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TELIDON EVALUATION EXECUTIVE SUMMARY REPORT

MAJOR POLICY ISSUES AND RECOMMENDATIONS

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Introduction

The Synthesizing Study comprised the fourth and last volume of Wescom's national evaluation of the Telidon field trials in Canada. The work chronicles the evolution of Telidon from government labs through field trials, evaluates the field trial results and discusses the emergence of industrial, regulatory and social issues which this nascent technology raises. The work suggests directions for Canadian society, government and industry in the Videotex, Teletext and information technology areas.

To conduct this work, Wescom was asked by the Department of Communications to review all available research dealing with the field trials being conducted in Canada through 1982. In addition, secondary background studies were also provided and were incorporated into this study. In addition to the available research studies produced by DOC and the service operators, Wescom complemented the available information with its own previous works on Videotex. Where necessary, in-depth interviews and discussions were held with industry spokespeople. In most cases the field trial information was available only in secondary form, and as a result only limited use was made of primary data. The majority of information dealt with the three main trials

currently underway: B.C. Tel, Bell Canada Vista and Manitoba Tel Project Elie. In addition, reports were incorporated from the OECA trial, Cantel and N.B. Tel Project Mercury.

Objectives

The objectives of this study as specified by the Department of Communications were:

1. To integrate the results from the four analysis contracts, relevant background studies and additional information that may be required to provide a complete picture for Canada of the potential social and economic effects of Telidon.

2. To provide an assessment, and to suggest directions for, Canadian society, government and industry in the Videotex, Teletext and information technology areas.

3. To review and evaluate the process of using field trials as a means to transfer the Telidon technology to the extent resources permit, to document the process by which Telidon was developed in government labs and transferred to Canadian industry.

The work produced for this evaluation consisted of three analysis reports and an overview synthesizing study:

1. Marketing and Economic Impact of Telidon
2. Social Impact of Telidon
3. Content and New Services
4. Synthesizing Study

In addition to these four studies, a fifth dealing with the human and technical issues was also implemented. That study, however, was not under Wescom's mandate.

Emerging and Industrial Issues

Videotex policy may be divided into questions of social and industrial development policy, and also into short term (emergent) issues and long term issues. Emergent issues pertain to matters which arise as the technologies are being introduced, while the latter pertain to issues which arise after extensive consumer adoption. The industrial development policy issues are of critical importance since if the proper industrial measures are not instigated to foster the Telidon industry, the social policies are most likely to be irrelevant. This work concentrated on the emergent policy issues which directly involve industry structure, development and support in Canada, as well as marketing and social concerns.

The main policy and industrial issues which were considered include:

1. How will Canada's regulatory traditions for cable, the telephone companies and broadcasters be applied to Videotex and computer communication systems in general in Canada?

2. How will regulatory measures be likely to further or impede development of the industry, and are the principles behind the existing regulatory measures even relevant to Videotex (i.e. Canadian content, access rules, use of advertising, etc.)?

3. Given the regulatory changes in the U.S., according to which the phone and computer companies are allowed to enter each others' businesses, what effects will these regulatory changes have on the relevance of carriage content in Canada, and will this principle now impede our Videotex industry?

4. How can competition against the cable, telco and broadcasting industries be encouraged so that a better quality of services and competitive services of information emerge?

5. What are the current principles and policies to enhance serviceware and software provision for Videotex and Teletext?

6. What are the industrial implications of Videotex and Teletext for the development of Canada's high technology industries? Given the fact that Telidon is really a communications protocol and that the NAPLPS protocol is gaining wide acceptance, what are the implications of a concentration on equipment manufacturing if Telidon flourishes through software for personal computers?

7. What are the policy implications specifically concerned with the publishing industry and electronic publishing?

8. Given that within the next few years personal computers will be as powerful as larger computers used in present artificial intelligence research, and given a greater commercialization of intelligent expert systems programs for the home, education and small business, what are the economic implications for Telidon?

In summary, the emergent policy issues were identified to be standards, forms of industrial access, nature of competition, regulation of content, and development and export support of content and software.

Standards

One of the most significant issues in the whole debate relative to Telidon and Videotex development is in the setting of an acceptable standard. The ability to set industrial standards will partially determine who controls which market share.

The importance of standards lies in the fact that until some universal standard is adopted, mass production of equipment for display is not likely to take place. Foreign manufacturers, particularly the Japanese, will not build extensive amounts of Videotex equipment until a single display standard is established for North America. The adoption of standards gives assurance to equipment manufacturers and users that products will not be made obsolete by future standards changes. The policy issue here, then, is not whether Vidéotex/Teletext standards should be adopted, but what standards are optimal and at what level they should be applied.

The most significant development which has recently occurred is the setting of the North American Presentation Level Protocol Syntax, or NAPLPS. The CCITT Videotex Working Group has approved three standards for Videotex systems throughout the world. These are the so-called Alphageometric (NAPLPS), the Alphamosaic CEPT Format endorsed by the Conference of European Post and Telecommunications Administration, and Japan's Alphaphotographic Captain

System. The task at the present time is to develop common functions within these three systems to facilitate their interconnection.

An important development with respect to the microelectronics in the broader perspective of industry is the fact that the images and pictures developed using NAPLPS codes can be displayed and manipulated on a standard personal computer. Personal computer software has now been developed which will enable the display of Telidon Videotex pictures. Several Canadian software products have been developed which allow this capability:

1. Telegraph -- developed by Microtaure of Ottawa;
2. Tayson software of Calgary, Alberta;
3. MVI Microstar software of Ottawa, Ontario;
4. Ashdune Software Inc. of Ottawa;
5. Async Inc. of Toronto; and
6. Alphated Systems Ltd. of Edmonton.

