracked usage as well as utilizing user diaries. User responses were obtained in pre-trial, mid-trial and end-of-trial measures. (Booth and Wills, Vol.II,1983).

The trial was not only good for determining the likes and dislikes of users, it also enabled IPs and Sub-IPs to test using Telidon as an advertising tool (Booth and Wills, Vol.II,1983). Results revealed that many of the participants had a high expectations about the types of services. These expectations far exceeded what was provided in the trial. This discrepancy often led to negative reactions to the trial offering.

7.10.5.5 CANTEL- DEPARTMENT OF SUPPLY AND SERVICES (DSS)

The Cantel trial was a major public access videotex effort by the federal government to enhance the access to government information services by the public (Booth and Wills,

August 1983). It was also the most noted example of government using the very technology it was attempting to create an industry for. The initial objectives of this program, started in March 1981, were: (Booth and Wills, Vol.III,1983)

1. To provide experience to the government in the selection, organisation and utility of electronically-based information services.
2. To act, by example, as an incentive to other organizations to use Telidon as an information dissemination device and to display the competence of the government in the Telidon program.

Development of the database was provided by Infomart who was also selected as the System Operator (Booth and Wills, Vol.III,1983). The database consisted of 50,000 pages characterized mainly by static directory type information along with some periodic categories which did change such as the national job bank and the weather information. The database underwent a number of changes since it was first designed to ease search procedures. (Booth and Wills, Vol.II,1983). Cantel was available through other field trial databases: BC Tel, Saskatchewan Tel and Grassroots. (Booth and Wills, Vol.III,1983)

Overall, the service was not seen as being overly useful. The inefficient indexing system led to the majority of users preferring to ask client services officers for the information or to use the phone book. (Booth and Wills, Vol.II,1983). Virtually all the information provided on Cantel was available through existing computer information or print and in many cases, these alternatives were considered more useful (Booth and Wills, Vol.III,1983).

7.10.5.6 ELIE-INFOMART/ MANITOBA TELEPHONE SYSTEM (MTS)

Elie is a fibre optics trial with Telidon offered as one of a number of services to residential users in the communities of Elie and St. Eustache, Manitoba. This trial began in October 1981 and ran for 18 months (DOC, Telidon Trials & Services, 1983). MTS was the provider of the terminals and equipment while Infomart managed the database (Booth and Wills, Vol.II,1983).

The $10 million trial stimulated the development of a fibre optics network to improve communications in rural areas and thereby raise the standard of living (DOC, Telidon Trials & Services, 1983). The result of this trial was the assessment of the capabilities of data transmission over fibre optics.

7.10.5.7 GRASSROOTS- INFOMART/ MTS

Grassroots was the first trial based on what was learnt in Project IDA. No longer was a service being offered as being too many things to too many people. (Proust, 1984) It represented Canada's first commercial videotex service and was a specialized niche application in the agricultural market (Thomas, 1983).

Infomart's system software and content production skills along with MTS' provision of the telecommunications network, terminal leasing and maintenance were indispensable to Grassroots' success (Infomart Brochures). Another key feature was the time-sensitive but distance- insensitive telecommunications charges levied at the low rate of 5 and 8 cents per minute in Manitoba and Saskatchewan (Foote, 1984).

The information offered on Grassroots had and still has an obvious economic worth to farmers (Thomas, 1983);hence, the reason for its continued success today.

7. 0.5.8 PROJECT IDA- MTS

This represented one of the first Telidon field trials. This small residential trial began in June 1980 and ran for 19 months. Infomart ran the database that contained about 3,000 pages on cultural, educational, entertainment and community services information. (DOC, Telidon Trials & Services, 1983)

Results indicated that everyone did NOT want videotex services. This trial attempted to be too many things to too many people and failed. The surveys administered were said to

have overstated the benefits and understated the costs and difficulties of becoming videotex literate. It was a sell survey. (Proust, 1984) This trial went down in history as being a lesson of what to avoid in the development of future services. In fact, these results were taken into account when the Grassroots service was developed.

7.10.5.9 iNET

TransCanada Telephone System developed a network infrastructure for an information society called iNET, in reference to the intelligent network functions inherent in the service (Farrell, 1982). This service commenced in July 1982 (DOC, Telidon Trials & Services, 1983). iNET operates on Datapac, CCG's (Computer Communication Group at Bell) nationwide, public packet switched network (Farrell, 1982).

The goal of iNET's gateway was to make access to information services just as easy as reaching friends by using the telephone (Farrell, 1982). Gateway technology refers to the interface between a database and a common carrier that allows the user to access information without involved procedures that change from one database to another (Ash and Quelch, 1982). iNET supported a variety of commercial online services targeted at business users, including a business videotex database as well as access to Vista (Stothers and Dietrich, 1984).

iNET 2000 is now the basis of ALEX's gateway technology. The foundation for such service was laid with this trial (Bell Canada, September 1989).

7.10.5.10 PROJECT IRIS-CBC

In November 1981, the Canadian Broadcasting Corporation (CBC) and DOC announced an agreement to conduct a series of trials to test the feasibility of introducing a national teletext service. Project IRIS (Information Relayed Instantly From the Source) consisted of

residential and public teletext trials offered in English and French in Montreal and Toronto and in English in Calgary. (DOC, Telidon Trials & Services, 1983)

A total funding of $7.164 million was invested of which $1 million came from CBC's budget (IISP funding included) (CBC and DOC, 1986). The two broad objectives of the trial were as follows: (CBC and DOC, 1986)

1. Economic development of the Canadian industrial Telidon capability.
2. Implementation of a trial broadcast teletext service serving as the forerunner for an operational service.

The first objective was met as it was necessary to develop a systems engineering capability for teletext within the CBC. In the course of doing so, CBC worked with industry to a maximum level possible with the schedule and funds available. By 1986, this industry had not reached a level of competency permitting it to undertake such a large scale job but the elements were put in place to do so in the future (CBC and DOC, 1986). Obviously, the second objective was met or there would be no write up on this trial. Unfortunately, CBC's funding was significantly reduced and they were not able to develop this service into an operational offering; however as stated, the foundation has been laid for this service to be continued in the future.

7.10.5.11 MARKETFAX- FAXTEL INFORMATION SYSTEMS

Marketfax began in February 1982 and has been continuing ever since. Marketfax was operated as a commercial service from the beginning (DOC, Telidon Trials & Services, 1983)

This is a NAPLPS-based subscription business service specializing in dynamic graphics displaying stock and bond prices, trends and other financial indicators. It is an example of an online page creation system and updating for business applications which depends on information immediacy, analysis and rapid dissemination on demand. (Foote, 1984). Brokerage firms are the main users of the system (McLauchlin, June 5, 1990).

7.10.5.12 NOVATEX- TELEGLOBE CANADA

Teleglobe Canada, the Crown corporation that handles international telephone and telecommunications connections between Canada and all other countries except the US created the first international Telidon database. This database included information about trade and economic affairs, scientific, government and technical information and information about Canada in general. (DOC, Telidon Reports,October 1984)

Begun in January 1981, over 30 Telidon systems were placed in embassies and consulate across the world. The goal was to facilitate worldwide marketing of Telidon and to solve the problems of transporting equipment around the world to give demonstrations. (Abt Associates, 1985)

Unfortunately, usage of the system was low either due to lack of Telidon system training of consulate staff or their lack of understanding the purpose of Telidon and were thus inactive in its promotion. (Abt Associates, 1985) This commercial business service was shut down July 13, 1984. This $4 million experiment had been extended beyond its original three year trial period but lack of response to marketing efforts led to the decision to close the database. (DOC, Telidon Reports,October 1984)

7.10.5.13 TELEGUIDE- INFOMART

Starting in September 1982, Teleguide was designed specifically for visitors to and residents of Ontario (DOC, Telidon Trials & Services, 1983). This commercial public access service was the first large videotex system to use NAPLPS (Thomas, 1983). Infomart spent $14 million developing this service with $2 million from the federal government to pay for Electrohome, Microtel and Norpak terminals. This was to eventually be turned into a consumer home service once the public audience had been built up (Thomas, 1983).

International sales of the Teleguide system were good. Six systems were sold in Japan and one system was sold in the US. The future of Teleguide was looking hopeful when in 1983, David Carlisle, the President, was fired and Infomart went through a streamlining process that reduced operations. Teleguide never prospered after this point. (Carlisle, June 8, 1990).

7.10.5.14 TVONTARIO

In March 1979, TVOntario began a three year Telidon trial in cooperation with DOC and Ontario high schools. The services developed were called EDUTEX videotex service, a 30,000 page database of information on careers and training opportunities and EDUTEL teletext service, a 100-150 page cycle with pages of news, education features, weather maps, financial reports, art reviews, health education and community information. (EAT; Stothers and Dietrich, 1984)

TVOntario was one of the earliest users of Telidon and EDUTEL represented the first Telidon teletext trial in Canada (DOC Press Release, April, 1982). The main problem with the videotex service was the long distance communications charges incurred by schools accessing student guidance information from TVOntario's main database. This was the main reason for the service being discontinued. With respect to the teletext aspect, although schools were not charged for this service, complaints were made about the lack of adequate content. As well, as the technology was first generation at the time, the teletext receivers functioned and provided clear pictures only 30% of the time. (Read, June 7, 1990)

7.10.5.15 WETA/ ALTERNATIVE MEDIA CENTER

The WETA teletext test was a research project designed and managed by New York University's Alternative Media Centre (AMC). It was working in conjunction with the

Public Broadcasting Station (PBS) WETA in Washington, DC (DOC, Brochure, May 1981). Telidon on WETA officially began June 24, 1981 (Alexander, 1981). It was designed as an experiment to evaluate the public's reaction to teletext and was not a trial to establish commercial viability (Alexander,1981; EAT) As well, technical difficulties of teletext in the Washington area were assessed and attempts were made to solve as many problems as possible (Storey, May 31, 1990).

In September 1982, the AMC concluded its role in the trial and turned over operational control to WETA-TV who in turn operated a VBI teletext service to 20 public locations (DOC, Telidon Trials & Services, 1983).

7.10.6 OVERALL RESULTS OF THE FIELD TRIALS

Most companies involved in Telidon in the early days (the first two years) spent more time doing missionary work i.e. conveying the word of Telidon, than they would have preferred (Lane, Videotex Canada, 1983).

Domestically, the trials increased public awareness through media coverage, trial participation and interaction of the public with public access terminals (Cantel, BC Tel, Teleguide applications) (Booth and Wills, August 1983). Internationally, the trials helped to establish Telidon as an integral part of the NAPLPS standard by being actual proof of the technology in use (Booth and Wills, August 1983).

Overall, Wescom consultants considered the most important result of the trials to have been an appreciation of the merits of targeted application-specific databases (e.g. agribusiness with Grassroots) (Foote, 1984). On the negative side, trials were intentionally unrealistic at times as they often did not charge for services and were geared to technical concerns (Foote, 1984). As well, a very important complaint deals with the content of the trial databases. Most participants agreed that information was enjoyable, interesting and

SOMEWHAT useful; however, there was concern that there was not enough information offered. Opinions were expressed that the database as a whole should be more extensive and comprehensive. (Booth and Wills, Vol.II,1983). Users were disappointed if information was not constantly updated and this was due to the expectations that Telidon as an electronic medium was designed to offer substantial benefits over printed material such as rapid online updating and modification (Booth and Wills, Vol.II,1983).

Overall, field trials served to create and develop a videotex industry within Canada. They served to test various applications and eventually led to a change in the major focus of the services from the mass consumer market to the specialized niche markets. A few field trials developed into operational services and are still viable businesses today. Finally, there has been a resurgent interest in videotex in Canada as evidenced by ALEX's consumer videotex service introduction in December 1988 in Montreal. New videotex services now have the benefit of past experiences to guide them.

7.11 USER ASSESSMENT

7.11.0 ASSESSMENT METHODS

Qualitative measures of the users' preferences for content, based on the total number of accesses or "hits" to each sub-IPs page set and actual user session length was provided by tracking data from statistical software packages installed in trials. Qualitative assessments of specific content categories were provided by user evaluations. Measures included: attribute ratings of the information, reasons for accessing information and perceived utility and value of the information over a time interval (Booth and Wills, Vol.II,1983).

The quasi-experimental approach was used in field trials; however, this approach is more appropriate for evaluating responses to equipment performance, productivity, technical

capabilities, networking, management provision and costing than for assessing socio-psychological impacts and implications (Booth and Wills, Vol.III,1983).

7.11.1 PROBLEMS ASSESSING EFFECTS

In most cases, trials lasted between six and eighteen months with measurements scattered throughout those periods often in an ad hoc manner. Thus, the ability to attach any degree of confidence and reliability to the findings, particularly those dealing with social issues, is questionable . The most fundamental problem, however, was the reluctance by Service Providers to observe the fundamental rules for providing a control and test group for evaluation . There was little concern shown for the time required for such things as learning effects to emerge. (Booth and Wills, Vol.III,1983)

The results of the trials can be considered descriptive of particular situations at particular times within a particular context but it would be highly suspect to extract from this data general findings which could be used to substantiate social impacts (Booth and Wills, Vol.III,1983).

7.12 ECONOMIC FACTORS

The severity and longevity of the economic depression which swept through the Western world in the early 1980s was perhaps the most relevant factor underlying the failure of several Telidon program components to achieve their objectives . In retrospect, videotex arrived at the wrong time for a mass penetration of the new media market to occur . The natural consumer and business reluctance to shift and radically modify existing media practises in the direction of new electronic choices combined with general economic uncertainty put a damper on Telidon's growth. (Foote, 1984)

The recession left many ambitious marketing plans in disarray or in abeyance. Sales of new products still in their infancy and thus, highly priced, often suffer during a

pronounced drop-off in employment, disposable income and new investment. (Foote, 1984) It was most interesting to note that very few of those interviewed mentioned the recession as posing a difficulty to Telidon's development. As well, very few reports have dealt with this significant worldwide factor. The program should be given credit for attempting to stimulate a new, high risk technology industry in the midst of a worldwide economic downturn. The fact that a small subset of the industry participants still operate or develop Telidon/NAPLPS services or products today is recognition of some success in establishing a videotex industry.

7.13 CONCLUSIONS

7.13.0 OVERALL ASSESSMENT OF THE TELIDON PROJECT

It would be unrealistic to expect total success in an undertaking as complex and multifaceted as the Telidon program operating as it did in a high risk competitive global environment during a recession (Foote, 1984).

The program's success was far from obvious. Terminal diffusion and pricing levels varied widely from the established goals. Consumer and business acceptance was minimal with extremely modest revenues to compensate for the early capital-intensive investment. Content development was significant in a statistical page volume sense but it was limited in specialized application areas with little in teleshopping and telebanking. The CVCC compiled only a mixed record of occasional accomplishments amidst a great many meetings and a multitude of deliberations. (Foote, 1984)

Environmental conditions were difficult in many respects. The general economic conditions and corporate investment climate were depressed. The international market experienced increased competition. As well, the major hardware and software retrofit modifications hindered technological developments. There was a natural consumer

resistance to new media and the resultant slower-than-anticipated market penetration. Finally, the political arena concerning regulatory uncertainty and federal expenditure restraint affected decisions whether or not to become involved in this new industry. (Foote, 1984)

In the face of these and other factors, the program accomplished a great deal. While none of the program's components' goals were completely fulfilled, each achieved a certain level of success. Government funding coupled with that of industry contributed to the creation of some 1200 jobs of which the majority were permanent (CBC and DOC, 1986). Overall, this program was successful in consolidating the North American market's support behind Telidon (NAPLPS) by laying the foundations for growth (Foote, 1984).

7.13.0.0 ATTAINMENT OF GOALS IN COMPONENTS

The question of whether or not the Canadian Telidon industry was profitable without government assistance remains unclear (Peat Marwick and Partners,1985); thus, whether or not the goal of creating a COMPLETE (meaning free from government support) Telidon industry was met remains unanswered.

Despite the early optimistic forecasts and the enthusiastic promotion of Telidon penetration for the residential market, this market segment was definitely not profitable. Related home computer service offerings such as NABU were not profitable and several US home field trials found it difficult to assemble a service which attracted enough consumer and advertising revenue to cover the capital and operational costs (Peat Marwick and Partners,1985). Only recently with ALEX has consumer videotex made a return to the Canadian scene.

The planners and directors of the program set unrealistic objectives in several important hardware and financial areas, most notably, with Telidon terminals deployed, revenues, pay-back and profitability threshold (Foote, 1984).

The final phase of the program, the Exploitation Phase, reflected a maturation and rationalization of short term goals away from these grandiose goals of mass terminal penetration and huge databases catering to the interests of everyone towards the creation of videotex content in the specialized applications in business, schools, governments and eventually, the home. (Foote, 1984)

7.13.0.1 INFORMATION SHORTFALLS

Information shortfalls were the major reason for the inconclusive results of the field trials. Some shortfalls are listed as follows: (Foote, 1984)

1. The volume, disposition and timing of corporate investment during trials in preparation for commercial marketing was not well known.
2. Little cost-revenue analysis was conducted.
3. Pricing structures and the levels favoured by consumers were rarely ascertained in trials.