In addition, hardware manufacturers are now using this standard in their products, e.g. Norpak jointly with Rockwell International.

Guaranteed Access

The regulations concerning form and extent of access will affect the diversity of Videotex/Teletext content.

Policy options for the terms of access of systems operators and IP's might involve:

1. A common carrier model could be followed to ensure access to the public telecommunications networks.

2. Under the common carriage model, a carrier could be permitted to operate Videotex systems through an arms-length subsidiary. In this case, external information providers would be guaranteed access to the communications network, but not to the Videotex system.

3. Alternatively, carriers themselves could be allowed to act as Videotex systems operators, with an accompanying responsibility to provide access for all external information providers.

4. Finally, a carrier could be permitted to operate a Videotex system and to exercise selective decision making regarding which services were included in it.

Cable and telephone companies could potentially operate under similar access conditions in the provision of Videotex: both could be required to act as common carriers for instance, or both could be allowed to provide Videotex systems with selective functions regarding content.

Alternatively, different terms could exist for telephone and cable companies. For example, cable companies could be allowed to exercise selective functions in services offered to subscribers, while telephone companies operated under the common carriage model. The perceived benefits, or restraints, that would result for either industry if a differential approach were adopted should be roughly balanced -- in the interests of fairness, inter-industry competition and practicality (to minimize debilitating regulatory debate).

Teletext presents quite different conditions of access compared to Videotex. Most importantly, the idea of unlimited capacity that underlies the idea of common carriage is not present. It is likely that Teletext will occur either in the very small vertical blanking interval (vbi) of an existing off-air broadcaster, or over cable-TV channels. In the first case, the question of access regards whether the TV broadcaster or an outside party will program the vbi. With cable Teletext, or Cabletext, the number of channels available is limited and access could be governed by a number of different approaches:

1. by regulatory allocations and priorities which entirely determine content;

2. by regulatory allocations and priorities which partially determine content;

3. by regulatory guidelines which influence content;

4. through selective decisions exercised by the cable operators, subject to some form of regulatory approval or review;

5. through selective decision by the cable operator alone; and

6. on a first-come-first-serve basis (whereby, like a common carrier, a cable operator must provide access when asked) until capacity is used up.

Options, of course, include combinations of these.

Nature of Competition

Given that the structure of the marketplace will influence and reflect the extent of competition, and given that under absolutely free market conditions competition between Canadian and U.S. information providers is "one-sided", a main issue here involves

what regulatory, tax and fiscal measures might be instigated to support Canadian content companies.

In particular, the recent deregulatory changes in the U.S. (according to which telephone and computer companies are allowed to enter each others' respective business) affects the question of which industries in Canada should be allowed to enter the Videotex market. Given the scarcity of domestic information provision, should both telephone and cable companies be permitted to offer Videotex services? The industry's future competitiveness will hinge directly on the regulatory issues that concern which IP's and system operators are guaranteed access to systems, who will be permitted to enter the Videotex/Teletext market, and what types of services (retrieval, interactive, etc.) they will be allowed to offer. Since several important potential IP's in Canada presently supply carriage, the conditions of foreign competition imply a re-examination of the separation of carriage and content, and of both the gains and detriments that this tradition entails.

The "separation of carriage and content" principle arises in the context of Videotex/Teletext industrial competition since, in many cases, firms which provide the communications networks to distribute Videotex could also be information providers, or at least Videotex system operators.

Although the separation principle has not been applied to cable, broadcasters or newspapers in Canada, it has been applied to the telephone companies, since it is thought that cross-subsidization by telcos of computer services over the phone lines would give them an unfair advantage.

Policy options with respect to the separation of carriage and content include:

1. Apply the content/carriage separation principle to all telecommunications carriers who wish to provide Videotex/Teletext services.

2. Apply the carriage/content separation principle to common carriers which are engaged in Videotex services, but do not apply this principle to the hybrids (i.e. cable companies) or to the broadcasters.

3. Allow carriers to operate Videotex systems, but prohibit their determination of content (with some possible exceptions such as white or yellow pages of the telcos).

4. Selectively apply a carriage/content separation policy for Videotex/Teletext systems at the level of the specific types of services offered. Thus, in the Canadian north, a telco might be allowed to offer telemedicine or messaging services if none are available.

5. Eliminate carriage/content separations for Videotex/Teletext.

The Regulation of Content

The specific ways content regulations are applied may partially determine which medium emerges as the predominant Videotex/Teletext carrier.

Content regulation is, of course, directly related to industrial access. Thus in Canada, unlike the U.S., networking among cable systems has not been allowed. The cable companies are also not allowed to create and transmit their own content (with the exception of the community channels). The question of who is guaranteed access to content creation over the new telecommunications media in Canada will most directly affect the new industry's scope, and given the lack of IP's in most of Canada's media, there are excellent reasons for policies and deregulatory measures to encourage a diversity of Videotex/Teletext content.

Regulatory content issues involve both Canada's competitive position vis a vis foreign (mainly U.S.) information providers, and internally relate to the issue of who is allowed to enter Videotex/Teletext markets and what content they are allowed to provide.

Another aspect to content regulation concerns the nature of the content itself: questions of quality; editorial concerns such as truthfulness; the use of advertising (particularly important given that Videotex/Teletext content may blend advertising with information). These questions have been faced in different ways with preceding media.

While there are a number of possible models for content regulation of Teletext and Videotex, a basic problem remains: any Videotex/Teletext system may involve communication networks, system operators and information providers, and there are presently no rules prescribing clearly defined areas of content responsibility.

Policy options with respect to the regulation of content over Teletext and Videotex involve:

1. Self-regulation by the information providers or by system operators (when the latter are also IP's), i.e. self-imposed content regulation.

2. Medium-specific content regulations, i.e. differing regulations for cable, broadcasters and common carriers.

3. Selective applications of existing regulatory practices pertaining to obscenity, equal access, etc.

Development and Export Support

Given the possibility that Canada may act as a passive market importing both hardware and content, perhaps the most critical set of emergent issues involves what specific forms of development and export support measures the government should instigate for the Videotex and microelectronics industries in general, beyond the subsidy program. With respect to a number of crucial economic indicators, such as balance of payments in high technology items and the extent of industrial foreign control, Canada more resembles some of the newly industrialized countries than it does other OECD countries; thus the applicability of microelectronic support measures in such countries to the Canadian situation becomes of central interest.

Rate Regulation vs Structural Regulation

There are essentially two forms of regulation: classic rate regulation, which establishes a return any firm is entitled to earn on its total investment; and structural regulation, which pertains to the scarcity of a given information resource and entry conditions. The first type of regulation has traditionally been applied to the telephone companies in Canada since they have a monopoly position.

With Videotex/Teletext, rate regulation could be imposed on the level of charges consumers pay for information, or on fees which advertisers or IP's might pay to enter pages into a data base. However, since the purpose of rate regulation is to protect consumers from monopolistic pricing, this form of regulation should not be applied to electronic publishing. Rate regulation could inhibit potential information and service providers, and such regulation would distort incentives in electronic publishing, since systems operators would have real incentives to increase their return by artificially inflating their rate bases. Also, there are major practical problems with rate regulation of electronic publishing. For example, regulators might have to review operators' decisions on the value of individual pieces of information or decide how to apportion the investment in a computer used simultaneously for electronic publishing and other services.

Structural regulation in the context of Videotex/Teletext relates mainly to whether broadcasters and cable operators will program or control Teletext (as services using a limited resource), and to the separation of carriage and content.

If parties who own the transmission channels are allowed to create content, it is argued that they may exclude competitors. The main problem, however, with a responding policy to separate carriage and content, especially in a country like Canada with a

paucity of information providers, is that automatic exclusion of carriers from providing content and services will eliminate valuable competitors from these areas.

A compromise here might involve a modified separations policy which gives the transmission companies more leeway than pure transmission.

Broadcast Teletext

Since the vertical blanking interval of television is a scarce public resource, it has been suggested that broadcast Teletext should be subjected to direct regulation in the public interest. Two possible approaches as to who may actually use the vertical blanking interval are suggested: the existing broadcaster under his or her broadcasting licence, or an unaffiliated party licenced by the CRTC to operate a broadcast Teletext service, leasing the vbi from the broadcaster. Narrowband Teletext (the 200 pages of the vbi) is so small that this space can really accommodate only one publisher.

In the latter case, given the possibility that an outside party might wish to offer a Teletext service which the user pays for instead of a service which is supported by revenues for advertising, it would not appear that such a situation would fall under the legalistic definition of broadcasting at all. However,

given the limited capacity of broadcast Teletext (approximately 200 pages), an outside programmer may be more attracted by the availability of full cable channels for Teletext purposes.

With respect to content regulation, it has been argued that broadcast Teletext over the vbi is part of a broadcaster's responsibilities as defined under the Broadcasting Act, and that the Television Broadcasting Regulations are applicable. Although there are problems in applying Canadian broadcasting regulations without modification to Teletext, the real issues involve:

1. whether such rules are even applicable to broadcast Teletext; and

2. given the ease with which content rules have been circumvented in other industries such as pay-TV, can the spirit of such rules be effectively enforced?

Aside from technical problems, the current form of content rules do not meaningfully apply to Teletext, since they apply to continuous program scheduling instead of information which may be accessed by the user at his or her discretion.

Although vbi Teletext functions on a broadcasting frequency, it makes little sense to treat it as regular broadcasting subject to content rules, since their imposition could inhibit the development of Teletext, and imposition of content rules could be as

easily circumvented in this media as they have been in others. Rather, vbi Teletext should be classified by the CRTC as non-regulated service and not subjected to rules or rate regulations. System operators should have the freedom to select content, to create pages, and to switch back and forth between free and pay services.

Many of the regulatory stances which could maim Teletext developments are tied in with its broadcast classification, and the CRTC should establish a new non-regulated status for narrowband Teletext.

Telephone Videotex

Although with the recent "attachment" decision anyone may attach equipment to Bell's lines in Canada, the phone companies are monopolies and the main policy issue here is whether or not the carriers should be allowed to provide Videotex information content and whether telephone Videotex should be regulated according to rate of return.

With respect to the issues of separation and access, the telephone companies should be permitted to originate and offer Videotex/computer-based information, data and transaction services, utilizing an arms-length relation and without rate regulation, but with the provision that they be required to provide equiva-

lent access to systems operators and information providers who wish to instigate their own Videotex services. Canada should act now and give phone companies a measure of competitive advantage in this new area. The aim should be to strengthen the Canadian Videotex/Teletext industry. While a common carrier model should be maintained to ensure access to switched phone networks, telephone companies should be permitted to operate Videotex systems, with responsibility for content. (This provision should not be subject to any specific content regulations such as a specified amount of Canadian content, but should rather be governed by general regulatory matters pertaining to obscenity, equal political access, etc.)