Technologically speaking, Telidon is very well documented with its merits universally known and accepted. Telidon/NAPLPS remains the world's state-of-the-art, leading videotex technology. (Foote, 1984)

7.13.0.2 MARKETING FOCUS

In retrospect, the government's focus on marketing Telidon as a home computer was inappropriate due to the high costs of decoders, the lack of software and Telidon pages to maintain consumer interest and the relative ignorance of consumers regarding the potential value of Telidon in the home. (Abt Associates, 1985)

7.13.0.3 MARKET PENETRATION

Despite the merits of NAPLPS, acceptance abroad has been slow. Herb Bown (the Father of Telidon) believes the answer lies in "vested interests". This means that most other countries have their own coding systems and want them to advance in the world marketplace. Minitel in France is a good example as, although its capabilities are limited compared to NAPLPS, France continues with it as it is a home grown technology. (Bown, May 24, 1990).

However, there is hope that the new data transmission system known as ISDN (Integrated Systems Digital Network) will provide a 20-fold increase in data transmission speed over present systems. NAPLPS' advantage is that it can still work with this system (Bown, May 24, 1990) due to the foresight of the inventors in specifying Telidon's basic design features. This would eliminate complaints of slow waiting time for image generation and large memory information retrieval.

7.13.0.4 PROGRAM MANAGEMENT

The program tended to operate under severe time constraints imposed under terms of Cabinet votes and the stiffening international competition (Foote, 1984). There was a constant tug-of-war between the politicians and media who wanted to see immediate results and the technical people who accepted the reality of the normal evolution and adoption of a new technology. Compromise was often the result of negotiations between the two sectors; however, this entailed reducing the scope of some plans initially deemed essential or the elimination of certain activities altogether. For example, the wide variety of associated project tasks undertaken (some diversification was for purely political reasons) often fell on the research group that first developed Telidon as they were essential to its continuing progress. Consequently, some planned R&D for advanced Telidon

enhancements was deferred because of manpower, funding and time limitations (DOC, Program Evaluation Branch, 1988).

7.13.0.5 PUBLIC AWARENESS

Public awareness of videotex in general and Telidon specifically remained low despite abundant publicity and media coverage regarding the new technology's potential. This could be due to the fact that public knowledge and understanding of new media is usually limited by experience and by the innate resistance to innovations and changing formats in information display and retrieval. (Foote, 1984)

7.13.1 OVERALL BENEFITS TO USER

An important criteria influencing the success of any new innovation is the ability to demonstrate a relative advantage over competing services and to offer a "net" benefit to the user in terms of such factors as convenience, speed and dollar savings. (Booth and Wills, Vol.II,1983)

In the field trial evaluation, it was often difficult for users to compare Telidon to other sources in an objective manner because they viewed Telidon in terms of its potential capabilities (as this was how Telidon was usually promoted) rather than on the basis of its actual or current offerings. Users felt Telidon did not offer major advantages over other sources of information and one of the major shortcomings was identified as the cumbersome search procedures (Booth and Wills, Vol.II,1983). There was a need for standards to be developed for content with respect to the interlinkage of services, gateway technologies, classification schemes, search procedures and database maintenance. (Booth and Wills, Vol.II,1983)

7.13.2 IMPROVEMENTS FOR THE FUTURE

Certain developments were suggested as being critical for market take-off and many have already been implemented: (Booth and Wills, August 1983)

1. The need to develop interactive services. (Now accomplished with ALEX)
2. The need to enhance capabilities and possibilities for electronic banking. (ALEX offers a CIBC banking service)
3. The need to develop more effective public services. (Not done yet)
4. The need to reduce the price of hardware for IPs and end users below $1000 and preferably between $300 and $600. (Norpak sells decoders for $500-600 now but this is still considered too high for mass consumer acceptance. ALEX terminals now rent for $7.95 a month and if the payback period for Bell was 2 years, this would imply a terminal cost of only $190.)
5. The need to provide incentives for the investigation of new applications focusing on content. (The CDP was the initiative for this)
6. The development of an international export potential of Telidon tied with other high technology products. (Possibly- The telesoftware PC-based consumer service Prodigy uses NAPLPS software for the graphics creation)

8 DATA ANALYSIS

The method of analysis used was pattern matching logic. This technique allows the comparison of empirically based findings with those of the theoretical propositions. The research propositions dealt with patterns predicted to occur. The research compared the patterns that actually occurred from the interviews with those that were predicted. Differences and similarities were analyzed and explanations were provided for the deviations.

The fundamental comparison between the predicted and the actual pattern involved no quantitative or statistical criteria. There was no precise way of setting the criteria for interpreting if a pattern had been matched nor does a rigorous definition of a pattern exist. Instead, the analysis required the interpretive discretion of the researcher. Caution was taken by the researcher not to postulate very subtle patterns. Ideally, one wants to conduct a case study where outcomes are likely to lead to gross matches or mismatches, and in which even an "eyeballing" technique is sufficiently convincing to draw a conclusion. This was possible in a few propositions as will be presented later.

Methodologically, the thesis is different from most theses. The structure is similar regarding the area of study, findings from the literature, limitations, and the conclusions and implications derived from the research. However, the methodology is specific to case study research i.e. research propositions instead of hypotheses and the data findings will not include the customary statistical tables as the results are mainly qualitative in nature.

An analysis of the chronological events of Telidon's development and implementation was conducted (see Analytical Chronology section). This was a special form of time-series analysis (Yin, 1989). This arraying of events allowed the researcher to examine some relevant "How" and "Why" questions about the relationship of events over time. (Yin,

1989). In this case, the outcome of the Telidon program was described and critically analyzed.

The descriptive approach involved documenting the events involving Telidon and organizing this information into a database format which future researchers can access. This database can be used for future research in order to develop hypotheses that will be causal in nature. It is composed of the previous analytical chronology and of a brief summary of each interview which will be presented next.

8.0 INTERVIEW SUMMARIES

The purpose of this section is for information's sake only. The researcher's goal was to establish a small database of the participants' responses to the underlying question of this thesis: Was Telidon a success or a failure?. Not surprisingly, there was no simple answer to this question which causes one to wonder whether or not this is an appropriate question to ask. The majority of the respondents stated that the Telidon program was a success in some respects and a failure in others. Often, an absolute success or failure answer was not possible without qualifying statements attached. Thus, the following summaries briefly present the experts' opinions.

NAME: Robert Baser
PRESENT EMPLOYER: Department of Communications
EXTENT OF INVOLVEMENT:

His involvement in the Telidon program began in early 1979. He had been working for a number of years for the CRC in the computer systems development area. He was responsible for database development and worked closely with Bell Northern Research to develop software to work with their Vista field trial. There was also an involvement in the Public Initiatives Program.

SUCCESS OR FAILURE:

We overreacted to what seemed to be a big new technology and market. We were wrong about the market but not about the technology. It is a tantalizing idea for transmitting information and we need this technology So, what form do people want the information in?

To sum, once this form is established, the technology has already been successfully developed to implement the future applications.

NAME: Herb Bown
PRESENT EMPLOYER: IDON Corporation
EXTENT OF INVOLVEMENT:

He is known as the "Father of Telidon". That is a strong indication of the extent of his involvement in the program i.e. he was involved in all aspects. Herb began at the Defense Research Telecommunications Establishment (DRTE) which then became the Communications Research Centre when it became part of Department of Communications in 1969. As part of the technology transfer part of the program, Herb was transferred to the private sector to the main hardware manufacturer, Norpak, in 1981. Tnen, in 1983, he left Norpak to start his own firm called IDON Corporation.

SUCCESS OR FAILURE:

Telidon was a success. There were 30-40 companies that got started by applying the technology. There are opportunities when a new technology is developed and there are time frames and opportunities associated with an introduction. Look at the evolution of coding methods which are assigned to everything from morse code through to ASCII- these all took 15-20 years before they became used by industry. Why should NAPLPS be any different? Currently, there are a larger percentage of Canadian companies involved in videotex than what you would normally expect given the size of Canada versus the United States. The reason for that is because of the government program and the activities that spun off from the Telidon program. We are definitely one of the leaders of this technology today.

NAME: Barry Brisco
PRESENT EMPLOYER: COM:PORT International
EXTENT OF INVOLVEMENT:

His involvement began in 1980. There were two companies involved: COM:PORT which was the marketing distribution company for Microtaure, the text-related software development company. They were selling software emulators for PCs in 1984 which the Times Mirror trial used.

SUCCESS OR FAILURE:

Telidon was a very significant success. It was a failure from the point of view that it will take 15 years to mature when it should have taken 10 years. Mainly due to the misunderstanding of what the technology meant and what its role was. People thought it was for the consumer mass market.

The standard developed under the research component of the program is very well designed and thought out. The standard could not have been developed as a non-proprietary standard outside of the government and one of the strengths is that it is not proprietary- it is available to everyone like ASCII.

The government invested time and money in their own technology and today, it is important to understand that Telidon is destined to be one of the most important information technologies of the next decade or two. The reasons for this claim are as follows:

1. We are almost at the point where we have conquered the US with consumer and business systems using NAPLPS and 2. The Far Eastern countries; Japan and Singapore are very NAPLPS committed.

NAME: David Carlisle
PRESENT EMPLOYER: Acuma Videotex Inc.
EXTENT OF INVOLVEMENT:

He got involved in May 1979. He was recruited to be the President of Infomart which was a joint venture of Southam and Torstar. Infomart was a major player in the Telidon program (see Company case study for details). He was responsible for establishing Telidon in the US through a subsidiary set up in Connecticut. Infomart was also instrumental in the standards negotiations for NAPLPS. In 1983, Mr. Carlisle left Infomart.

SUCCESS OR FAILURE:

Telidon is the most efficient way to send images from A to B. It is the only major coding system that is machine independent and thus, it is inherently successful. What people do with it is another problem. The initial efforts of the Canadian government to get Telidon established as a standard for Presentation Level in North America were entirely successful. It is only because of the failures of Viewtron and Gateway in the US that the French have had an opportunity to re-establish more of a foothold in the US. I do not think they will survive.

NAME: Jim Carruthers
PRESENT EMPLOYER: Norpak Corporation
EXTENT OF INVOLVEMENT:

Dr. Carruthers joined Norpak in 1982 to run the engineering department. He took over as President in 1985 at which point Norpak restructured and focussed more on teletext rather than videotex. The strategy was altered to focus on low volume, high value added items that took advantage of the engineering expertise of the company.

SUCCESS OR FAILURE:

Telidon was a failure because it was an unabashed publicity non-thought based program.

NAPLPS is a success. I believe NAPLPS will be the standard of systems around the world and we are working to ensure that this will happen. The success we are making is evidenced by Alcatel of France incorporating the NAPLPS standard in their French systems.

NAME: Professor David Coll
PRESENT EMPLOYER: Dept. of Engineering, Carleton University
EXTENT OF INVOLVEMENT:

In the 1960s, Dr. Coll was working at the Defense Research Telecommunications Establishment in a Communications Research Group. The program that existed at DRTE was transmitting an interactive image communication system using narrow band lines (telephone circuits).

In 1967, he moved to Carleton University and in 1971, the wired city simulation laboratory was developed to deal with character generation on TV sets. From there, his interest in Telidon developed and he was involved with a consulting company, Phillip A. Lapp Limited. Dr. Coll held seminars dealing with Telidon and collected a large amount of information from the industry participants.

SUCCESS OR FAILURE:

The concept of Telidon: the ability to access a database with images, is totally alive. It is a good idea. However, Telidon itself was a failure.

The most salient reason for failure was the lack of a market for information. As well, it was never clear whether the DOC role was to create the technology, establish a world of information systems in which Telidon would be used, assure Telidon's future by establishing it as a world standard or whether market forces should rule to accept or reject the idea. Finally, the standards strategy of DOC dissipated the technical efforts and drained the project of its brilliant technical leadership- the small group of original inventors were involved in all aspects: invention, design, debugging, contracting, standards and marketing as well as promotion and selling of the concepts.

NAME: Larry Dworkin
PRESENT EMPLOYER: Dworkin Communications
EXTENT OF INVOLVEMENT:

Mr. Dworkin was responsible for the public relations of the Telidon program, particularly Norpak's system, in Canada and the US.

SUCCESS OR FAILURE:

Telidon did not work so it was a failure. While theoretically the technology works, the field trials uncovered many bugs. The system was too slow as an example. It obviously had some commercial applications. However, the overall program was not a success. It was probably doomed from the beginning because Telidon did not have the typical success stories (those that have a bottom line to them i.e. XYZ Corp. saved this amount of money by using the system) to promote. It did not have a standard kind of marketing; instead, industry and government just hoped it would take off because the technology was so good.

NAME: Jim Feeley
PRESENT EMPLOYER: IDON Corporation
EXTENT OF INVOLVEMENT:

Mr. Feeley entered the Telidon program in 1979 from Algonquin College. By 1981, the responsibility for the program rested with Mr. Feeley and William Sawchuk of the CRC. He was in charge of the administrative aspect (heavily involved in the field trials) and was involved in the Office Communications Systems program. In 1981-82, he was a DG of Informatics Applications Management. He ran the Exploitation side of the Telidon program until the end of 1983 when he left the government to work for IDON Corp.

SUCCESS OR FAILURE:

> If your attitude is that it takes 30 years to introduce any technology into society, then you could say that the Telidon program was a success because of the jobs it created, of the prestige it has given Canada, of all the companies who exist mainly or solely because of the experience they gained and the services and software developed.
>
> The government tried to move the technology more quickly than society was willing to buy into. The introduction of technology into society is a 30 year cycle and this is a time frame you cannot force feed.

NAME: Robert Fitzgerald
PRESENT EMPLOYER: Norpak Corporation
EXTENT OF INVOLVEMENT:

He was involved initially with the CRC in 1978. His responsibility was attending standards meetings, working with standards bodies to come up with a standard transmission through the TV channel which is teletext. In 1981, Mr. Fitzgerald moved to Norpak as part of the government's technology transfer strategy and continues to work there in the teletext aspect.

SUCCESS OR FAILURE:

> The teletext version of the Telidon technology was a success as evidenced by the decisions of the marketplace. The EIA compared the French Didon system, the UK system and Telidon in order to recommend a system to the FCC as being the standard for the US. With three standards to choose from, it was decided to allow the marketplace to decide. CBS was responsible for the Canadian teletext version being accepted as they had trials with both the French and Canadian technology and concluded Canada had the best technology. CBC then followed with their own trial based on Telidon technology (IRIS); thus, the marketplace effectively decided that Telidon was a success through the marketplace's adoption of it.

NAME: Roger Hough
PRESENT EMPLOYER: Communications Sciences Research Corporation
EXTENT OF INVOLVEMENT:

Mr. Hough was involved in the consulting aspect of the Telidon program, most notably in the market demand forecasting area. The well known report written in 1980 forecasted demand for Telidon terminals for the period 1980-1990. This was considered a conservative report at the time. This report was not well received due to the great optimism regarding Telidon's potential. However, reality has shown that even these estimates were overstated.

SUCCESS OR FAILURE:

Telidon was a failure. There was a huge concentration on the technology itself and the idea of graphics over a phone line was so imbedded in people's minds that the thought of whether it was useful or not never occured to people. Telidon as it was developed at the time was not viable in North America. People were not willing to sit still and wait for information to be displayed.

NAME: Cathie Irwin
PRESENT EMPLOYER: Bank of Montreal
EXTENT OF INVOLVEMENT:

The BOM was involved with Telidon as a service provider for Infomart's Grassroots service. Around 1983, ATMs had shown great success and there was a feeling within the financial industry that customers were now willing to accept telebanking services. A limited banking service was offered. As well, another trial was attempted with banks in the US using AT&T terminals. The overall results of the trials provided good research into pricing issues.

SUCCESS OR FAILURE:

Involvement in Telidon as a pilot was a success but from a financial bottom line point of view, it was not. Telidon was ahead of its time. You have to provide a service that customers perceive to be value added (it must have value over and above the regular service they get from the bank). Telidon was not perceived as having a high value.

NAME: Peter Jordan
PRESENT EMPLOYER: Microstar Software Inc.
EXTENT OF INVOLVEMENT:

Mr. Jordan was at Systemhouse in charge of assessing new technologies when he discovered Telidon. He saw it as useful for engineering applications (e.g. transmission of drawings and circuits, for MIS systems where graphics were used). Deciding that hardware was not the enduring feature of videotex, he developed a Telidon decoder for PCs. In February 1983, Microstar was formed.

Microstar was involved in every field trial undertaken at the time; thus, giving it a foothold in the videotex industry.

SUCCESS OR FAILURE:

The government's involvement was warranted. Someone has to promote new concepts and ideas. NAPLPS was beautifully designed and it is here for the long term.

Those who focussed on Telidon as a TOOL were successful. The whole trick in the industry is to remove the NAPLPS context as the focus on NAPLPS caused misconceptions as to what Telidon really was i.e. a graphics protocol. As well, the focus should have been and is now on the software for PCs as hardware will never be the route to success. That is why Microstar is a success- the proper strategy was followed.

NAME: Professor Pierre Juneau
PRESENT EMPLOYER: Department of Communications, Université de Montreal
EXTENT OF INVOLVEMENT:

Mr. Juneau held the position of Deputy Minister at DOC in the early days of the Telidon program. He was a strong supporter of this technology due to its capacity to transmit information graphically and the possibility that it would be used for mass media to process complex information to large groups of people. He was always concerned that media could rarely transmit complex information to large groups as the mass media (television, radio) tends to impart information by dramatization. His main role was in persuading the government through Cabinet to support Telidon.