Teletext and Videotex on Cable

Cable TV in Canada has been given a "hybrid" status by the regulatory agencies, exhibiting characteristics of both a programmer of content and a carrier.

If any cable operator should want to present full channel Teletext information, s/he would have to seek authorization from the CRTC. The resultant CRTC decision would then be based on such factors as the uses to which Teletext channels were being put, issues of media concentration and cross-ownership, the quantity of channels available in a specific location, and so forth.

Apart from developing content themselves, cable operators could acquire and present Teletext/Videotex services in two ways: assembling a package of material derived from outside information providers; or leasing capacity to a systems operator. (In the former case, the cable operator itself acts as the system operator.) Under either arrangement, cable operators are prevented from assuming an information creation role, but act with some say concerning what types of packages they assemble.

Cable companies should be allowed to provide Videotex/Teletext information and transactional services without being subject to access provisions, according to which they must provide access to their cable networks by other systems operators or information providers. This suggestion reflects the role of the cable operator as a retailer of a select package of services to subscribers.

Regarding Teletext, cable operators would require CRTC approval for channel usage. Problems of diversity -- of either type of content or information source -- could be dealt with as they arise. The question of arms-length subsidiary arrangements is less central than the designation of the cable operator as a retailer or packager of services, with a degree of selective control over content, subject to regulatory monitoring. The initial aim of policy should be to stimulate Canadian industry. At later times, if necessary, further regulatory provisions may be developed -- to provide interconnect access, for example, to

outside Videotex system operators if cable evolves into an information utility medium.

Finally, given the nature of Videotex/Teletext content, where "information" and "advertising" easily blend and advertising support may become significant and necessary, cable regulations must be amended to allow "advertising" on services of this sort.

The general deregulatory stance proposed here, involving the elimination of a separation policy, will encourage vertical integration and Videotex/Teletext coalitions involving carriers, broadcasters, newspapers, cable companies and financial sources. A stringent separations policy, on the other hand, would essentially prevent vertical integration in information and service provision. While access to the switched phone network is guaranteed for small information providers, the development of larger IP's, able to withstand and compete with foreign products, is essential. Diversity, meanwhile, is fostered by: assured access to the public phone network; attractive provisions for a number of industries to enter Videotex/Teletext services; and liberal participation by carriers in content provision to encourage the development of distinct sources of information in a given community.

Field Trial Evaluation, Marketing and Economics

Although the results of the Canadian field trials have been evaluated in detail in other parts of this research program, particularly the marketing and social studies, the synthesis study did reveal the key points resulting from the evaluation of the field trials. At the time of the writing of this report, 24 field trials were in progress. Eleven of these were operated by the telephone companies, one by broadcasters -- the CBC -- five by cable companies, four by federal, provincial or municipal government agencies, and three by educational institutions. An emphasis on a selected set of field trials was necessary in these studies, since they constituted the prime source of data. These were: B.C. Tel, Manitoba Tel's Project Elie, Bell Canada's Vista, OECA, WETA in Washington and N.B. Tel's Project Mercury.

In assessing and evaluating the field trials, consideration was given to the goals and objectives of each of the following:

1. the federal government;

2. hardware suppliers such as Microtel, Norpak and Electrohome;

3. system operators such as telcos, cable companies and broadcasters;

4. information providers;

5. sub-IP's, comprising small page creation firms placing their pages on behalf of clients with an umbrella or end-page supplier or information suppliers actually implementing the production; and

6. users.

Field trials have been dominated by the involvement of the telephone companies, with eleven of the telephone company trials accounting for the placement of approximately 1,500 terminals, or about 75% of the total number in place.

In the initial development of the Telidon program, trials were defined by the federal government as having four basic purposes. These were:

1. to promote the introduction of Telidon terminals in the field trials;

2. to stimulate the services which might take advantage of Telidon's inherent capabilities;

3. to demonstrate the superiority of Telidon over competing systems; and

4. to create a government/industrial vehicle which might take Telidon to the marketplace.

In evaluating the government goals for the program, a number of more specific objectives were defined. These were:

1. to have operational Telidon services in all major urban centres utilizing telephone and cable by 1985;

2. the instigation of two national Teletext services in French and English;

3. to eventually have Canadian manufactured Telidon terminals and adapters available as standard over-the-counter retail products in stores across the country;

4. to make Telidon the North American standard of Videotex;

5. to develop an operational mobile Videotex service;

6. to provide public information services;

7. to instigate a viable electronic publishing industry; and

8. to develop export industries supplying Telidon software and hardware.

Correspondingly, the goals of service providers have been defined as:

1. the assessment of Telidon's technical capabilities;

2. the encouragement of spin-off activities and evolution in new types of applications;

3. to assist in the development of a marketing plan for service providers which would result from the assessment of the user pilot trials;

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;

5. to know how quickly market sectors such as retail, banking, travel, electronic mail, etc., will view Videotex/Teletext services as a worthwhile, cost effective media;

6. to gauge some sense of mass market appeal of Videotex services; and

7. to establish standards in sectors such as education.

A summary of the key findings from this evaluation reveals:

The manner of implementing field trials introduced significant restrictions and limitations on interpreting user response and on the estimation of market demands for future services. Whereas initially the field trials were designed to provide a laboratory or experiment in which various responses to Telidon programs could be assessed, this in fact was not capable of being carried

out primarily because of the minimal amount of co-operation between the field trial operators and because of the lack of co-ordination at the early stages of trial development and implementation.

It is not yet known what the Videotex/Teletext products will actually comprise, and furthermore the existing market projections for both Telidon hardware and software have been shown to be widely inaccurate. Projections, made over the past three years, have ranged anywhere between 40,000 terminal installations on upwards of 500,000 by 1984.