In the summer of 1982, Mr. Juneau left DOC to become Chairman of the CBC. He had only a minor involvement in CBC's teletext trial- Project IRIS.

SUCCESS OR FAILURE:

It was not a business success. The market demand was not there for the technology. Telidon was ahead of its time. However, a positive note is that a videotex industry would not exist today if it were not for the government's leadership- this was essential.

NAME: John Kelly
PRESENT EMPLOYER: DVS Communications
EXTENT OF INVOLVEMENT:

Mr. Kelly was not a supporter of the Telidon concept. He was involved in a broadcast service that was closer to telesoftware than teletext. NABU was the firm established in 1980 to offer this service to consumers and it lasted for 2.5 years. NABU was a software broadcaster to PCs whereas Telidon was strictly an alphanumeric process of keeping graphics in a computer and then trying to develop businesses around it.

Telidon was not created for a broadcast environment but for an on-line environment in which telephony was the basis for communications networking. NABU was based on a broadband basis where a whole cable channel was dedicated to communications. Telephone, until fibre optics arrives, does not have a broadband delivery capacity.

NABU did not need Telidon to create images because they were delivering software to the memory of one's disk and the user would work from that point.

SUCCESS OR FAILURE:

Telidon had two problems: 1) creation costs for the average screen was very high and still is compared to other technologies and 2) the presentation style was too slow. The technology has been obsoleted by photodigitizing in that creation costs of a Telidon approach to graphics is extremely expensive and time-consuming.

NAME: Philip Kinsman
PRESENT EMPLOYER: Department of Communications
EXTENT OF INVOLVEMENT:

Mr. Kinsman became aware of Telidon while working at the Citizen newspaper. In 1980, he had been philosophizing about the future of newspaper and thought Telidon would possibly fit into this. He joined the Department of Communications in 1980 with the

responsibility for public relations and marketing with some involvement in database design and development. During the period 1980-1982, Mr. Kinsman was working on Telidon full-time after which time he worked on other files along with the Telidon file.

SUCCESS OR FAILURE:

Telidon is still alive and well. It is starting to come back and it was ahead of its time when first introduced. People are more computer literate now.

It was naive to think we could have a hardware industry. Electrohome and Northern Telecom perhaps had the capacity for large production but were not interested at the time. The software industry was appropriate and we are still developing good software as a result of the work we did with Telidon.

We did not know where Telidon was going to be used. Things started to improve when we asked what it was supposed to do. We knew it could work in public places and in specialized databases which needed graphics capabilities such as the stock market. However, we never quite ascertained what it could do for the average person.

Now, ALEX is back and Bell has the results of their involvement in Telidon and with Prestel to guide them.

NAME: Leo Lax
PRESENT EMPLOYER: MITEL Corporation
EXTENT OF INVOLVEMENT:

In 1978, he was involved in a project at the Royal Military College (RMC) which involved the transmission of graphical information from the CRC in Ottawa to RMC in Kingston. That was the beginning of the technology which was different then- this dealt with Graphical Task Instructions (GTIs) which were the predecessor to Telidon's PDIs. The years 1978-1981 were spent on the project working with Herb Bown's group in modifying and improving the definition of these GTIs.

In 1981, Mr. Lax left the military to join Norpak as Engineering Manager. He stayed with Norpak until 1984 working on the evolution of what became NAPLPS. As well, he was responsible for [illegible] es to the government for the field trials and worldwide.

SUCCESS OR FAILURE:

The Telidon program was a success. It established the technology, developed expertise in the country that did not exist before and certainly made Canada a strong and visible nation in the standards making bodies. It has met those national objectives. As a program to develop new industry, it was a failure. An industry focussed on Telidon did not evolve. However, the technology and knowledge base that was gained through the funding of this program now exists in various forms in today's activities.

NAME: Yun-Foo Lum
PRESENT EMPLOYER: Communications Research Centre
EXTENT OF INVOLVEMENT:

Dr. Lum was extensively involved in the standards negotiations from the very beginning. He was instrumental in the 699 standard being accepted by the CCITT in 1980 and in the establishment of the joint ANSI/CSA NAPLPS standard in 1983. He was and still is Chairman of the CVCC/CSA Working Group.

SUCCESS OR FAILURE:

Telidon was a success. We were successful in establishing Telidon as an international and national standard. The industry is now beginning to make use of it in applications. We were also successful in establishing a commercial venture: Grassroots is proof that there is a use for this technology; however, greater commercialization never occured under the program. As well, 200-300 permanent jobs have been created by the Telidon program.

NAME: Roy Marsh
PRESENT EMPLOYER: Communications Research Centre
EXTENT OF INVOLVEMENT:

Mr. Marsh was one of the early participants in the program. Mr. Marsh was involved in the standards process, the marketing aspect of the program and the field trials. Regarding the marketing/promotional aspect, he was involved in organizing and providing secretariat to the Marketing subcommittee of the CVCC.

SUCCESS OR FAILURE:

Telidon was a great success. We wanted to accomplish two things: 1) We wished to establish Telidon as a standard which we did successfully and that was published in December 1983 by the CSA/ANSI and was endorsed by the CCITT in 1984 as an international standard- it was one of three standards in the world. 2) We wanted to establish a viable videotex industry in Canada to support Canada's need for videotex services and to export products and services if possible. We also succeeded in that to a great extent. There are a number of companies in Canada who succeeded very well in this business and have stayed in business despite the fact that the market has not been as huge as initially predicted. As far as government investment is concerned, they have had this returned in taxes many times over.

Without the successes we had in building the industrial capability which exists in Canada today, it would have been much more difficult to produce ALEX. Bell would have purchased its terminals from France (Minitel) instead of them being developed and manufactured by Northern Telecom and Norpak. As well, content creation and software can be provided from Canadian companies.

NAME: Sandi McDonald
PRESENT EMPLOYER: Department of Communications
EXTENT OF INVOLVEMENT:

Ms. McDonald first heard about Telidon as a journalism student at Carleton University which led her to write her Honours paper on videotex- a marketing study. DOC hired her to promote the Telidon story in 1982. She was involved with a brochure produced by External Affairs as well as marketing Telidon at Videotex conferences. She was Manager of the DOC Telidon Information Program that was run by Philip Kinsman to promote Telidon.

SUCCESS OR FAILURE:
What we set Telidon up to be is not what we have in place today. You cannot say it was the success that we had envisioned but you cannot say it is a failure and that Telidon went nowhere. Elements of videotex have flourished in industry as the graphics capabilities have become specialized services that are being used.

NAME: John McLauchlan
PRESENT EMPLOYER: Independent Consultant
EXTENT OF INVOLVEMENT:

In July 1981, Mr. McLauchlan left BNR to start up a company called Faxtel Information to take advantage of the Telidon technology. His view of Telidon was different from most others. He looked at it as nothing more than a graphics communications protocol to provide graphics for business.

His involvement was writing proposals to the government to receive funding and the marketing of their applications- Marketfax and Telichart. Page creation and seminars on Telidon were services provided to increase revenues; however, the main focus was the applications for Telidon.

SUCCESS OR FAILURE:

Videotex is a success and I think that as the years go on, you will see videotex operations operational all over the world, especially in North America. From the videotex conference held in Toronto last May (1990), you can see many services being built in the US and being gatewayed together. We all expected the future to be here already and it is not. Mistakes were made on how to apply Telidon and expectations were very much beyond what they should have been (i.e. Everyone was to have a terminal and there was going to be the electronic wired city).

I believe in NAPLPS and the whole concept and I am thankful for what the government did with the IISP as we would not be here if it had not been for government involvement.

NAME: Mark Norton
PRESENT EMPLOYER: Securityhouse
EXTENT OF INVOLVEMENT:

Mr. Norton was President of the main hardware manufacturer, Norpak. He began at Norpak in 1972 and in 1975, work began with the Telidon inventors: Bown, O'Brien, Warburton, Sawchuk and Fitzgerald. They were working in common visual space communications and Norpak was contracted to develop the electronic tools required to conduct the communications. Mr. Norton was involved as President until 1985.

SUCCESS OR FAILURE:

> It was both. What has resulted is a small handful of key players that are still involved. Norpak is probably the most successful by-product of the whole program (Norpak received substantial government assistance- it received the majority of the hardware contracts for the trials).
>
> Telidon is one of those technologies that evolves. The technology was available but it takes 15-20 years for the market to be ready for it and if you do not take a chance and develop it, then you do not accomplish anything.
>
> One of the biggest failings of the program was calling it Telidon. That is symptomatic of the government's identity crisis that they had- they had to identify with the Canadian government rather than the marketplace. They should have always called it NAPLPS or NABTS and identified with the industry which we were trying to build in order to identify better with the customer.

NAME: Douglas O'Brien
PRESENT EMPLOYER: IDON Corporation
EXTENT OF INVOLVEMENT:

The predecessors to the PDIs, the GTIs, were originally developed in his Master's thesis written in 1975. He was working at CRC and in 1975, work began on Home and Business technologies. The advent of data communications into the office was starting. The GTIs were the command set to drive the terminals in a functional manner rather than a hardware dependent manner.

Thus, he was involved in Telidon from the beginning- the standards process, the marketing, the research and development and the field trials. As part of the government's technology transfer, he worked for Norpak but eventually left with Herb Bown to set up the firm IDON Corp.

SUCCESS OR FAILURE:

Telidon was a definite success but it did not live up to its hype. ALEX is proof that it was a success. Telidon's technical strategy was not ahead of its time. This strategy placed Telidon out 10 years in the future when the cost of memory would drop to the point where the technical approach taken would be viable. The technical strategy was long term whereas the public relations strategy was always tomorrow.

NAME: Dan O'Connell
PRESENT EMPLOYER: Faxtel Information Systems Limited
EXTENT OF INVOLVEMENT:

Mr. O'Connell's background is as a stock broker with Dominion Securities. He provided the financial expertise for the Marketfax application. He is currently working at Faxtel with the Marketfax application providing the core of the business.

SUCCESS OR FAILURE:

Telidon was a success in Faxtel's terms because we succeeded to the extent that we have. I don't think it was a success in the context of what people were thinking at that time (i.e. the mass market). Now, with ALEX and the developments in the US, they are running back after having learnt the bitter lessons of the past.

The failure part boiled down to the fact that Telidon was promoted as a vision of the wired world instead of the transmission technology which it was. This led to Telidon being perceived as something more complex than it really was. Now, industry is repackaging the technology and selling it as a graphics medium.

NAME: Bernard Ostry
PRESENT EMPLOYER: TVOntario
EXTENT OF INVOLVEMENT:

Mr. Ostry was Deputy Minister of DOC in 1978 when the Telidon program was introduced to the world. He has been called the "Executive Father of Telidon" as he was very instrumental in gathering Cabinet support for the development and growth of this technology. He believed that Telidon was an important product that would take some time to move beyond where it was (in the CRC laboratory) and this required government investment and support. He believed that the technology should be moved out of the labs to the private sector with the help of government as quickly as possible.

SUCCESS OR FAILURE:

If you were to ask a Canadian journalist or a politician, they would probably say Telidon was a failure. If you ask the same group of people in Japan about their technical failures including CAPTAIN, they would say it was not a failure. They spent the money and experimented with the technology hoping to achieve a certain success; however, they did not see success in the market but they learnt an immense amount from it. If you live in a society that learns from its "failures" then that is how you develop an attitude to science and technology that eventually works. You cannot have experiments with the basis that every experiment leads to

some profitable success. If we had this opinion, then we would have no science. Telidon has taught many people many things that were useful to them.

Technically, there is no question that it was the most clever and the best in the sense of the precision of the pictures. It is a superior system.

NAME: Douglas Parkhill
PRESENT EMPLOYER: Retired
EXTENT OF INVOLVEMENT:

The one person everyone told me to interview for the research was Mr. Parkhill. He was the Assistant Deputy Minister for DOC throughout the early years of the program and was deeply committed to Telidon's development in all areas. Mr. Parkhill was very instrumental in gathering political and financial support for Telidon. He was involved in the overall aspect of computer communications many years before Telidon and wrote a book dealing with this area in 1966 called "The Challenge of the Computer Utility". As well, he was Chairman of the main industry/government cooperation vehicle, the CVCC.

Today, he still believes that this was a noteworthy program and has written a large manuscript detailing Telidon's development and growth as well as dealing with videotex and teletext throughout the world. He is currently seeking a publisher to publish this story.

SUCCESS OR FAILURE:

In retrospect, the ambitious goals set in the early days of the program were largely unfulfilled. This does not mean that Telidon was a failure in the sense that the Avro Arrow program was. Everything did not collapse, we continued. There was an export market and there were other countries like Japan that adopted the standard. Canadian companies now sell on that basis.

The successes that did result are:

1) The model for government/industry cooperation i.e. CVCC
2) Canada's recognition in the international videotex scene.
3) The establishment of an embryonic industry.

NAME: Dorothy Phillips
PRESENT EMPLOYER: Communications Research Centre
EXTENT OF INVOLVEMENT:

Dr. Phillips was responsible for the Behavioural Research and Evaluation group that evaluated the Telidon technology with respect to user issues. Her involvement began in 1979 through the Home and Business technologies program.

The Behavioural research studied not only Telidon-related issues but the overall technology and user issues such as ease of access to information and graphics and their importance to users.

SUCCESS OR FAILURE:

The Telidon program was instrumental in initiating research on basic issues that were Telidon-related but that have been carried over to other technologies. Work is still underway dealing with access to information. Thus, alot of work arose directly from the Telidon program. The expertise gained from the program is benefitting other projects. One of the things that came out of the program and that was well beyond this program is what is happening now in Videoway with the firm Videotron. The Videoway system is interactive TV and they also have a teletext system that uses Telidon code.

NAME: George Piskor
PRESENT EMPLOYER: Cavalier Information Technology Systems Limited
EXTENT OF INVOLVEMENT:

Mr. Piskor first became involved in 1981 when he left Northern Telecom to resume consulting. He was involved in the marketing research aspect (report was written detailing forecasts for North America for 1980-1990), the IISP from the start to the end and he negotiated a Telidon international file with External Affairs- the consulate project and background management report.

SUCCESS OR FAILURE:

Telidon was successful in stimulating the market but it did not stimulate the market for Telidon. It got many people thinking about it and there were spin-offs that resulted. Norpak and Infomart began and started people thinking about geometric databases and international standards. Microstar began with Telidon and is very successful. There were many fallouts as out of 52 companies awarded IISP contracts, only 5 or 6 are currently operational.

If you measure Telidon before a vision of an information-based society, I think Telidon was very successful for the amount of money spent as many people started thinking about what was involved in actually applying the technology. It was probably a cheap price to pay for getting Canadian industry and the government to think about the importance of funding development and of participating in international standards development.

If you view Telidon as a protocol, it was 100% successful as it was accepted. If you look at the problems of 1981, the issues Telidon was addressing are taken for granted today: color screens, downloading, transmission speed. A suitable analogy is the X.25 protocol introduced in the 1970's which was one of the earliest generic communications. It took a long time to establish it as a standard, make the modifications and bring it to market. The X.25 did not take off until the mid-1980s which is a 15 year gestation period. Telidon has crystalized over time. It has developed appropriately.

NAME: Steve Prashker
PRESENT EMPLOYER: Geography Department, Carleton University
EXTENT OF INVOLVEMENT:

He was involved in applying the technology to cartography. A pilot project was attempted with Statistics Canada with the resulting information inputted to the Bell Vista trial's database. In 1983-84, he wrote software to generate Telidon pages- text and graphics pages, on a microcomputer. The Department had effectively developed a micro-based Telidon page creation system. Editing was straightforward with this system unlike some of the former page creation systems developed by Norpak. Software interface programs were also developed that took the existing digital outline of a map and converted it to Telidon format as well as allowing the addition of color theming based on select variables.

SUCCESS OR FAILURE:

> Telidon was not a better way of mapping, it was simply another graphics protocol. I think people became frustrated with time delays and the searching process which was cumbersome. Looking at the screen was difficult and there was a limited amount of text available per screen. Overall, it was nothing to get excited about.

NAME: Bruce Read
PRESENT EMPLOYER: TVOntario
EXTENT OF INVOLVEMENT:

Mr. Read has been Director of Engineering since 1981. In 1979, he was a consultant with TVO and assisted in organizing the first full scale trial of the Telidon system in the broadcast teletext mode and the videotex mode. He became part of the planning team that involved John Storey, Robert Fitzgerald and Herb Bown from the CRC for the TVO system.

SUCCESS OR FAILURE:

> I have a research background and I do not believe an experimental program that has a negative outcome should be described as a failure. It can be a failure if you set certain terms of reference and they are not met. (This is the case with Telidon and its initial objectives). However, if you stop experimenting because the last one did not work out, you should not be in the research business because you do not have the correct approach.
>
> Our trials were operational on a fairly large scale with government support. However, there was the problem of the ongoing operational costs of the videotex service which the schools could not afford. With respect to the teletext service, it had more complex technology that resulted in poor reception in 70% of the schools.

NAME: William Sawchuk
PRESENT EMPLOYER: Communications Research Centre
EXTENT OF INVOLVEMENT:

Being a researcher, Dr. Sawchuk carried out research activities that related to the technologies used in the Telidon program. This involved participating in the key coding which was developed and the associated hardware and software so that there would be prototype equipment for demonstrations. Most of his involvement was in research with additional duties in field trials. Specifically; the IDA project, the WETA/AMC trial and Bell's Vista trial.