This study suggested a complete reassessment of the demand forecasting methodology is required for assessing the potential for Telidon penetration in the residence and business market. Such a reassessment has to be based fundamentally on a totally restructured demand estimation model which takes account of more of the factors of the marketplace and product attributes than have been done to date.

Commercial viability of the Telidon product cannot be directly assessed as a result of the response to field trial services. In many of the trials the desire of page creation companies and service operators to generate short term revenues rather than to refine their techniques and investigate actual applications for Videotex/Teletext has led to very limited content development and

hence a high degree of user rejection after initial enthusiasm. Moving too rapidly into a market phase has meant that very little information can be tapped to substantiate possible future sales.

At the present time a reassessment of various applications and implementation strategies is taking place among most of the large-scale operators, and in only a few limited examples are full-scale commercial operations now being implemented. It is worth noting that those that are the most successful are not the ones which emerged from the field trial activity (i.e. Grassroots).

Service operators have viewed the trials for the most part as a chance to offer them information related to the technical, physical and human resources necessary to provide a Telidon service offering. The trials have enabled the successful evaluation of technical capabilities of Telidon equipment and modes of service delivery. Hardware has been evaluated, networks have been assessed, and the carrying capacity of optic fibres vs copper wires and broadcasting are all now well known and established.

Responses of system operators and those involved in the trials, and those who are hoping to learn more about the market response, indicate that to date many questions remain unanswered about what potential exists in the various market sectors of residence and business. Further efforts need to be placed, therefore, in

examining these sectors relative to the types of applications which would be needed and desired.

Considerably more effort needs to be placed on the development of serviceware, software, content and specialized applications such as transactions, banking and transit information systems.

Targeted applications which have emerged from the trials and which offer likely potential are agriculture, tourism, banking, specialized uses such as stockbrokers, retailing and public information for community services and transit.

The adoption of the NAPLPS standard has meant the capability for developing a strong presence in the graphics market by Canadian suppliers is very real. This, however, was not assessed in the field trial setting and is something which is worth considering for the next phase of research and investigation.

There has been an extremely slow development and implementation strategy for transactions and messaging. Telidon's suitability to each of these areas are well known, yet in Canada there did not emerge in any of the trials an effective test of messaging or two-way transaction capabilities. Only recently have retail shopping examples emerged, and as yet there is no banking service utilizing Telidon for at-home banking.

Most users expressed general satisfaction with the Telidon equipment, such as keyboards and terminals, and dissatisfaction with keypads. However, it should be noted that at the present time a number of equipment manufacturers, i.e. Microtel Pacific Research, are now working on new designs for keypads.

Information retrieval has been the primary application in most trials, and content quality has been shown to be paramount. Dissatisfaction with the quality of the data bases has occurred, with many users expressing initial interest and then subsequent disappointment with trial service offerings.

There has occurred a moderate response by in-house business users to present Telidon configurations, specifically for the data bases as developed in the trials. Interest has been expressed for messaging, but a quality service has yet to emerge. These, however, are likely to be brought about in the next year. This will stem from the increase in competition in the telecommunications market for electronic messaging services.

To date there has been a penetration of less than 5,000 terminals within the Canadian marketplace. Although this has stimulated the terminal manufacturing sector somewhat, terminals are still very expensive -- averaging close to $2,000 -- and are restricted in their functions to display and information retrieval. In the future it is expected that these terminal prices will come down

below $1,000 and are likely to be somewhere in the neighbourhood of $600. The important question which remains, however, is whether these types of terminals, with their limited capabilities, will offer enough benefits to the user, either in the home or business market, to justify an expense of $600. Of more significance is the fact that now there is a merging of technologies whereby Telidon can be integrated as software into personal computers. The market for this service is likely to expand much more rapidly than if one simply waits for the price of Videotex terminals to come below $1,000.

With respect to the industry investments, Wescom's statistics indicate that over $100,000,000 has been invested by the private sector in the Telidon industry, with at least 55 firms now directly involved. The government to private investment ratios are estimated at 1 to 3.

Internally the trials have increased public awareness through media coverage, trial participation and interaction with the public terminals (Cantel, B.C. Tel public trial).

Internationally, the trials have helped established Telidon as an integral part of the recently approved NAPLPS standard. This has been promoted by AT&T and CBS and now has the support of the International Standards organization (CCITT). Telidon equipment

and software sales have also been encouraged at the international level.

In general, the following points should be emphasized:

1. The field trials results suggest that Videotex and Telidon face extremely tough competition from competing technologies such as personal computers, work stations, graphic design terminals, etc.

2. The main way to sell Telidon is to blend it into other competing and complementary technologies. This is the case for encouraging business use as well as residence services. Telidon is more likely to be of interest as an addition to business than as a stand-alone unit.

   This market is likely to be highly segmented, with large business more likely to view stand-alone systems as appealing. Small business would be most attracted by its linkage to personal computers and with other office products. Thus, developing a capability for Telidon in personal computers, work stations, etc., enables Telidon to take advantage of the rapid penetration and proliferation of these services into the business market. With respect to the residence market, it is critical that Telidon be made available through whatever means are at hand, e.g. if cable companies want to provide Telidon services, then they should

be encouraged to do so, and efforts to develop a cheap decoder enabling two-way capability over the cable network should be encouraged. Likewise, telephone companies can provide the services through linkage via the standard telephone lines. Finally, providing a capability for Telidon on cheap home computers would also be a good way of encouraging their penetration.