SUCCESS OR FAILURE:

Telidon was ahead of its time. One has to consider the Canadian environment which was poor economically at the time and one of our goals should have been to just make people more computer literate in the sense of being aware of new technologies. The technology was developing as it was being used which was difficult however, technology in this area has stabilized to a degree where an international standard is established and services can be offered without fear of equipment obsolescence. I cannot state the eventual success of the ALEX service five years later but they did conduct considerable research in terms of services to be offered and the design chosen which led to NAPLPS being chosen as the superior technology which is indicative of its successful development.

NAME: John Smirle
PRESENT EMPLOYER: MITEL Public Switching
EXTENT OF INVOLVEMENT:

Mr. Smirle joined DOC around 1976 to work on the standards for everything- telephony, data, etc. in a secretariat shop for the CCITT. As a result of that effort, he was involved with Telidon standards negotiations from the beginning. His involvement was as a standards strategist and negotiator with the policy level people in the other countries who were behind the standards.

Later, his duties were expanded to marketing- the promotion and strategic alliances to help make the commercial side happen. Then, as part of the technology transfer aspect of the program, he was transferred to Norpak to work on the teletext side of Telidon.

SUCCESS OR FAILURE:

Both methods, videotex and teletext, are still percolating below the surface in Canada and the US. The technology has become a standard for a number of activities that are more specialized. It has become a system for Olympics information and the world standard for

generating maps because of its good graphics and text capability as examples. However, the home based applications have not developed.

Perhaps we will emerge triumphant. Bell is returning with ALEX and Northern Telecom is involved which is something that was wished for in the early days but for business reasons they did not judge the time to be right.

Overall, Telidon is neither a success or a failure. What has occured is part of the normal evolution of technology and markets.

NAME: John Storey
PRESENT EMPLOYER: Retired
EXTENT OF INVOLVEMENT:

In 1978, he wrote a short internal study for the CRC on teletext systems- the British and the French systems were compared. At the start of 1980, he was involved in the development of the actual graphics language and the PDI set that was submitted to the CCITT. His area of concentration was the teletext side of the technology; thus, he was involved in the TVOntario and WETA/AMC teletext trials.

SUCCESS OR FAILURE:

Telidon technology was and still is superior to other teletext and videotex systems and there is a success in this comparison. However, it is a failure due to its lack of adoption. It is not universal in North America. One of the main reasons for this is the FCC in the US rules on marketplace decisions instead of setting a standard. This hampered our entrance into the US which was very damaging. It was more than simply the market as there was a lack of interest from broadcasters.

NOTE: This answer assesses only the teletext aspect of the program which was the extent of his involvement. However, this answer is incomplete as it ignores the videotex aspect."

NAME: Jim Storm
PRESENT EMPLOYER: Shieldings Incorporated
EXTENT OF INVOLVEMENT:

Mr. Storm was involved through the company NABU where he was the Executive Vice President. NABU developed a home cable computer that would be resident in a home and receive its source of programming and information content from the cable network. Cable was nothing more than a high speed delivery device. NABU was criticized for not supporting Telidon.

SUCCESS OR FAILURE:

Telidon was too far advanced. The concept of trying to get that kind of graphical presentation into the home did not exist and this comes back to the concept of the wired city. People became carried away with the implementation of the wired city instead of asking if this was what the world was ready for.

As well, Telidon was not promoted as a protocol, it was promoted in the sense of database applications and database resources which were lacking and this approach is one of the problems that killed Telidon.

NAME: Frazer Taylor
PRESENT EMPLOYER: Carleton International, Carleton University
EXTENT OF INVOLVEMENT:

Mr. Taylor was heavily involved in the CVCC as Chairman of the Educational Sub-Committee. This sub-committee was an educational pressure group based on users in the educational sector. Schools were represented by the Ministry of Education. There was a linkage between computerization in schools and Telidon as a tool. Schools were becoming involved with micros and the two camps, Telidon and the micro, were related. His interest was looking at the broader aspect of computerized education (e.g. long distance learning).

As well, there was work conducted with Telidon as a new delivery technology for maps. Carleton was one of the first to use the technology in an application sense (1977-1978).

SUCCESS OR FAILURE:

Telidon was a small step in a continuing process. It was an example of a technology that was rapidly superceded by other technologies but it was good at the time for presentations. The results of the cartography work have been published and widely dispersed. These results are now being built upon by other researchers in the area of computerized graphics. Steve Prashker's work in the Dept. of Geography with Telidon and cartography was an early demonstration of what was possible.

NAME: Andrej Tenne-Sens
PRESENT EMPLOYER: Communications Research Centre
EXTENT OF INVOLVEMENT:

His involvement began in July 1979 as Manager of Field Trials for DOC. Duties involved supplying working equipment to the trials and conducting demonstrations at headquarters or at various places in Canada and internationally. The second position was as technical advisor. He left the program in 1983 to return to CRC.

SUCCESS OR FAILURE:

Telidon was a failure. The main reason the whole videotex technology did not prove to be a serious competitor to newspapers was that existing print media are inexpensive, provide more detailed images and are portable. I cannot see videotex for general information purposes being viable.

Telidon is not suitable for mass information; however, there are some specialized applications that make excellent use of its capabilities such as Marketfax.

Telidon would not have widespread success if it were introduced now or when it actually was. It will never be portable. Was it worth the millions spent in Canada? No- stock markets would still operate as well without the application Marketfax. In other words, the few instances where Telidon was found useful did not warrant the government effort expended.

NAME: Robert Warburton
PRESENT EMPLOYER: Communications Research Centre
EXTENT OF INVOLVEMENT:

Mr. Warburton was involved in the original group that came up with the concept. His activity was mainly in the area of systems support which entailed the configuration of systems to get them operational, writing system hardware routines and repairing systems. Duties also included interfacing with the users of the system who ranged in function from the system programmer to application programmer to certain scientists who were users of the system.

SUCCESS OR FAILURE:

Telidon was a big success. Not specifically for a number of the people involved in the early trials but there are a number of firms now making money with this technology. Often, the application of Telidon or NAPLPS is very successful because people have not associated that word with it. We developed a graphical coding scheme which was one component of a mechanism to interact with terminals and generate graphical information on the screen.

The protocol was standardized to provide long term longevity and flexibility of the data that is created as well as compatibility between systems for the users and the information providers.

8.1 RESEARCH PROPOSITIONS SUMMARIES

8.1.0 PATTERN MATCHING ANALYSIS OF RESEARCH PROPOSITIONS

The following section will present the findings of the interviews conducted for each proposition. All ten propositions will be presented on an individual basis. Note that each interviewee answered only those propositions that were relevant to the extent of their involvement in the Telidon program. Thus, for example, a strictly research oriented scientist would not have reliable information regarding the promotional aspect of the program.

The responses to each proposition have been kept in their original transcribed form for maximum authenticity. After this presentation, a summary of each proposition will be discussed.

8.1.0.0 RESEARCH & DEVELOPMENT PROPOSITION #1

A sole hardware firm was responsible for adapting Telidon equipment to the AT&T standard. It was proposed that an industry effort would have sped up the process and allowed Canada to maintain its technological lead.

Robert Baser	The ever changing specification was a problem. We had an initial standard to work with, then AT&T made Norpak, Electrohome and CRC COLLECTIVELY go back to the drawing board. It was messy as we had already bought alot of terminals for the trials;thus, we had to put the new ones in the field and do the conversion of the database material from the old to the new standard- new software to write. But, we ended up with a new protocol that was superior to the 699 and to win over the British and French, anything was good that made the standard more superior.
Herb Bown	Because Canada had to make the changes immediately, some Canadian industry participants had to redo their coding and hardware to be compatible with the new standard and this caused delays in the introduction/development of the technology. Companies beginning at the 709 level did not suffer; however, those starting at the 699 like Norpak did. It was a COLLECTIVE effort as many companies were involved in the standards issue.
Barry Brisco	AT&T's intervention did not hurt us at all. What hurt the Canadian industry was the significant dispersion that occurred. AT&T's approach had a core part that was well-defined and straightforward to implement but there were parts left open to interpretation. This dispersion resulted in incompatibilities between systems which presented a problem when trying to convince major national IPs of the multiple services and gateways and networks when dispersion made some services unavailable on some terminals. Industry did not cooperate effectively to manufacture compatible equipment. Bell has solved this problem by creating their version called ALEX NAPLPS and this has been set as a firm standard for the industry.

Jim Carruthers	The AT&T announcement made things crazy for Norpak. We were in the situation where we had the lead and it was given away. The technology was incompatible with the new standard and since we were already in the marketplace, we were faced with continuous engineering as the standard evolved. We had a continuing transition. The others could wait as they did not have a product base or an established position to continue.
Professor David Coll	Norpak was the chosen instrument. This decision had very far reaching effects on the success of the program or lack of success. Norpak was doing all the building.
Larry Dworkin	The AT&T announcement did not hurt the Canadian industry. This was required to allow Telidon to be accepted as the North American standard. AT&T did Telidon a big favour.
Peter Jordan	It was a frustrating experience for the hardware manufacturers but not for the software companies. We just added more software. It actually enhanced our position and hurt the hardware sector as that is where the upgrading problems occurred.
Leo Lax	Norpak was the key technology resource for driving alot of the standards negotiations. Norpak was pushing the Canadian implementation of Telidon. Norpak initially worked in conjunction with other companies, Electrohome, BNR and Microtel Pacific. Norpak was not the only company developing software. Norpak did alot of work to commercialize the benefits of the technology- it involved missionary work on trying to convince companies (IBM, RCA, SONY) that this particular technology had merits as a technology and then, to try to convince them that this particular implementation of the technology was the best. The standards bodies worked very closely with Norpak in defining the standard. CRC did a technology transfer with O'Brien and Smirle and Bown moving to work for Norpak. Overall, there was alot of cooperation in defining the standard.
Yun-Foo Lum	Norpak had nothing to do with the enhancements as the CRC made the changes to the coding. Norpak was involved in building the terminals based on the new standard. The two years to update the standard could not have been shortened as one had to go through the industry cycles of meetings and consultation to gain approval.
Roy Marsh	Norpak, Electrohome and Microtel updated their terminals to the 709 as quickly as possible. In the longer term, this did not matter as the micro was arriving and to change from one standard to another was not difficult. The hardware update was costly for those with existing 699 terminals. The problem was we should have known we would have to change. Anything that was put in place for the first time should have been viewed as a throwaway.

Mark Norton	There was a limited market and what the government was doing was encouraging as many people as possible to be manufacturers. They encouraged Electrohome and Microtel. The government's reasoning was to lower the terminal costs. To have more people working on the terminals to lower the price meant a more competitive supply. It was a concern that people buying terminals from only Norpak would pay a premium-plus price for them. Out of necessity, it had to be done this way as the Japanese were not interested in manufacturing small custom jobs.
Douglas Parkhill	We accepted the changes as the alternative was absolute disaster as AT&T might have gone with the European system. Also, we felt the process of retrofitting existing terminals to make them compatible with NAPLPS appeared relatively simple which in reality, it was not. The process of conversion took a very long time and the principal reason was not the technical difficulty of making the changes but the problem of agreeing on what the final standard was going to be. What happened was a series of evolving prototypes so retrofitting was constantly being done. The standard was developed jointly by the CSA and ANSI and this process is slow.
John Storey	Norpak developed the enhancements and did very well. This was the best route to go at the time as if one tried to coordinate all the firms in industry, it would have slowed things down more. Norpak was under alot of pressure to get things built and did this very quickly despite the standards delays. Norpak being a small firm allowed Norpak to respond quickly to some of the development needs.

8.1.0.1 RESEARCH & DEVELOPMENT PROPOSITION #2

Government R&D efforts were not properly focussed on the resolution of the NAPLPS standards issue. The introduction of the IISP stimulated the purchase of existing Telidon terminals at a time of confusion regarding standards. It was proposed that the government did not appropriately focus its energies on resolving the standards issue as evidenced by the introduction of the IISP.

David Carlisle	After the AT&T announcement, the process for the next 13 months was very difficult in terms of Telidon itself. Implementation of standards is not a governmental activity, it is done by independent groups called standards associations. There were ANSI and CSA; thus, a new set of players became involved who had to implement the resolution. Technicians were meeting in working groups in back rooms for months endlessly arguing about pixels and the government could not control this process; thus, the whole industry went on hold while this happened.
Jim Carruthers	The IISP came at a time when terminal standards had not been set and terminals were still too expensive so there was not the consumer demand. It was too early. The money now would be very well spent.
Leo Lax	The IISP was conceived earlier than the AT&T announcement (February 1981 vs May 1981). However, this announcement created an environment that made it politically smart for the government to settle this immediately. AT&T is a credible communications provider worldwide and their acceptance of the majority of the Telidon program was more significant than the changes they asked for. Technically, the changes were troublesome and they were hoping they would not have to do them but reality was the acceptance of their standard was the bigger news.
Yun-Foo Lum	I was concerned about how DOC was proposing to spend the IISP money. The money was scattered everywhere so no critical mass was achieved in any trials.
Douglas Parkhill	The IISP was introduced before the AT&T announcement. We had no idea of the standards difficulties that would occur. The program was put on hold as the money sat there, terminals could not be ordered because the standard was not set. It was a matter of waiting for the standard to be set.
George Piskor	DOC was committed to Telidon regardless of what was happening. We wanted to get people thinking strategically with field trials and how it was going to affect the marketplace. It was discussed very lightly to delay the introduction of the IISP but the function of strategic positioning encouraged DOC to say "Let's get on with Telidon!" as it was better in the marketplace to have 80% functionality than none at all. The French and British were marching ahead with richer budgets so we attempted to do the same.

8.1.0.2 MARKETING PROPOSITION #1

It was proposed that government funding was not properly allocated across all the areas important for growth. The areas that suffered from lack of funding included: Marketing and Field Trials with respect to content development, applications development and user assessment.

Robert Baser

Much of it was focussed on R&D (prototypes) for the first 3 years as we had to catch up with the French and British systems that were close to commercialization. The marketing arm set up during this time did not receive much money. The later $30 million which included the CDP was responding more to people issues. Thus, focus changed in 1983.

Barry Brisco

Government funding was useful for the research component in terms of the CRC developing the standard. The biggest problem was marketing. The companies had small, shallow pockets. We did not have the resources to go into the American marketplace on a large noticeable scale. For example, we have competed with France who injects millions of dollars into promotion. The support is often there for developing the technology but not for marketing it. The government runs the PEMDE program; however, it is not worth the time involved to submit a proposal for the money.

David Carlisle

Regarding overall government funding, the government did their best. Mr. Ostry, Mr. Parkhill, Mr. Juneau and Mr. Madden did their best to get what they could in terms of funding and allocated it in the best way possible. I disagreed with most of how they did it. The first $23 million: only a fraction gets to the private sector after funds are allocated to evaluation reports and outside consultants and research. They had to distribute the money fairly: economically, geographically, by industry, private versus public sector. There are political considerations and these took funds away from the businesses running services with the technology.

Jim Carruthers

Overall, the approach taken by the government was not wise in that they set out to foster a myriad of small companies and this is an unsuccessful approach. There is no national policy like the Japanese or Koreans. We continue to spread our efforts too thin. There was a way of concentrating our efforts in government as they did with an aerospace policy. There were people at DOC that realized they had to go for strength and select only a few companies. Out of that selection grew a Canadian industry. They did not cave into the political pressures of spreading the wealth around as they did with Telidon. Bell has spent more on ALEX than the government did on the whole program and the focus is on one service, not creating a whole industry as was attempted with Telidon.

Larry Dworkin

The government getting into business is what killed Telidon. A common phenomena in Canada: The government sets up a program to establish an industry; however, people know how to set up an organization that meets the criteria of the program precisely but the probability of the program existing beyond government funding is almost zero.

The government was throwing money at applications that people were coming up with rather than taking a hard look at some and seeing where the real markets were. Funds were not effectively allocated.

James Feeley — To make the program go we needed $100 M. The politicians decided we did not. I had convincing reasons for the budget but we were only given so much. All the areas suffered from lack of funding.

Peter Jordan — No funding was received from the government. Government funding of companies is the worst thing as it builds a cocoon in which business operates- it is not a realistic setting. Hardware was the focus of the government programs and even after the introduction of the IBM PC in 1981, they never let go of this focus. This was wrong as the PC market was growing rapidly.

Phillip Kinsman — Canadians have always been traditionally weak at marketing. We definitely could have spent 10-20-30 times what was spent.

The resources of the Telidon program had to be distributed to create a regional balance and social balance, between software and hardware. We ended up with alot of small projects across the country and never had the critical mass in any one company. I wonder if we were to do it in more pragmatic terms i.e focussed strategy of funding a select few, if we would have had a more successful commercial venture.

Leo Lax — The majority of the industry was heavily subsidized by the Telidon program. Equipment purchases (hardware), trials and actual commercial implementations such as Infomart's Grassroots were funded. The prime focus was subsidizing equipment purchases for implementations. As well, alot of money was spent on managing the standards activities through the various bodies and trying to make the Canadian standard the international standard.

Roy Marsh — Between 1978-1985, government spent about $55 M. R&D, field trials and applications received the bulk of the funding. The government is a very poor marketer and very little was done by government. Thus, no money was put aside for hard core marketing.

Sandi McDonald — Marketing funds: DOC, whose focus was mainly technical, had the lion's share of the funding for the first 4 years and then, External Affairs had the lion's share for marketing during the Exploitation Phase. This caused many bad feeling in DOC as DOC streamlined and External Affairs expanded.

John McLauchlan — We would not be in business today if it were not for the IISP. The funding was for terminals but perhaps it should not have been. Perhaps it should have been for the development of business applications. The terminals ended up putting money into the pockets of the terminal vendors. The idea was to get the terminal base that would access the services but someone had to develop the services. The government programs were hardware driven versus application driven. The reason Marketfax is not the success expected was due to lack of funds to market the service properly.

Doug O'Brien — R&D always needs more but it received a good portion of the funds. Alot of money went to political reasons e.g diversity of trials- putting in a field trial where anyone wanted to keep everyone involved and happy.

Dan O'Connell	The government should have funded marketing more. This area suffered as funds were not available. Marketing required alot of effort as sales were made through direct selling.
Douglas Parkhill	The concentration was on field trials. R&D was a relatively small part. In fact, it had a devastating impact on the R&D program at DOC because nearly all the funding and efforts went to the trials. The amount allocated to marketing was sufficient and there was never a lack of marketing money. Companies as well spent their own money on marketing.
George Piskor	The amount spent on marketing was quite substantial considering there were no professional marketers involved from the government.
John Storey	Government was very good in allocating money for field trials.
Bob Warburton	All areas suffered. We went a long way with the funds received but it pales in comparison with the European counterparts.

8.1.0.3 MARKETING PROPOSITION #2

It was proposed that the Telidon people should have first established Telidon in the home market before attempting to enter the international arena. The reason being that Canadian industry would have been more receptive to Telidon as it was a home grown technological effort. Once a solid base had been established in Canada, Telidon people could have focussed their energies on international markets with the strength of a Canadian base to support their efforts.

Herb Bown	We concentrated on both levels. The reason we had to go to the international standards arena so quickly was due to the British and the French attempting to get their standards approved as the international standard. You can only establish a home market at the speed that people can adopt things. The government used its program to do field trials to encourage the adoption of the technology in Canada. The IISP was used to develop Telidon on the home market. There are really only two groups in Canada who could introduce Telidon on a nationwide scale 1) the phone company 2) the publishing area-Torstar, Southam. Both gave Telidon a try and Bell was delayed with regulatory problems and Torstar withdrew after 4-5 years due to financial reasons.

Barry Brisco	There was focus on the US and Europe. The politics did not allow us to make sales in Europe (due to their vested interests). The Europeans had their own technology and their telephone companies were owned on a government monopoly basis. The focus for Microtaure and Com:Port was and is the US market which was large enough to adopt such applications successfully.
David Carlisle	It absolutely helped to have a running service (Grassroots and Teleguide) in Canada with statistics on them to support the efforts of getting contracts in the US. That was everything. That is how we sold the US- we sold applications not technology.
Jim Carruthers	The marketplace for the majority of Canadian firms is the US. The second focus is Asia and third, Canada. Norpak's business is mainly exporting. Americans adopt innovations quicker because they are more adventuresome. We are slow adopters of Telidon.
Peter Jordan	We have 75-80% of revenues from outside Canada as Canada is too small a market for any technological development to be used here- it can be developed here but to use it in mass market form is difficult. The majority of the trials that used our software were in the US: e.g. Gateway (Infomart).
Phillip Kinsman	In Canada, we were trying to develop the market through awareness. We were trying to get people involved to learn about videotex technology. The mass market was the goal and whether we could develop this in Canada was uncertain. Much effort was on the international arena and there was a natural reason for it to be there. The Americans, Germans and Japanese had not decided on a standard. The French and British were battling each other and had submitted their standard for approval to the CCITT. A true commercial battle emerged between the British, French and Canada. The standards issue established the focus on the international arena. We had a real problem with credibility in the States. We didn't have any trials here with the mass or commercial viability to say "This is our technology in use.". There were many terminals in the field but they were too dispersed.
Leo Lax	International seems like the major focus as the international activities are better documented than the national activities. The international issues were important from a national basis as there was national pride involved and being the nation who would have the dominant protocol would open the world market to all companies involved. Every national team was working very hard to ensure that their companies would have access to the standard.
Yun-Foo Lum	A Canadian standard, accepted internationally would exert a strong bearing on it being accepted nationally. This would unify the many videotex systems proposed for field trials in many parts of Canada.
Sandi McDonald	The international arena was all about standards and that was the entire focus.

Doug O'Brien	The government should have used Telidon internally. The other departments were not responsible for Telidon; thus, decided not to get involved. International focus was a reaction to protect ourselves from the European invasion.
Douglas Parkhill	The main focus of marketing was on the international market-particularly the US. In Canada, the industry was doing the marketing itself through the various field trials. Not a large sum of money was available. If we would have had a strong base in Canada to support our efforts overseas, Canada would have a greater international presence in the EC.
John Storey	Norpak found it very difficult in the foreign markets when Canada itself was not adopting its own technology.
Dr. Jim Storm	International was the focus and part of the reason was due to the people working in DOC's marketing area. They were trying to build an export market for Canada; however, the first thing that anyone asks is to show them where the system is running in the home country. They should have developed a home market and built on the strength of this home market.

8.1.0.4 FIELD TRIAL PROPOSITION #1

It was proposed that the focus of Telidon field trials was concentrated more heavily on technical issues (technical capabilities of Telidon equipment and modes of service delivery) than on user issues (content development, benefits to users, potential applications, market segments, users needs and wants).

Robert Baser	PIP looked more at the user issues, IISP was technical and the greatest amount of money went here so the majority of trials were done here.
Herb Bown	User and technical issues were both addressed but some focussed on one issue more than others- overall, a 50-50 focus. There were a number of technical things to be done. We did a number of different trials using different media to show the world that the Telidon coding was media independent.
Barry Brisco	They were looking at both technical and user issues but primarily the user side e.g. Will people use the services and pay for them?
Prof David Coll	There was no actual research done dealing with user interaction. Social scientists used questionnaires and opinion surveys but little analysis was done when the data was collected.

Larry Dworkin — The problem with the trials were they worked fine technically but the next step asking "Will people BUY the system?" was where the research fell flat. The trials absolutely focussed on technical issues more than user issues.

James Feeley — Mostly technical issues as a focus of the trials. There were not enough terminals to effectively test users. Most of the reasons for the trials were 1) to test the technical aspect and 2) to keep the phone companies involved because if they would make the committment then the government would be able to let the phone companies carry on after the government program ended.

Technical issues had to take precedence as you had to get the technology out of the lab in order for a system to exist. If you did not work on the standard and the technology, then you had nothing. You could always argue that people could develop content later but you cannot argue that they will develop the technology later if you develop content first. This is a main reason the CDP came as late as it did.

Cathie Irwin — We were testing customers usage of banking, particularly with respect to pricing. Customers did not seem to see much value in the service. Good pricing research did result from the trial and we were the only bank in Canada to do this.

Phillip Kinsman — The early field trials were technically oriented but by 1980, the focus was on what does the user want to see on the terminal.

Leo Lax — There were many groups involved in the trials so groups focussed on different aspects (user and technical). Norpak focussed on technical aspects: reliability, user friendliness, acceptability of the hardware within the home, ease of installation. There was another group involved in the capture of information- the ease with which the information could be retrieved from the existing news media and put into the videotex trial databases automatically

Sandi McDonald — The program was technically driven and driven by the standard. DOC is a technical department and because Telidon was its child, that was a limitation and it was very difficult to get outside the borders of technology and that is exactly what was required. Marketing was important; however, technology was King.

Doug O'Brien — There were no market trials, they were all technology trials. ALEX is a market trial.

Douglas Parkhill — As far as expenditures were concerned, until the Exploitation program, the technical issues were a focus as the technical problems had to be solved. You had to get hands on knowledge of how to run the network of a scale that had never been tried anywhere before. Also, we had to allocate alot of money on hardware because of the standards problem. We had to have the hardware first, otherwise, there was no sense in developing content as there would have been nothing to run it on.

Dorothy Phillips	User issues were not formally dealt with in trials. There was a Wescom study written that was out of the BRE shop. However, I never went to a field trial site to access how things were set up from a user aspect. The companies did their own assessment for the user issues but there was more focus on technical issues.
George Piskor	They focussed on technical issues and user issues in terms of what they wanted and where the market was. However, users were not brought in on any structured basis.
William Sawchuk	Both were addressed. There were user types of investigations from the user point of view on menu driven systems by the BRE (not done at field trial sites as per D. Phillips).
John Storey	Most of the trials **attempted** to focus on the user issues rather than the technical issues. However, in the initial years, the trials experienced technical problems and these had to be dealt with.
Frazer Taylor	The program was hardware driven with not enough emphasis on applications.
Andrej Tenne-Sens	Initially, the focus was on the technology. The focus shifted when the Exploitation program started in 1983.

8.1.0.5 FIELD TRIAL PROPOSITION #2

The greater the centralized coordination and cross comparison in trials, the greater the usefulness of the trial results.

Robert Baser	People came together to learn during trials to see if videotex would work so they needed feedback on acceptance. Surveys were done on a before and after trial basis with Vista and computerized statistical packages provided access pattern information too. Bell provided each IP with monthly statistics regarding the access patterns for their page set. That gave them feedback on the attractiveness of the service and how to organize information. Not all trials used this- the smaller trials did not.
Herb Bown	There were many committees (CVCC sub-committees) and alot of exchanging of results-TVO, Infomart and Bell were involved. There was a tremendous exchange of information in terms of what everyone learnt in these various trials.
Barry Brisco	I don't think they did it formally and that partially comes from the element of competitiveness between parties who were trying to put together a viable service. Also, it partially comes from the view that we are dealing with a very complex analysis as in "Why did a trial fail?"- there are many variables involved.
David Carlisle	Many people came to Infomart for information. There really were not much to the field trials. There was Vista, Ida, 50 terminals in New Brunswick however most were small and never amounted to anything.

Prof David Coll	By the time it came around to cross analysis of results, the program had died and the government was focussing on the Office Automation program. Results that were compared- nothing was done about the results, no further research was done to add enhancements.
James Feeley	The trial operators were competitors so the information did not flow freely. The phone companies may have told each other the results; however, they would not tell the cable companies as they do not have a working relationship with them.
Peter Jordan	Companies do not cooperate in Canada. It is some kind of gene that we have. We were on the main CVCC committee but nothing significant resulted from these meetings. (This viewpoint was supported by literature)
Prof Pierre Juneau	DOC was very smart in associating the business people to their activities (the CVCC had many top communications people involved). The leadership of the government through the DOC was essential as without this we would not have a videotex industry. Industry people cooperated very well and thus, must have thought Telidon was a good idea.
Phillip Kinsman	The Telidon Reports newsletter was sent to those involved in industry and field trials. Telidon Reports was written for marketing purposes: it was translated into seven languages and distributed throughout Europe and Japan. It was a form of cross comparison as it dealt with the happenings of field trials. There was also a documentation center where people could go for information.
Leo Lax	The majority were government supported trials and all the reports were always public, they were always presented and exchanged. There was a limited amount of proprietary information that often dealt with detailed technical issues at the very lowest level, it was not at industry level as industry was very cooperative.
Yun-Foo Lum	There was no cross comparison of results due to the diversity of trials- too small, too scattered.
Roy Marsh	There was cross comparison. Dorothy Phillips did some of these. (In her interview, she said she was not involved at the field trial sites).
Sandi McDonald	There was cross comparison of results. DOC was the central point for results. However, Bell ran their own trials and kept the results proprietary. Infomart did the same as well. It was the nature of the business environment to keep the information confidential as this was being used to help them ascertain potential markets and applications.
Dan O'Connell	Faxtel conducted no cross comparison with other trials.
Bernard Ostry	There were various trials with the intent of pooling the experience in order to establish Telidon in the marketplace nationally and internationally. However, they all began to pull out of the trials which hampered efforts to compare.

Douglas Parkhill	There was cross comparison. There was a report written on field trial evaluation. Within the CVCC, there was a sub-committee concerned with the field trials and all of the people shared the information on a continual basis.
George Piskor	The key qualitative results were available at all the conferences but the more quantitative results were proprietary. In terms of communications internally, when one is dealing with a rapidly evolving structure with a group that is set up on the fly, things are not always done efficiently. Internal communications within DOC and industry were often done on an informal basis.
Bruce Read	TVO was the first trial so we did not learn from others but others learnt from us.
William Sawchuk	The feedback was not always a formal process; however, it existed. There was an attempt to learn from every field trial but the trials all started at more or less the same time. Each was slightly different. There was not enough time in the program to have launched 2 or 3 trials in a perfect information environment and then, once completed, to feedback that information and then launch another trial. The results of the IDA trial was superceded by Grassroots. The WETA trial preceded CBC's project IRIS. Thus, there was information passed on to subsequent trials.
John Storey	There was no formal centralized analysis of trials to see where enhancements could be made. As a result of our involvement running the trials, we could see where there were technical problems. From this, Norpak developed improved equipment.
Jim Storm	Everyone that started a trial attempted to ascertain what went on with other trials.

8.1.0.6 INDUSTRY VIABILITY PROPOSITION #1

Further government assistance may have proven useful in establishing Telidon as a commercially viable industry. It was proposed that government should have continued its support another 6-9 years to allow Telidon to enter the rapid growth phase described in the adoption of technology process. It was assumed that at this phase, private industry would have been capable of continuing on without government assistance.

Robert Baser	It could have helped. Look at the French model. There was potential where the system was a computer with software, there could have been a ploy where we could have underwritten half the cost of software for computers or encouraged database development.

Herb Bown — For any government program, given the time scale in which government operates, if you can get funding for 4 years, that is a major achievement. It has nothing to do with the fact that the program should have been funded beyond that and I know as I tried to get it funded but the government goes through its cycles. Now, it is artificial intelligence and networking and in the year after, it will be 3 more new buzz words that people will move onto. It should have continued another 5 years- a 10 year program in total would have been reasonable. What Telidon was and what ALEX is now is an attempt to bring to the home and small businesses a technology to permit the exchange of information and the acquisition and selling of information that never existed before. That is something new and revolutionary. If funding could have been continued and the government started to use the technology itself, then we would be further ahead today.

Barry Brisco — Not necessarily. Although the setbacks in the marketplace that came from the missed interpretation of what the technology could actually provide by way of benefits and applications made things difficult, there is still an industry in Canada. There is no American NAPLPS expertise. There are 6-12 companies, mainly small with Norpak being the largest that are carrying the technology along successfully without government support.

David Carlisle — That is problematic. Dispersing money in small amounts to be fair and equitable to all interest groups across the country is of no value. The government needs to be able to put money into organizations that are serious and capable of doing something.

Jim Carruthers — The level of funding required was in order of $1 billion as the French spent. Unless you are willing to make a commitment at a level that can be successful, there is no point doing it at all. We were trying to do too much for too little. IBM has spent more than Telidon did and they have yet to reach the penetration that Telidon expected. I don't think government funding can achieve this unless there is a total national committment like putting the man on the moon. This is not possible with a country like Canada.

Larry Dworkin — Government funding was required to help industry get started. However, the money was around for much too long and the industry did not take a hard look at the marketplace to see what was really needed. They should have funded the program a maximum of 3-4 years.

James Feeley	If the government had continued on with that program, it would have been wasting money. Unlike France, Canada does not have a national telecommunications policy. The provincial phone companies are regulated by the provinces; thus, no national policy resulted. In France, the phone system badly needed upgrading but in Canada there is not much we could change. There was no solid reason for the phone company to agree to the pressure from the government if the government was not going to invest alot of money and force a national policy; neither of which they were willing to do.
Roger Hough	Hough is not supportive of government funding. The French artificially created a critical mass of terminals. However, it is better to let the market decide as done in the US. The aspect of federal taxpayer's money going towards R&D in Canada is unknown to the US where private industry invests in consumer R&D. It is better to let the market decide.
Leo Lax	When the funding dried up, people with plans of implementing programs did not feel that these could be started on their own. Thus, alot of the infrastructure that was built collapsed and industry went into a recession. Only a few companies continued to exist in the same form (Microstar as an example which was successful because it was in a market that was growing due to the rise in PCs population). There is no question that further assistance was required. France is the best example of that situation- the government supported Minitel very actively and it is now a way of life. Private industry has taken over in the sense that only the network is being funded. They only stopped subsidizing a couple years ago.
Roy Marsh	It is a pity the government cut funding off so abruptly. Certain areas should have received further assistance- further research was warranted. However, I do not believe in industry support such as the CDP. It creates a distorted marketplace by funding some and not others- not all are allowed the opportunity to prosper. Basically, let the industry take the international standard (the result of government research) and do with it what they want.
Sandi McDonald	Continued government assistance should have been available. The technology was evolving and the microcomputer was beginning to have an impact on society; thus, there was a new market to enter. However, no program is funded for more than 4-5 years and this is considered long term. It is based on the term of government. The Vision 2000 program is attempting to obtain 10 year funding and we probably will not succeed.
John McLauchlan	NO. Six years is alot of time in this business. If you are going to develop a software application, you should have it running in 3 years. The government funded the program long enough.
Mark Norton	Government funding is very important. However, we require a well thought out strategy. The development of this strategy became too impulsive, too politically driven, too public relations driven. To spend more on the same strategy would be a waste.