Competition from the U.S. and Japan is likely to be quite significant either in software or in hardware possessing the NAPLPS standard. This is particularly relevant given AT&T's thrust in developing a home Videotex terminal and its intention to sell products in Canada.

3. Hardware, however, is not going to be the way to gain the greatest penetration of Telidon. Content development must go hand-in-hand, and much more development needs to take place in the area of applications. Developing a mass encyclopedia-like information retrieval capability has two fundamental problems. One is the volume and types of information that individuals will want, and secondly the competitive factor. Already there are a number of very good and competitively priced information retrieval services operating primarily in the U.S. (The Source).

4. The field trial experiences have shown that information content must be highly directional, inexpensive and offer utility to the user. Entertainment is only one factor in a whole range of issues which will lead to higher and higher probabilities for penetration into the home market. Further investigation needs to be made on how the various service attributes interact together in order to create a useful and beneficial service to the individual.

5. Videotex service operators must provide linkages to a wide variety of data bases utilizing, where necessary, gateways for facilitating access to the information. It is not likely that we are going to be able to directly legislate and regulate content development; therefore it is critical that individuals be given the capability to select from a wide range of content, and at the same time that Canadian industry be encouraged to develop content which could compete effectively with those services which already exist in the U.S. Without an encouragement of the domestic industry, it is very likely that individuals having the capability for on-line information retrieval will go to those services which already exist in the U.S.

Competing and Complementary Technologies

This report examined six items which could significantly influence the growth of Videotex/Teletext and Telidon services in Canada over the next decade. These areas were:

1. artificial intelligence;
2. information retrieval;
3. on-line data bases;
4. the integrated office and computer graphics;
5. computer-based instruction; and
6. the cable industry and Videotex.

The growth of more versatile presentation and transmission technologies will have a significant impact on Telidon. The growth of personal computers with extremely sophisticated graphic enhancements has been estimated at 38%-75% annually. Their diffusion, along with the emergence of cable services, have placed increased pressure on implementing stand-alone Videotex and Telidon services.

The current development of cable in Canada presents the most direct threat to telephone company opportunities in the provision of Teletext and Videotex services. While the business market is still the prime focus for telephone company and Videotex effort, the growth of dedicated networks still poses a threat. Although

the cable industry is still mainly restricted to one-way services, the increased popularity of Teletext services indicates that this may not be a problem for information retrieval. All of these opportunities suggest that cable may have a much larger role to play in the provision of Videotex/Teletext services than the telephone companies, particularly in the residential markets. Their role, however, is not likely to be generated as quickly as the telephone companies and may, in fact, occur in the medium-term, 5-7 years, for Telidon services in Canada.

Videotex is well suited to being bundled into a number of current office services and for providing direct competition to some hardware manufacturers in the area of integrated office equipment. Such an accumulative or additive approach to Videotex fits in well with the general trends in integrated office applications. However, the main constraints of Videotex are its high price and limited software for applications.

A significant amount of interest has been expressed in Videotex and Telidon services from the educational market. There is every likelihood that over the next few years further developments in that area will take place. However, at the present time, in spite of considerable policy interests in Canada concerning the use of Videotex as a delivery mechanism for computer learning, Videotex/Teletext offer limited mass market use in that field. More interest is being directed to the area of computer re-

training and to programs other than formal education. These are likely to offer opportunities for Telidon in the future.

The highly supported and subsidized Videotex and Telidon industry in Canada is presently focused almost entirely on meeting requirements of the field trials and experimental services. Subsidization efforts have been directed almost entirely to the hardware area. The future must see a movement away from this emphasis to applications and content development. Although the field trials will continue to provide the main impetus to the industry over the next few years, there is no doubt that at some point government support must be diminished and the industry will have to demonstrate its own viability. The key to that viability will be the development of two-way capabilities, low priced integrated graphics display and transmission services, transaction services, messaging, education and retraining applications, integration to other services and software development.

Industry Developments

In this section of the report attention was directed to the supply side of the Telidon industry and is concerned with those companies and organizations which now form the core of the Canadian Videotex industry. These include:

1. service providers, telephone companies, cable companies, etc.;
2. information service providers and page creators; and
3. hardware manufacturers and software developers.

In general, the analysis of the Telidon field trials focused on the identification of applications, market sectors, preference for content, terminal design and service operation. Very little information emerged which focused on the structure and supply side of the industry.

An overview of the structural relationships in the Canadian field trials evaluated as part of this study reveals that the majority have followed a structural model composed of four levels:

1. service provider;
2. umbrella IP;

3. other IP's; and

4. sub-IP's (information suppliers, primary).

This type of approach to service provision has evolved as a result of several factors:

1. the reluctance of some telephone companies to become providers of information (for regulatory reasons primarily);

2. the efficiency of segmenting the tasks for providing a prototype service and therefore minimizing risks to individual participants;

3. the movement into the Videotex industry of companies from different business sectors, possessing expertise in areas such as publishing, directory production, networking, software and computing services;

4. the need to develop service offerings in a variety of locations across the country in a relatively short time frame;

5. a lack of any one organization with a degree of vertical integration to provide all services necessary;

6. the nature of government support for a variety of companies to participate in the industry in various locations; and

7. the willingness of service providers to encourage and allow access to the network and utilization of computer services from page storage and transmission.

Assessment of the relationships which evolved in the trial situation and a review of the findings of the evaluations have led to recommendations in seven key areas for future service provision. These include:

1. management;

2. co-ordination of services;

3. development of strategic marketing plans;

4. adherence to standards for service operation and page maintenance, design and delivery;

5. development of an efficient and effective billing and customer data file;

6. a consistent, co-operative and equitable approach be taken with respect to the quality of service provision, with particular emphasis focused on assessing market needs and providing high quality service; and

7. emphasis on the development and institution of gateways to enhance the range of information available to all service

offerings, and to encourage the greatest diversity of access.