Dan O'Connell	Government has to get out of these programs at some point; otherwise, too much money will be spent. If a company cannot survive after several years then it is likely that it would not survive regardless of funding.
Bernard Ostry	Every time we have a comparative advantage, we do not stick with it and we did not support Telidon long enough. The French government stayed with their system and it is a raving success. They gave away the sets and imposed government will on the phone companies to put the telephone directory on line. It was a different kind of exploitation than what Canada attempted.
Douglas Parkhill	Definitely. DOC should have worked much harder at getting Vista to continue its service. As well, they should have allowed the CBC to attempt an operational teletext service. If this would have happened, two national services would have been established which could have led to many extremely valuable services and the international impact would have been much larger.
George Piskor	This would have prolonged the issues of people feeding from the government trough. The question was not one of money but of technical infrastructure and the economics of manufacturing- who was going to do this?
Bruce Read	The videotex service had the problem of line charge costs and government funding would not have solved this as they refused to fund users of the service.
John Storey	It may have aided in persuading people to conduct more trials but unless they did something like the French, there were not enough people interested in information services with Telidon as there were many other sources of information available at cheaper cost.
Dr. Jim Storm	Six years is a relatively short period of time when introducing a technology. However, when presenting the situation from a financial or budgeting point of view, the politicians will say "If we cannot make this work in 4 years then there is not a need." Thus, support would have been useful but difficult to obtain. Companies like Prodigy in the US had the benefit of the failed Telidon trials and the market research done and still decided to invest $650 million to build a service based on Telidon (NAPLPS).
Andrej Tenne-Sens	Further assistance would not have helped. If the technology is going to be inherently useful, governments do not need to fund it as it should develop on its own by market demand.
Bob Warburton	Government support ended too soon as Canada was fighting an upward battle against the British, French and Americans (AT&T).

8.1.0.6 INDUSTRY VIABILITY #1A

The Telidon program more closely resembled the Introduction phase in the adoption of technology process than the expected Acceptance phase. As there was only one response for this proposition, it was answered using documents in the literature.

Douglas Parkhill	An embryonic industry was created by this government program.

Videotex has been described as the Fifth Medium (Cutler, 1990) and as of this date, this article stated that this medium was only in its infancy.

8.1.0.7 INDUSTRY VIABILITY #2

It was proposed that the lack of consistency in the recommendations stated in the government reports on Telidon resulted in confusion when establishing marketing strategies. This confusion, in turn, resulted in the marketing strategies being ineffective.

Larry Dworkin	Government thought they had their own expertise and that was a horrible mistake. They are not marketers. One of their biggest mistakes was they did not rely on the private sector- they thought they understood the marketplace and they do not have the kind of experience necessary. Many of the people in charge of the program were technical and did not have the marketing knowledge. This resulted in a lack of a focussed marketing strategy.
Phillip Kinsman	There were conflicting interests between firms and they could not agree. Thus, there were some conflicting marketing strategies which resulted and DOC tried to act as a broker- to be the neutral party that passes on information on directions to be followed and often, this advice was taken. There was no formal marketing strategy at DOC.
Roy Marsh	Marketing strategies were discussed at the Marketing Sub-Committee of the CVCC. There would never be complete agreement on a strategy to follow as people had different objectives. You never get unanimous agreement on a marketing strategy because each company markets their individual benefits.

Douglas Parkhill — The consultant's reports recommended strategies were passed through a committee of hard-nosed businessmen who then would make their own decisions. As well, the International Marketing Secretariat at EA and DOC reviewed these reports. These reports were not taken as gospel. As well, no one strategy would have worked- a combination was required.

8.1.0.8 INDUSTRY VIABILITY #3

It was proposed that Telidon should have been promoted as a communications medium to be integrated with other systems in various industries instead of government attempting to isolate it as a separate product and industry.

Robert Baser — Videotex and Telidon or NAPLPS are really 2 different things which we ended up merging together. Videotex is the application of advanced information technology. You deliver it with a protocol be it NAPLPS, Prestel or ASCII. The ASCII terminal could be called a videotex terminal and this started happening that people were saying they were in videotex when it was just ASCII, they were not using the NAPLPS protocol which became associated with videotex. It was a bad move. That caused great confusion and when videotex failed then they said Telidon failed. The protocol is still very good, it does not diminish the protocol but in the people's eyes it did. NAPLPS is a tool-use it how you can best use it.

Herb Bown — What we tried to do was encourage the adoption of technology within a whole bunch of different industries. That is why we were doing work with TV, cable and telephony (the science or practice of dealing with telephone). Telidon is a coding system- it is a good way of doing graphics efficiently and many companies like Formic and Microstar are using the same technology in many areas that have nothing to do with videotex. It was never the intent to create Telidon as a separate industry. Telidon was only the name of a DOC program that was administering the whole thing.

Barry Brisco — We don't hear of Telidon anymore and many have not heard of NAPLPS. Trying to sell technology is a difficult sale. You don't promote a technology for the sake of technology. We had to be an applications representation. Telidon was driven very much by the technology aspect but when people asked what we could do with it, no clear answers emerged.

It was the wrong approach to promote Telidon as a separate industry versus a communications medium. It was partly due to the computer revolution- they were coming out of the old mainframe mindset where PCs did not exist. Thus, the only viable computer system was a large scale mainframe and that was a significant reason for promoting Telidon as a separate system.

James Feeley — Telidon was a protocol. But the government was not selling the protocol, it had a program to develop an industry. It is easy to confuse the protocol with videotex which is a service which uses the phones. Telidon was the first attempt to get an industry going with the phone companies where one uses a phone to access databases to communicate and do transactions- it cannot be an industry on its own and we were not trying to do this. It is an industry that depends upon whoever decides to take it.

Peter Jordan — The whole trick in the industry is to remove the NAPLPS context. In the older days, everyone was into the nuts and bolts and that is why it was a painful experience. This NAPLPS focus caused misperceptions of what Telidon really was i.e. a graphics protocol and that hurt the progress of the industry. Telidon should be viewed as a TOOL.

Phillip Kinsman — It was naive to think we could have a hardware industry. Electrohome and Northern Telecom, who were not interested, perhaps had this capacity for large production. The software industry was appropriate. Norpak was a top-end customized product firm- the leading edge technology development. We did not see them going into the mass market. However, we were networking 10 years before people in the PC business thought of networking. Most office environments are just starting to network. Thus, we were already thinking of Telidon's integration into other environments at an early stage.

Roy Marsh — It was promoted as videotex, as a special separate terminal. Nowadays, you would choose a different way because the technology and the applications have changed. This type of separate industry promotion was correct at the time.

Sandi McDonald — A communications medium versus separate industry would have been better perceived by the users. The standards issue created the perception of the Telidon industry; however, users do not buy Telidon because it is standardized.

John McLauchlan — Telidon was a better way of delivering graphical information to a computer device somewhere in the world and the number of bytes to communicate the graphics is significantly less than anything else at the time. It was a waste of effort to market Telidon as a separate industry- they should have looked at the protocol and developed business applications for it and promoted it as applications.

Dan O'Connell — Telidon is just a transmission protocol and the only problem we saw was not too many people seemed to understand that it was as simple as this. The videotex industry was seen as a basket which contained alot of things and gave people the wrong idea. We could have provided this service using other protocols and we did not see ourselves as part of the videotex industry. If someone had said they were going to start an ASCII business, people would look at them very strangely. The same applies for someone with a graphics transmission called Telidon with someone saying how are we going to start a Telidon business. Telidon should not have been represented as such. Now, they are repackaging it and selling it as a hot item- as a graphics medium.

George Piskor	Why bother inventing a new industry? This was certainly a new way of doing business but we do not need a whole new infrastructure because we already have B&W displays. The thought of color graphics and an international standard and a graphical database was seen as an extension of a software industry.
William Sawchuk	This separate industry led to misperceptions. Telidon was considered to be a new communications service, not an augmentation to an existing one and this is the reasoning behind this focus. One of the goals should have been to make people more computer literate in the sense of being aware of new technologies.
Dr. Jim Storm	Telidon was being promoted by DOC, not in the sense of a protocol but in the sense of database applications and database resources and this is one of the problems that killed Telidon as database content was lacking. DOC should have embraced Telidon as a communications protocol and encouraged its use in applications.
Andrej Tenne-Sens	Telidon was promoted as a thing unto itself. A huge breakthrough was the software developed for the PC- integrating Telidon with another technological development. The trend of PCs was increasing but Telidon terminals were not; thus, they should not have ignored this trend.
Bob Warburton	CRC developed an effective graphical communications system. It was simply a mechanism and the reason to standardize was to provide long term longevity and flexibility of the data created and compatibility between systems for the users and IPs. Telidon was seen as something unto itself- Telidon meant boring pictures and slow access. However, the system went much beyond what people saw. The way people perceived Telidon did not reflect what it could do.

8.1.1 SUMMARY OF PATTERN MATCHING ANALYSIS OF RESEARCH PROPOSITIONS

To summarize these findings, a brief paragraph will state the overall opinion of each proposition.

8.1.1.0 RESEARCH & DEVELOPMENT PROPOSITION #1

The overriding viewpoint of the first R&D proposition was that the standards change was unavoidable and the resultant process for acceptance by the standards bodies was part of the natural evolution a technology experiences. There was a collective effort with the hardware upgrades as the three manufacturers had existing 699 terminals that required upgrading. A greater collective effort was made difficult by the high capital investment

required for manufacturing hardware which did not allow easy market entry. Note also that Norpak received the majority of the government funding. There is no doubt that this upgrade caused many problems as previously explained. However, the outcome was that the initial setback experienced by the hardware industry has been regained and NAPLPS is becoming more and more the preferred protocol to use. Documentation regarding the standards process support the viewpoint that the change from the 699 to 709 standard, despite troublesome adjustments, was beneficial in the long run.

8.1.1.1 RESEARCH & DEVELOPMENT PROPOSITION #2

The IISP definitely arrived at a problematic time when the standards were constantly evolving. A delay in the IISP would have delayed the growth of a number of services but would have reduced the problems experienced with the "moving target" phase of Telidon (Peat Marwick and Partners, 1985). However, the IISP was required for two important reasons:

1. DOC was committed to Telidon regardless of what was happening and although it was discussed very lightly to delay the program, it was decided that it was better to have 80% functionality in the marketplace than none at all.
2. Also, the field trials developed under this program were essential support for the international standards battle as they were operational proof that the Canadian technology was superior to the French and British.

8.1.1.2 MARKETING PROPOSITION #1

In the beginning, there was a technical focus on hardware and modes of delivery; however, in the later years (1983-1985), marketing took on more importance. A good portion of the costs of software development (applications), data management (content development) and engineering were covered with private funds; thus, reducing the possibility of successfully establishing a solid Telidon presence in the market (Booth and Wills, Vol.I, March 31, 1983). Government support was too focussed on one area (technical) which resulted in the neglect of activities in other areas. A more balanced funding strategy would have been

advisable. It is safe to conclude that marketing suffered due to lack of funds as expressed throughout the several interviewee responses.

Overall, all areas of the program were said to have suffered as the amount of government support was too minimal; thus, it was spread too thin. The reality of the situation was that the government spent less on the overall program than Bell has spent to date on the introduction of one service, ALEX and a paltry sum compared to what the Europeans spent, yet Canada insisted they could create the same impacts their competitors were attempting. This was not a realistic scenario.

8.1.1.3 MARKETING PROPOSITION # 2

It was very difficult to resolve this proposition as there was much agreement on the need for domestic marketing efforts but there was also a high level of agreement (both in interviews and throughout the marketing reports) that the international focus was necessary due to the following factors.

The international market was the focus due to the need to establish Telidon as an international standard in a relatively time frame; however, field trials were the method used to demonstrate the technology in use in Canada which in turn served to develop a Canadian industry.

Without question, the US was viewed as the main market and it was crucial that the Europeans not gain a foothold there and establish their standard; again more reasoning for the international focus.

However, this strategy did hinder attempts by Canadian firms to market their firms outside Canada. Norpak experienced credibility problems as no trials with mass market viability existed as examples when they were attempting sales. Infomart is said to have been successful with Grassroots in the US mainly as a result of their service in Canada to act as

proof. However, Grassroots is an exception as it was (and still is) a successful operational service. Most of the field trials did not result in operational commercial services.

The fact that a North American standard has been set is proof of a unified North American market behind the Telidon concept. This was accomplished with the heavy focus on the international area. There was a necessary trade-off to be made and this was unavoidable; thus, the domestic front suffered due to the international focus.

8.1.1.4 FIELD TRIAL PROPOSITION #1

Without doubt, technical issues were the focus of the field trials. Focus was directed more towards the users during 1983-1985 once the technology had stabilized somewhat. Technical issues had to take precedence as the technology had to be developed to have a system. One could always argue that people could develop content later; however, one could not advocate developing the technology later and the content first as the content would have nothing to run on. Both documentation and interviews supported this viewpoint.

8.1.1.5 FIELD TRIAL PROPOSITION #2

Information exchange occurred in many informal manners. This was done through the CVCC and its sub-committees and government newsletters- DOC made genuine efforts to communicate with the field trials. However, the natural competitive nature of the industry disallowed any form of close corroboration. Many of the detailed reports were conducted by the field trial companies themselves and the results were proprietary. Field trial interviewees indicated little cross comparison with other trial operators, they seemed to function independently. As well, the statistical software that was used in a few trials produced results that were not significant enough to compare across the trials.

Documentation on the field trials was easy to attain; however, the information contained little in the form of results useful to other trial participants. They were too inconclusive or incomplete.

8.1.1.6 INDUSTRY VIABILITY PROPOSITION #1

The majority of interviewees indicated that no further government assistance was required for the following reasons:

1. An industry has already developed, albeit smaller than expected but still viable without government funding.
2. The level of funding required to equal the impact of the French and British systems was not feasible for Canada due to its small size.
3. Six years support was sufficient time to discover whether or not a market existed for Telidon. The international standard was established; thus, it was up to industry to develop it for the marketplace.

Industry did however request that government support the industry through direct procurement of Telidon-related products and services (Industry Viability report, Peat Marwick and Partners, 1985). This did not happen.

8.1.1.7 INDUSTRY VIABILITY #1A

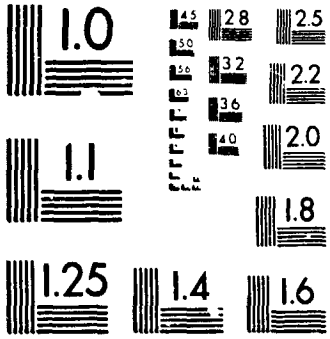
The Telidon industry in Canada has been described as embryonic and immature. According to the Adoption of Technology Process presented earlier in this research, Telidon remains in the Introduction Phase as after five years, the average unit price was very high (over $1,000) and the penetration level according to a CSP International survey (presented in the Market Forecast section) was only 0.25% for Pre-NAPLPS and 0.03% for NAPLPS applications.

8.1.1.8 INDUSTRY VIABILITY PROPOSITION #2

Marketing strategies proved to be ineffective. Due to the conflicting recommendations put forth in the various consultants reports, the research could not effectively and unanimously

3 of/de 3

PM-1 3½"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT



point to certain applications as having the highest potential. Thus, firms were left to their own judgements which were often based on incomplete information.

The firms also had conflicting marketing strategies due to their differing interests and the extent of their involvement in Telidon. DOC attempted to act as a mediator and suggest advice which was often taken. However, the government is not known for its marketing skills; thus, industry bore the responsibility for marketing strategies which took into account what the government and reports stated.

8.1.1.9 INDUSTRY VIABILITY PROPOSITION #3

The majority of the respondents agreed that Telidon should have been promoted as a communications medium; however, a large number of reports consistently described intentions for Telidon to become a separate industry.

Telidon was a protocol, a tool to be used to generate graphics and that was the simple outlook that interviewees advocated. However, there was the perception of Telidon as a separate industry and a possible reason is partly due to the computer revolution- Telidon people were coming out of the old mainframe mindset where PCs did not exist. Thus, the only viable system was a large mainframe. This hardware perspective was significant reason for promoting Telidon as a separate industry.

8.2 RESOLUTION OF CONFLICTING STATEMENTS (IN DOCUMENTS AND INTERVIEWS)

A 1985 Industry Viability report by Peat Marwick and Partners stated that the current markets for videotex had mainly been developed in Canada to date but the focus was rapidly shifting to the US marketplace. This was clearly wrong as the major focus of Telidon had been to secure the US market before the European competition established a foothold there. Hence, the great effort expended to have Telidon established as a CCITT

international standard. Hence, the agreement with AT&T to enhance the original Telidon code, the 699 international standard, in order to have a huge, credible ally such as AT&T to ease Canada's entry into the US. Hence, the international marketing agreement between DOC and Infomart for Infomart to market Telidon throughout the US and convince them to adopt the Telidon standard.

As well, this report stated that as Canadian companies penetrated the US markets, they would face very stiff American competition as many key US firms had entered the videotex industry through corporate joint ventures. Examples of such ventures were: AT&T, Knight-Ridder, Times Mirror and CBS. What was not stated was that Canadian participants were the other partner in three of the four ventures mentioned. DOC was heavily involved with AT&T in establishing a North American standard, Infomart s US subsidiary was conducting a trial with Times Mirror and CRC and Norpak were working with the CBS on the establishment of an international broadcast standard that would also be used in their teletext trial.

Another report by TEEGA Research Consultants evaluated Telidon's R&D process and although this is a small point, it was a glaring mistake. The infamous basis of the Telidon graphics protocol are called PDI's for Picture Description Instructions. However, this report calls them Picture **Discrimination** Instructions.

The next part of this section will briefly discuss the differences in opinion between government and industry respondents with respect to the propositions. Note that not every proposition resulted in a difference of opinion.

Research and Development Proposition #1: Government believed that there was a collective industry effort and where one respondent stated that Norpak was the only firm, he justified this by saying the coordination of an industry effort would have taken too long. This was the quickest way to a resolution of the standards issue.

The majority of the industry respondents thought this was a collective process as Electrohome and Microtel were also manufacturers of terminals. However, they did agree that Norpak was the chosen instrument and thus, dealt with the bulk of the changes. It was pointed out that only the hardware industry suffered long delays. It was fairly simple to adjust the software that ran Telidon on PCs and there were no hardware incompatibilities to deal with.

It appears that industry and government agree on this proposition.

Research and Development Proposition #2: There was a mixed reaction from both sides. Both government and industry respondents believed the IISP money was not well spent as the projects were too small and too scattered to achieve the critical mass desired. Also, terminals were still too expensive at this point. However, justification was that the IISP was conceived before the AT&T announcement (February 1981 vs May 1981) and that it was better to have some functionality in the market than none at all.

Marketing Proposition #1: The one area that was not stated as lacking funds was research and development (except for one respondent). One comment stated from both sides was that the funding had to be allocated wisely in a political sense i.e. geographical representation, equality of interest groups, and this hindered the critical mass goal. Both sides agreed that hardware and field trials received the bulk of the funding.

Marketing Proposition #2: There was unanimous agreement that the focus was mainly on the international arena and getting the Telidon protocol accepted as an international standard was the main reason. Also, the US was seen as the major market to develop mass consumer applications for Telidon. Canada was viewed as only a test market for the field trials. The majority of the respondents agreed that the international focus was unavoidable due to the time pressures of the international standards process as well as the threat of the French or British establishing a foothold in the prized US market.

Field Trial Proposition #1: There was unanimous agreement that the focus was mainly technical as the technology was evolving; thus, many changes were required in the hardware and software. User issues were dealt with only informally and later on in the program (1983-1985).

Field Trial Proposition #2: Government, in general, believed that a good forum for information exchange was achieved with the CVCC and its sub-committees and through DOC Information Services such as the Telidon Reports newsletter. However, industry states that the useful information gathered mainly by the larger trials (Bell's Vista, Infomart's Grassroots) was proprietary- the competitive nature of industry resulted in a lack of information which could have been useful to those involved in trials. Also, although the government thought useful information came from the CVCC and that it had a significant impact on industry, many respondents did not even remember this committee and those that did stated that no useful information came from it. The CVCC was a good idea in theory but in practice, never amounted to much. A review of some of the CVCC's documents showed much generalizing about the future of Telidon and suggestions for things that should be done (in general); however, no concrete guidelines for industry were produced. Industry also states that information was mainly in a public relations form: praising what Telidon could do in the future and saying how big this technology would become, instead of doing realistic market surveys of what the potential was at that time.

There is an obvious split between government and industry opinions on this proposition.

Industry Viability Proposition #1: It was interesting to review the responses. There was a tie between the government respondents: half believed that government funding should have continued as Canada had a comparative advantage and the technology was still evolving. However, the recipients of the majority of government funding i.e. industry, agreed that no further assistance was necessary. Reasons stated were that

Telidon needed a commitment like that of the British and French but this was not feasible with a country the size of Canada. "Let the market decide if there is a demand for the product" was a common statement. Industry felt the funding was required to get things started but now that the international standard was set, it was up to the market to decide the fate of Telidon. And the market did decide, there exists a small group of self-sufficient companies selling products using the NAPLPS technology.

Industry Viability Proposition #2: Both government and industry agreed that there was no formal marketing strategy at DOC and that the lack of a focussed strategy hindered marketing attempts. Industry stated that the government are not marketers and should have left this aspect to professionals in industry. Government believes its role was to give direction to industry but not to set a definite guide of what to do. Government thus justifies its role by saying the Marketing Sub-committee of the CVCC, DOC and EA were only there to provide direction; however, some believe better results would have occurred if the money government spent was given directly to companies for marketing as their resources for this area were tight. Industry respondents stated that Telidon sales required direct marketing which was expensive and time-consuming and thus, expensive.

Industry Viability Proposition #3: All but two respondents to this proposition believed that Telidon should have been promoted as a communications medium, not as a separate industry. The separate industry perception was due to various reasons: Telidon was a NEW communications service, the old mainframe i.e. separate system way of thinking. The interviews and documentation suggest that most people involved with Telidon saw it as a separate industry but in hindsight, agree that this was wrong. The government publicity and media coverage along with the international standards battle against the British and French led everyone to believe Telidon would become a household word. Demand estimates, terminal placements, industry revenues, potential applications for Telidon all made this technology seem larger than life itself. But the reality was that

these expectations were quite inaccurate and did not properly consider the evolution of technology time period or the obstacles faced when introducing a new information technology to a generally computer illiterate public. This led to great disappointment and loss of interest by both industry participants, government and the general public. The promotion of Telidon as a separate industry grew from these expectations.

8.3 REASONS FOR DEEMING TELIDON A FAILURE

The most compelling reason for failure was the lack of a market for information. It was never clear whether the DOC role was to create the technology, establish a world of information systems in which Telidon would be used, assure Telidon's future by establishing it as a world standard (a major DOC strategy that dissipated the technical efforts and drained the project of its brilliant technical leadership- the small group of original inventors were involved in all aspects: invention, design, debugging, contracting, standards and marketing as well as promotion and selling of the concepts) or whether market forces should rule to accept or reject the idea. (Coll and McPhail, 1986).

Another factor was the lack of useful information on Telidon to guide industry in building this technology into a mass consumer service. Many evaluation reports were written which were found to contain only generalizations of what could be done and there was much repetition in the recommendations amongst the various reports written. Often, two reports contained exactly the same information which resulted in no fresh information being generated to aid industry. At times, when more specific and realistic reports were written, they were withheld from the public so no negative impressions of Telidon's potential would be generated.

As well, the Telidon program was a huge publicity blitz for the Canadian government. Canada had a superior technology and was seen as the underdog in the international standards battle. Its national pride was at stake and the media played up this issue. This

led people to believe that Telidon could do many things that would not be possible for many years; thus, leading to disillusionment with Telidon.

It is the researcher's hope that this thesis provided a realistic assessment of the Telidon program.

8.4 REASONS FOR DEEMING TELIDON A SUCCESS

In retrospect, the ambitious goals set in the early days were largely unfulfilled. However, the successes that did result include: (Maria Cioni & Associates Inc., 1985)

1. The model for government/industry cooperation i.e. CVCC
2. Canada's recognition in the international videotex scene.
3. The establishment of a new Canadian industry.

Note that item #1 was not a success in the Telidon program but it was useful for providing a framework that can be utilized for future programs. The basic reasoning behind the creation of the CVCC was sound but its implementation was not well done.

The structure the government established to develop a Telidon industry should provide a good framework for technical programs in the future. The general downfall of this structure was the short time period in which too many events were occuring. As a result, there was little or no time to evaluate and control the progress of the various components. The government should be complemented in setting up the great diversity of components that it did. Once again, what the government did was sound in its general theory. The researcher believes and many respondents implied that had there been more time, more controls and checks on activities i.e.field trials, more sharing of useful and specific data, and less grandiose goals, the structure set up by the government would have been more successful.

Despite the difficulties with videotex start-ups, many companies still remain interested in the topic as evidenced by well known companies such as IBM, Sears, AT&T and JC

Penny and Bell Canada. A good example is the Prodigy service which IBM and Sears introduced in several major US cities in 1989. (Marsh, 1989)

By March 1985, several new companies were formed which are still thriving today (Norpak, Microstar, Com:Port International, IDON Corporation as examples), public awareness was raised about the potential impact of information technology and about the capability of the Canadian information technology sector. As well, some useful applications of videotex were put into place which are still operating today (Grassroots, TABS, Marketfax). Perhaps, the most noteworthy result is that Bell is buying the terminals and the software required for the ALEX service from Canadian companies. (Marsh, 1989). These companies include: Bell Northern Research, Northern Telecom and Microstar.

Canada, thus, developed a small videotex industry which is capable of responding to the demand for videotex in Canada and is capable of supplying an export market with little or no government assistance. Canadian companies have also gone to offshore production for some of the products which are expected to be produced in large quantities. (Marsh, 1989).

The goal of the creation of a complete and commercially viable industry has been achieved. Thus, it is not just to call Telidon a failure. Instead, it was a success on a smaller scale than originally expected, but nonetheless, a success.

8.5 THE FUTURE

There is a lesson to be learnt from the Telidon program. It is an example of a government/industry partnership that did not live up to its potential. There are a few areas that should be carefully dealt with in future programs.

1. Do not set grandiose goals of mass consumer acceptance and usage nationwide unless the appropriate amount of funds are available to support these goals. The government

funding was a very small amount in contrast with the French and the British who had similar goals. If the reality of the situation is that funds are limited, then the funds should be concentrated on areas of strength and high potential of success. The funding for Telidon was dispersed among too many participants in too many regions of the country with alot of the funds being spent on unsuccessful ventures. The dispersion was justified by political and geographical equality reasons; however, an allocation on a manageable size of potential areas would likely result in greater cross comparison of results which were more specific and useful to those involved.

2. There was the perception by many government officials that they had set up a mechanism through newsletters, a central DOC information office and the CVCC in which to foster the flow of information between both government and industry, and amongst industry participants. However, industry clearly stated that there was little sharing of useful, quantitative data of field trial results and that this was due to the competitive nature of Canadian industry. Future programs should consider this problem and perhaps offer companies a motive to cooperate. Funding allocation could depend on the level of cooperation between businesses, perhaps strategic alliances or partnerships between firms could be established.

3. Government believed that Canadian industry could support a cost efficient mass production of terminals for consumers; however, this was proven impossible. Canada has been described as having a talent for high end customized products that often require small production runs or assembly by hand. Companies often have products mass produced in countries where the facilities are readily available and labour is inexpensive. This is a more desirable scenario for future products aimed at the mass consumer market.

4. Regarding the promotion of a new technology, a lesson was learnt with Telidon that disappointment occurs when the actual product does not live up to its reputation. The key

point here is to promote the technology in a realistic manner by stating exactly what it can do today and what its purpose is. The technology's future potential should be promoted as well but it should be clear that this is NOT what it does now. In this way, a more accurate picture of consumer opinion and acceptance of the product is obtained from marketing surveys and user panels.

5. A final point deals with the aspect of government involving itself in marketing activities. The fact that the government is not a good marketer was pointed out by many respondents, government participants included. The marketing of a new technology or product should be left in the hands of professional industry marketers with detailed experience in marketing new concepts. Too many times, promotional activities such as media releases and newsletters were labelled marketing activities, with user and market research ignored.

GLOSSARY

- Why Videotex is so hard to define?

  One reason is that videotex is changing, the industry is evolving and will continue to evolve as the technological capabilities change and our understanding of consumer needs grow (Maria Cioni & Associates Inc., 1985). Specific to Canada, definitions from Canadian government sources have stressed the technology while a few have stressed the user. This is indicative of the overall direction which the Canadian Telidon program took (Peat Marwick and Partners,1985).

- Alphageometric

  This is a method of displaying alphanumeric characters and graphic shapes from transmitted geometric instructions (LINK, 1980).

- Alphamosaic

  This is a method of displaying alphanumeric characters and graphic shapes generated from a limited number of mosaic element shapes (LINK, 1980).

- Alphanumeric

  This is the term for alphabetic and/or numeric characters (LINK, 1980).

- Asynchronous transmission
  Data transmission at irregular intervals that is synchronized with start/stop bits.(Long, 1987)

- Closed User Group (CUG) / Closed Loop Services

  A service or database that which only pre-defined users have access (LINK, 1980).

- Common Visual Space Network

  The technical system under development at the DOC that allowed interactive graphic communication among persons or groups at two, three or more locations (LINK, 1980).

- Dynamically Redefinable Character Set (DRCS)

  The DRCS contains definable characters whose pixel patterns can be down loaded from the host or can be local within a terminal (LINK, 1980).

- Gateway Technology

  This technology refers to the interface between a database and a common carrier that allows the user to access information without involved procedures that change from one data base to another (Ash and Quelch, 1982).

- Hybrid System

  This is a system where requests might be made via the telephone network to an information supplier who would insert data in the next broadcast teletext cycle (DOC, Brochure, May 1981).

- Information Providers (IPs)

  The companies that design and create pages and provide data base management. e.g Tele-Direct and Infomart. (Booth and Wills, Vol.II,1983)

- Marketing

  The activities involved in developing product, price, distribution and promotional mixes that meet and satisfy the needs of customers. (Papadopoulos, Zikmund and d'Amico; 1988)

- NABTS

  The teletext broadcast standard for North America: North American Broadcast Teletext Standard which is approved by the CCIR (Maria Cioni & Associates Inc., 1985).

- NAPLPS

  An information interchange standard that permits videotex and teletext information and transaction service providers and equipment manufacturers to develop their products according to a standard interchange format (TEEGA Research Consultants Inc., 1985).

- Page Set

  The term used to describe the pages belonging to individual Sub-IPs. They are like small data bases which together form the larger data base (Booth and Wills, Vol.II,1983).

- PDIs

  PDIs are picture description instructions which are the basis of the geometric Telidon scheme and constitute executable picture drawings or control commands such as "point", "line", "arc", "polygon" (TEEGA Research Consultants Inc., 1985).

- Sales

  Sales refer to the explicit attempts by the seller to transfer products or services to the purchaser. Most firms involved in Telidon did not clearly distinguish between these two concepts (Abt Associates, 1985).

- Sub-Information Provider (Sub-IPs)

  Companies such as the Bay, Consumers Association of Canada, and various government departments that provide the information that forms the content for the trial data bases. Many of the sub-IPs enlist the services of the IP companies to create

their pages and perform the technical aspects of content provision. (Booth and Wills, Vol.II,1983)

- System Operators (SOs)

The telephone companies such as BC Tel, AGT, MTS, Bell and NB Tel who provide the phone lines, install the equipment and offer technical support (Booth and Wills, Vol.II,1983). In general, the organization responsible for the overall operation of a videotex service (LINK, 1980).

- Teletex vs Teletext

Teletex: This refers to a term adopted officially by CCITT to define a specific type of terminal-to-terminal text communications service (Bown, Kukulka, Lum, O'Brien, Smirle; 1982). This is the transmission of letters or messages from one computer or word processor to another over special networks. (Thomas, 1983)

Teletext: This means the broadcasting of Telidon or similar graphics images (Thomas, 1983).

- Telidon Industry (one suggestion) (Peat Marwick and Partners,1985)
  1. A manufacturing industry to provide system terminals, computers, communications and associated software.
  2. An electronic publishing (information providing) industry to provide information content.
  3. A distribution industry
  4. A public data base operating industry

- Videotex vs Videotext

Videotex: This means Telidon or similar systems which deliver their information by telephone line and permit the user to control the central computer through his own keyboard or keypad.