Investments

Overall federal government investments in Telidon between 1979 and 1982 totalled $47 million. It is estimated that a further $130 million has been invested by all sectors of the Telidon industry for the period 1979 to 1982. This provided a total of close to $180 million to the end of 1982, with estimates for 1985 of $300 million.

An in-depth assessment of industry participants in terms of their allocation of dollars for developing a service revealed that software costs, user terminal costs and manpower and engineering requirements require the greatest amount of funding. To date most of the funding provided by DOC in terms of field trial development and subsidy has been allocated against the cost of purchasing user and IP terminals. Much of the development for software, data base management and engineering is borne solely by the system operator.

An assessment of the implications of the Telidon industry with respect to job growth potential revealed that there was a significant amount of optimism among most of the industry participants in terms of the demand that is likely to emerge for services. As

a result, there will be new job opportunities and employment prospects being developed over the next two to five years. Areas most likely to require increased personnel were marketing and sales, consulting, management and to a lesser extent development and systems applications engineers and designers. The present situation sees a dominance of the technical and service personnel, while the future holds promise in the areas of marketing management, consulting and sales.

Assessment of the returns which are likely to accrue on investments in Telidon indicated that a period of between three and ten years was a likely scenario to make the industry profitable. This suggested the late 1980's -- 1986 to 1990 -- are the critical periods for the industry. The results indicated that industry growth is likely to be much slower than originally anticipated, and that the market will remain relatively small for the next few years. Estimates of market size were set at $60 million by 1985 for one sector, while overall Canadian revenues generated were set between $200-$300 million.

There was a significant amount of uncertainty expressed about the future possibilities of Telidon services which stemmed from the highly competitive nature of the services and the high cost of implementing a commercial service. It was acknowledged by a number of industry participants that services are still not

profit-making and they are a long way from having a substantial and secure revenue base.

While over $100 million has been invested in various Telidon programs to date, it would seem that successful and substantial revenues are not anticipated for at least another three to five years. It is likely that a five to ten year perspective is more realistic for the achievement of the level of return most companies are expecting in order to support commercial ventures. Those companies providing specific and targeted services have already seen significant levels of interest in their operations, and most are expecting profits to be achieved within two years.

Larger companies providing Videotex services expected a substantial improvement in return on investment and in profits from 1985 onwards. The basis of those projections was the growing interest for services such as Teleguide, where over 4,000,000 accesses per month were estimated, and the perception that in-home terminal placements are going to increase rapidly across Canada and North America in the 1984-1986 period.

The most significant prospect for future growth, however, was viewed as the international market. The need was identified to place much more emphasis on applied uses of the technology. Transaction services such as electronic banking and home teleshopping were all identified as critical to fostering positive

market developments. Within the manufacturing and hardware sector, a high degree of uncertainty was expressed about the possibilities for short and medium term gains. As yet there are no mass production schedules for Telidon terminals, decoders or TV sets equipped with Videotex systems. There were, however, a number of indicators suggesting joint Canadian/U.S. ventures in hardware development.

Market Forecasts

In all sectors of the industry there was a belief that the forecast provided for the penetration of terminals into the residence market made very little sense. These were clearly overly optimistic and were not likely to be reached in any near term. Current estimates should therefore be scaled down by significant amounts and set back at least two years, according to most industry spokespeople. Most of the companies were now projecting a five to ten year period before the penetration of Telidon would reach significant levels in either the business or residence market. Critical developments for market take-off were identified as:

1. the need to develop interactive services;

2. the need to enhance capabilities and possibilities for electronic banking;

3. the need to develop more effective public services;

4. the need to reduce the price of hardware for IP's and end users below $1,000 and preferably between $600 and $300.

5. the need to provide incentives for the investigation of new applications focusing on content; and

6. the development of an international export potential of Telidon tied in with other high technology products.

Further discussion of the government incentives and funding revealed that there was a mixed reaction among industry spokespeople. Some felt that a reduction in government activities and funding would encourage more investment from the private sector since there would be more of an inducement to have enterprises become profitable over the shorter time span. Increased funding should be directed to the development and investigation of market needs. Attempts should be directed towards application assessment and the matching of technology capabilities with specific market requirements.

Developments should be directed towards content development and new and innovative applications for the technology which emphasize transactions and business services. Research on international market possibilities should also be undertaken. Specific recommendations were:

1. encouraging much broader and more in-depth research into the issues of content and data base structure;

2. funding developments for software and enhanced applications;

3. conducting more in-depth and systematic research dealing with market needs and to identify applications which may be amenable to Telidon;

4. providing financial incentives in the development of those areas to companies and individuals who are either already participating in the industry or are willing to invest;

5. to encourage low cost and forgivable loans for research work on content and applications;

6. to develop programs in universities and college which encourage research on new services and the computer fields such as Telidon and other interactive systems;

7. to examine the Teletext field more aggressively as a means of encouraging overall penetration and acceptance of Videotex services, particularly in the residence market;

8. allowing research and development write-offs for software development;

9. encouraging provincial governments to examine in a more systematic way the educational applications of the technology and to support the development of services and software which address applications in that sector;

10. to de-emphasize the current situation where the hardware and manufacturing sectors have been provided with the majority of incentives, and to shift the emphasis of the next phase of funding to content development and applications research;

11. to stimulate efforts to address international marketing through a systematic program of market intelligence assessment and research;

12. to provide support for the export of products and services; and

13. to develop policy and regulatory stances which foster an open market approach to service provision and which restrict the monopoly control of services.