Videotext: This means the transmission of textual information from a central computer through telephone lines to home or office computers. (Thomas, 1983)

APPENDIX 1

1. Robert Baser
   Deputy Director
   Policy and Applications Development
   Communications Applications
   Department of Communications
   REFERENCE: Andy Tenne-Sens

2. Herb Bown
   President
   IDON Corporation
   Ottawa
   REFERENCE: Documents

3. Barry Brisco
   President
   COM:PORT International
   Videotex Marketing Services Inc.
   Ottawa
   REFERENCE: Herb Bown

4. David Carlisle
   President
   ACUMA VIDEOTEX INC.
   Toronto
   REFERENCE: Herb Bown

5. Jim Carruthers
   President
   norpak corporation
   Ottawa
   REFERENCE: Herb Bown

6. Professor David Coll
   Engineering Department
   Carleton University
   Ottawa
   REFERENCE: Brent Petersen (PHD Student - Carleton Engineering)

7. Larry Dworkin
   President
   Dworkin Communications Inc.
   Toronto
   REFERENCE: Phillip Kinsman

8. James Feeley
   IDON Corporation
   Ottawa
   REFERENCE: Herb Bown

9. Robert Fitzgerald
   Manager
   Hardware and Systems Development
   norpak corporation
   Ottawa
   REFERENCE: John Storey

10. Roger Hough
    President
    Communications Sciences Research Corporation
    Ottawa
    REFERENCE: George Piskor

11. Cathie Irwin
    Vice-President
    Personal Banking Group
    Bank of Montreal
    Toronto
    REFERENCE: Documents

12. Peter Jordan
    President
    MICROSTAR SOFTWARE LTD.
    Nepean
    REFERENCE:

13. Professor Pierre Juneau
    Department of Communications
    Universite de Montreal
    Montreal
    REFERENCE: Professor Ian Lee

14. John Kelly
    President
    DVS Communications
    Ottawa
    REFERENCE: Jim Storm

15. Philip Kinsman
    Director General
    Information Services
    Department of Communications
    Ottawa
    REFERENCE: Documents

16. Leo Lax
    Assistant Vice President
    ISDN Marketing
    MITEL Corporation
    Ottawa
    REFERENCE: Herb Bown

17. Yun-Foo Lum
    Director
    Broadcast Systems and
    Networks Research
    Communications Research Centre
    Department of Communications
    Ottawa
    REFERENCE: Roy Marsh

18. Roy Marsh
    Director
    Informatics Applications Communications
    Development
    Communications Research Centre
    Department of Communications
    Ottawa
    REFERENCE: Herb Bown

19. Sandi McDonald
    Manager
    International Research Policy Communications
    Development and Planning Branch
    Department of Communications
    Ottawa
    REFERENCE: Phillip Kinsman

20. John McLauchlan
    Independent Management Consultant
    11 Windy Golfway
    Don Mills
    REFERENCE: Herb Bown

21. Mark Norton
    Securityhouse
    Ottawa
    REFERENCE: Jim Carruthers

22. Douglas O'Brien
    Vice President
    Technology and Standards
    IDON Corporation
    Ottawa
    REFERENCE: Herb Bown

23. Dan O'Connell
    President
    Faxtel Information Systems Limited
    Toronto
    REFERENCE: John McLauchlan

24. Bernard Ostry
    CEO and Chairman
    TVOntario
    Toronto
    REFERENCE: Ian Lee

25. Douglas Parkhill
    Toronto
    REFERENCE: Herb Bown

26. Dorothy Phillips
    Director
    Behavioural Research
    Communications Research Centre
    Department of Communications
    Ottawa
    REFERENCE: Herb Bown

27. George Piskor
    President
    Cavalier Information Technology Systems Limited
    Ottawa
    REFERENCE: Documents

28. Steve Prashker
    Geography Department
    Carleton University
    Ottawa
    REFERENCE: Rick Mallett - Carleton University, Computing Services

29. Bruce Read
    Director of Engineering
    TVOntario
    Toronto
    REFERENCE: Professor David Coll

30. William Sawchuk
    Director General
    Broadcast Technologies Research
    Communications Research Centre
    Department of Communications
    Ottawa
    REFERENCE: Professor Ian Lee

31. John Smirle
    Director
    International Marketing
    MITEL Public Switching
    Ottawa
    REFERENCE: Herb Bown

32. John Storey
    Ottawa
    REFERENCE: Professor David Coll

33. Jim Storm
    SHIELDINGS
    Toronto
    REFERENCE: Professor David Coll

34. Frazer Taylor
    Director- Carleton International
    Carleton University
    Ottawa
    REFERENCE: Professor D. Coll

35. Andrej Tenne-Sens
    Systems Engineer
    Radio Communications Technologies
    Communications Research Centre
    Department of Communications
    Ottawa
    REFERENCE: Robert Warburton

36. Robert Warburton
    Manager
    Computers & Interactive Systems
    Communications Research Centre
    Department of Communications
    Ottawa
    REFERENCE: Documents

BIBLIOGRAPHY

ABM Research Ltd, Vista in-Trial Research II, Toronto, July 1983.

ANSI/CSA, "Videotex/Teletext Presentation Level Protocol Syntax- North American PLPS, American National Standard X3.110-1983, Canadian Standards Association T500-1983," by the American National Standards Institute and the Canadian Standards Association, December 1983.

Abt Associates of Canada, Evaluation Study of the Telidon Program: Telidon Marketing. Program Evaluation Series, Department of Communications, March 1985.

Alexander, George A., "Bringing Text and Graphics to the Home Screen," The Seybold Report, Vol 11, No 6 (November 23, 1981).

Archibald, Russell D.. *Managing High Technology Programs and Projects*. John Wiley &Sons Inc., New York, 1976, Chapter 1.

Ash Stephen B. and John A. Quelch, The New Videotex Technology and Its Impact on Retailers in Canada.. Technological Innovation Studies Program Research report , Industry, Trade and Commerce, Technology Branch, November 1982.

Atkinson, Richard C, Gordon H.Bower and Edward J.Crothers, *An Introduction to Mathematical Learning Theory*, New York: John Wiley & Sons, Inc., 1965, Chapter 2.

Bass, Lawrence W. *The Management of Technical Programs*. Arthur D. Little, Inc., New York: Frederick A. Praeger, 1965.

Bell Canada, ALEX Coming to Toronto. Ottawa: Corporate Public Relations, Ottawa, September 18, 1989.

Bell Canada, ALEX- Why Now?. Brochure, Ottawa: Corporate Public Relations.

Bell Canada, Brochure, May 1989

Booth, Peter J. and Russel M.Wills, Marketing and Economic Evaluation of Telidon. Department of Communications, Vol.I, March 31, 1983. DSS Contract

Booth, Peter J. and Russel M.Wills, Telidon Field Trial Evaluation: Content and New Services. Department of Communications, Vol. II, March 31, 1983. DSS Contract.

Booth, Peter J. and Russel M.Wills, Telidon Social Impacts Study. Department of Communications, Vol. III, April 1983, DSS Contract.

Booth, Peter J. and Russel M.Wills, Telidon Synthesis Study.. Department of Communications, Vol.IV, March 31,1983. DSS Contract

Booth, Peter J. and Russel M.Wills, Telidon Evaluation Executive Summary Report: Major Policy Issues and Recommendations. Department of Communications, August 1983. DSS Contract.

Bown, H.G., "Canadian Invention makes ALEX world-leader." Newspaper Article, May 1990, [photocopy].

Bown H.G. and C.D. O'Brien, "A Perspective on the Development of Videotex in North America," IEEE Journal, Vol. SAC-1, No.2, February 1983.

Bown, H.G., C.D. O'Brien, J.C. Smirle, Y.F. Lum and J.Z. Kukulka, eds. Telidon, Videotex Presentation Level Protocol: Augmented Picture Desciption Instructions. Ottawa: Communications Research Centre, Department of Communications, February 1982.

Bown H.G. and W. Sawchuk. "Telidon- A Review" IEEE Journal. Reprinted by Communications Magazine, January 1981, 22-28.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 31st Parliament, 1979: Issue No. 6, November 29, 1979.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 31st Parliament, 1979: Issue No. 7, December 4, 1979.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 32nd Parliament, 1980: Issue No. 1, June 26, 1980.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 32nd Parliament, 1981: Issue No. 17, May 28,1981.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 32nd Parliament, 1981: Issue No. 18, May 29,1981.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 32nd Parliament, 1982: Issue No. 26, April 20, 1982.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 32nd Parliament, 1982: Issue No. 31, May 18, 1982.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 32nd Parliament, 1983: Issue No. 65, May 26, 1983.

Canada. House of Commons, Minutes of Proceedings and Evidence of the Standing Committee on Communications and Culture. First Session of the 32nd Parliament, 1983: Issue No. 67, November 23, 1983.

Canadian Broadcasting Corporation (CBC) and Department of Communications (DOC),.Final Report on the Experimental Phase of a Broadcast Teletext Service- A Joint Project of the CBC and DOC, 1986.

The Canadian Telecommission. Policy Considerations with Respect to Computer Utilities. Ottawa: Information Canada, 1971.

Cioni, Maria and Peter G. Bowers, Telidon and Education in Canada. Ontario Educational Communications Authority (OECA).

Coll, D. C., Notes on Some Significant Canadian Telecomminications Activities, in Canadian Developments in Telecommunications: An Overview of Significant Contributions, eds. D.C. Coll and T.L. McPhail, The University of Calgary, 1986.

Coll, D.C., L.H.Strickland and E.Dieguez, Development of Guidelines for the Evaluation of Proposed TELIDON Applications. Carleton University: Department of Communications, March 31, 1982,.DSS Contract.

Coll, D.C., "Telidon Seminar Outline", December 9, 1982 [photocopy].

Communications Canada. Communications for the Twenty-First Century. Minister of Supply and Services Canada, 1987.

Cutler, Blayne "The Fifth Medium," American Demographics Journal , June 1990.

Deaks, Brian, C.A., Touche Ross. Interview by Carla Mascioli, May 1990.

Department of Communications. Program Evaluation Study: Summary of Findings for the Videotex Standards: Agreement Underlies Telidon's Success. Department of Communications, Brochure.

Department of Communications. TELIDON, Is There Any Other Choice ? Department of Communications, Brochure, 1980.

Department of Communications. Telidon, Brochure. Information Services,. May 1981.

Department of Communications. Telidon Today. May 1982.

Department of Communications. Telidon Directory. April 1984.

Department of Communications, Press Release. Fox announces $2.7 M for Telidon services in Toronto. Toronto: April 26, 1982.

Department of Communications, Behavioral Research Group. Behavioral Research on Telidon I. 1980.

Department of Communications, Behavioral Research and Evaluation. Telidon Behavioral Research 2: The Design of Videotex Tree Indexes. May 1981.

Department of Communications, Behavioral Research and Evaluation. Telidon Behavioral Research 4: Data Entry in Videotex: Keypad Design and Page Number Format. January 1982.

Department of Communications, Program Evaluation Branch. Evaluation Assessment Study of the Telidon Program. September 6, 1983.

Department of Communications, Program Evaluation Series. Evaluation of the Telidon Program. June 1987.

Department of Communications, Program Evaluation Series. Telidon Research and Development. January 1988.

Department of Communications. Telidon Content Development Programme: Request for Proposals. 1986.

Department of Communications. Telidon: Industry Investment Stimulation Program: Request for Proposals. 1983.

Department of Communications. Telidon Trials & Services. Department of Supply and Services, 1983.

Department of Communications. Telidon Reports Newsletter. March 1981.

Department of Communications. Telidon Reports Newsletter. July 1981.

Department of Communications. Telidon Reports Newsletter. March 1985.

Department of Communications. Telidon Reports Newsletter. August 1981.

Department of Communications. Telidon Reports Newsletter. March 1984.

Department of Communications. Telidon Reports Newsletter. October 1984.

Department of Communications. Telidon Reports Newsletter. March 1983.

Department of Supply and Services. Cantel for Canadians, Brochure.

Ekos Research Associates Inc.. The Benefits to Users of Telidon. Department of Communications, Program Evaluation, March 19, 1985.

Farrell, J.H. "A Gateway to Videotex." Telephony, Telephony Publications Corp., Chicago, Oct. 11, 1982.

Feeley, James "Telidon Trials and Operations- Results, Experiences and Future Trends." Proceedings from Videotex 83 held in New York, June 1983. Online Publishers, UK, 1983.

Foley, Mary and Paul Hurly, The Applications of Telidon Technology to Continuing Education, October 8, 1980.

Foote, John A., The Telidon Program: Canadian Videotex at the Crossroads, June 1984.

France Program (ANTIOPE), Advertisement, 1980.

"Research Methods: Videotex, the Individual and Society.". Proceedings from the France-Canada Seminar held in Ottawa 13-15 May 1981.

Fulford, Robert , "How Telidon May Change Your Life," Saturday Night Magazine, September 1980.

Gecsei, Jan. Towards Distributed Processing in Videotex. University of Montreal, August 1982. Department of Communications Contract.

Gilles, Donald. "Telidon: Technology, Industry and Government: Technological Determinism in Canadian Telecommunications." Conference on Culture and Communication Held in Philadelphia 1989.

Gilles, Donald. "Innovation in Canadian Broadcasting: The Canadian Broadcasting Corporation's "Project IRIS" Teletext Trial September, 1982 - March, 1984" Conference for the Learned Societies of Canada Conference Held in Victoria, B.C. 31 May 1990 to 06 June 1990.

Gurstein, Michael and Fernande Faulkner. "TELIDON and Its Applications." Proceedings of a Seminar, September 1980, edited by Socioscope.

"Videotex still a solution looking for a problem, but interest is reviving," Globe and Mail, 13 March, 1989.

Godfrey, David and Ernest Chang, eds., *Gutenberg Two*. Toronto: Press Porcepic, 1981.

Godfrey, David and Ernest Chang, eds., *The Telidon Book*, Toronto: Press Porcepic, 1981.

Government of Canada. Telidon Trials and Services, 1983.

Hewat, Brian., "Notes for an Address on Bell Canada's ALEX Videotex Service," in a News Conference held in Toronto 18 September 1989, by Bell Canada, Corporate Public Relations, Ottawa.

Hickling Johnston, Field Marketing Trial Strategy for Telidon, February 1979. Department of Communications Contract.

Hough, Roger W. and Associates,Ltd., A Study to Forecast the Demand for Telidon Services over the next ten years, December 1980. Department of Communications Contract.

Imapro Inc., Telidon Application Study, July 18, 1983.

Infomart. "Inside Videotex: The Future...now." in Proceedings of a Seminar Held in Toronto 13-14 March , 1980.

Infomart , Grassroots and Infomart Brochures.

Intelmatique. French Telematique Programme. September 1980

Lane, Martin, Chairman VISPAC. "Standards? What Standards? Or 699 and All That," Videotex Canada, Vol. 1 No. 2, Tele-Direct (Publications) Inc., August 1982

Lane, Martin, Chairman VISPAC. "Three Years on the Merry-Go-Round," Videotex Canada, Vol.2, No.1, Tele-Direct (Publications) Inc., Summer 1983.

Larratt, Richard. "Videotex: Information Explosion for TV," Radio-Electronics- New Technology, November 1981.

LINK Resources Corporation. Glossary of Terms. 1980.

Long, Larry. *Computers in Business*. New Jersey: Prentice-Hall Inc, 1987.

Lum, Y.F. "Memo to the Minister from the Deputy Minister" [photocopy]

Madden, John C., Videotex in Canada, Department of Communications Publication, 1981.

Maria Cioni & Associates Inc. "Understanding the Canadian Videotex Marketplace." In the Report on the Videotex Canada Meeting Held in Toronto 4-5 March, 1985.

Marsh, Roy, "Telidon/NAPLPS," Department of Communications, May 27, 1989.

Mill, Michael V. A Study of the Human Response to Pictorial Representations on Telidon. Department of Communications, Behavioural Research and Evaluation Group, 1980.

Mosco,Vincent. "Canadian Telidon." in *Pushbutton Fantasies*. New Jersey: Ablex Publishing Corporation, 1982.

Organisation for Economic Cooperation and Development. New Telecommunications Services, Videotex Development Strategies. Information Computer Communications Policy, 1988.

Papadopoulos, N., W. Zikmund, and M. d'Amico, *Marketing*. T.H. Best Printing Company Ltd, 1988.

Parkhill, D.F. Some Thoughts on the Information Revolution and Telidon. Submission to the Royal Commission on Newspapers, Kent Commission, April 7, 1981.

Address by Douglas F. Parkhill, ADM, DOC to Rotary Club, Royal York Hotel, Toronto, September 11, 1981.

Peat Marwick and Partners. Telidon Program Evaluation: Viability of the Telidon Industry. April 22, 1985.

Phillips, Dorothy. Behavioural Research and Evaluation. Department of Communications, 1975-1981.

Phillips, Dorothy. The Potential of Telidon as an Interactive Medium. Department of Communications, 1980.

Phillips, D.A., P.J. Hearty, S. Latremouille, W.C. Treurniet and T.E. Whalen, eds. "Behavioural Research in Telematics," Canadian Psychology, 26:3

Piskor, George. Videotex Market Forecast (1981-1990): Consolidated North American Perspective. Cavalier Information Technology Systems Limited, 1982.

Pressman, Elaine D. and Irwin S Pressman. Content Assessment: A Measurement Model for Videotex. Department of Communications, 1985.

Proust, Marcel. "Remembrance of Videotex North American Past " Videotex Canada. Vol. 3, No. 1, Tele-Direct (Publications) Inc., Summer 1984

Raffaele, J.A. *The Management of Technology: Change in a Society of Organized Advocacies*. Washington, D.C.: University Press of America, 1978, Chapter 5.

Rubenstein, Albert H. *Managing Technology in the Decentralized Firm*. John Wiley &Sons, 1989, Chapter 5.

Social Impacts Subcommittee of the Canadian Videotex Consultative Commitee. Information Technology: A Call for a National Dialogue on the Emerging Information Society. March 1983.

Socioscope Inc. A Report on a Focus group Study of User Responses to Telidon. 1983.

Stothers, Jennifer and Mark Dietrich. "Canada: Videotex Pacesetter." Videotex Canada, Vol. 3, No. 1, Tele-Direct (Publications) Inc., Summer 1984.

TEEGA Research Consultants Inc. Evaluation Assessment Study of the Telidon Program. Department of Communications, Program Evaluation Division, September 6, 1983.

TEEGA Research Consultants Inc. Telidon and the Standard-Setting Process. Department of Communications, Program Evaluation Branch, March 25, 1985.

Tenne-Sens, Andrej. Telidon : 699 to T500. Department of Communications, July 1982.

Truxal, Carol. "Americanizing videotex." IEEE Spectrum, November 1982.

Videotex Standards: Agreement Underlies Telidon's Success, Brochure.

Yin, Robert K. *Case Study Research: Design and Methods, Applied Social Research Methods Series,*. Vol 5, California: Sage Publications, 1989.

END

28-05-92

FIN