Content and New Services

Objectives of the Study

1. To provide an inventory of existing Telidon content and services.

2. To address issues arising from the perceptions of the data base content and new services in the Canadian Telidon field trials through usage data and qualitative research from selected sources.

3. To examine information service provision, the evolution of content, and the roles played by IP's and sub-IP's in the creation and development of content.

4. To consider the viability of public and community information.

5. To forecast future content and new service configurations for business and residential users with accompanying policy recommendations.

Approach Used in the Study

1. The report focused mainly on the content and services offered in the B.C. Tel, Elie and Vista Telidon field trials. In addition, data from Cantel, Project Cabot, TV Ontario, Alberta Correspondence School and the WETA/AMC trial were used.

2. A variety of sources were utilized in this study, including:

   a. tracking data;
   b. qualitative research reports;
   c. secondary research studies;
   d. observations and measurements of actual data bases;
   e. structured telephone interviews.

3. Tracking data was only available for the B.C. Tel, Elie and Vista field trials.

4. Telephone interviews were conducted with sub-IP's and IP's.

5. The qualitative reports provided a variety of information relating to the users' response to content: (note that these are only a sample of the reports used)

6. Case studies were conducted for the three major trials using tracking data, qualitative research reports and observations of the actual data bases.

7. An inventory undertaken for each trial provided information about:

   a. volume of pages and types of services available;
   b. availability of community and public interest information;
   c. evolution of content.

8. The responses of the users to the content and services of each trial was determined using the following measures:

   a. types of information most frequently accessed;
   b. users' qualitative evaluations and ratings;
   c. location of terminals and influence on usage;
   d. length of sessions;
   e. comparing Telidon to other sources.

Future Developments and Emerging Applications

(This section drew mainly upon the B.C. Tel evaluation.)

1. This section has examined the penetration levels of specific types of business equipment in the B.C. Tel field trial.

Those offering potential for the integration and adoption of Telidon in the future involve messaging and image transmissions services such as facsimile, telex and communicating word processors. Presently, these all have medium to low penetration but have high future potential. Telidon most probably will not be a substitution for such services but rather a complement which conceivably could offer simple and convenient access at low cost. Although this specific field trial sample is by no means technologically sophisticated, it is apparent that penetration rates for enhanced processing, image transfer and messaging technologies are rapid, but again future Telidon adoption will refine Telidon's ability to develop and implement applications such as messaging, transactions and interactive capabilities in existing offices.

2. This section has substantiated the need to provide a Telidon service which is bundled into other technologies as software or chipboards, is quick in response and simple in use. Current systems configurations in the field trials have left many users disappointed. Movement away from the advertising and marketing functions of Telidon is necessary if its perception is to shift from "an electronic catalogue" to a multi-functional software protocol which may be incorporated into a wide variety of existing business technologies.

New Directions for Content Development

1. Before a significant penetration of services occurs, enhancements will be required. These will include:

   a. more simplified and accurate messaging and transactional capabilities;

   b. keyword search capability;

   c. photographic transmission capabilities;

   d. lower cost page creation terminals.

2. The only configuration of Telidon analyzed in the field trials was essentially an on-line information retrieval service. System designers and content developers must begin to test two-way interactive services and transactions in addition to on-line retrieval services.

3. Natural query languages will render the tree structure search capabilities of Telidon and simple keyword searching procedures obsolete. Therefore, it is recommended that research be instigated to incorporate such AI based search procedures into Telidon systems.

4. Analysis of the various data bases and field trials has revealed at this preliminary stage a need for standards to be developed for content. However, more than technical specifications are necessary, and effort must be directed

toward the interlinkage of services, gateway technologies, classification schemes, search procedures and data base maintenance.

5. The diversity of content and new services is directly dependent on regulatory measures, i.e. who is allowed to present what over Videotex and Teletext. Specifically, we recommend that:

   a. VBI Teletext should be classified by the CRTC as a non-regulated service and not subjected to content rules or regulations, and systems operators should have the freedom to select content and create pages of their own choosing.

   b. With respect to the issues of separation and access, the 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 systems operators and information providers who wish to instigate their own Videotex services.

   c. Cable companies must be allowed to provide Videotex/Teletext information and transaction services without being subjected to access provisions, according to which

they must provide access to the cable networks by other systems operators or information providers.

6. Approaches to Telidon product marketing must involve service tiering. Such will encourage the presentation of "grades" of services such as information retrieval. These should be considered in tandem with tiered pricing which reflects the cost of the service offering.

7. Selected Canadian industries such as banking should be encouraged to provide capabilities for Telidon transaction services and be provided with the appropriate regulatory environments to offer such services.

8. Software for content and service creation (such as applications generators) should begiven all of the tax and fiscal benefits which are itemized in the final summary study -- Canada should also instigate significant reduction in business taxes on exported informatics products to Pacific Rim countries (such as Videotex/Teletext software).

9. Targetted applications which have emerged from the field trials and are likely to offer potential are:

   a. agriculture;

   b. tourism;

   c. banking;

d. retailing;

e. specialized users, i.e. stock brokers;

f. transit information systems.

10. In order to ensure access by a wide variety of service providers and page creators, policies must be adopted which will restrict large IP's from discouraging smaller IP's from creating and placing information on a data base. Large integrated Videotex service providers must allow for access to page creators and not utilize their position to restrict competition in providing services.

11. The Videotex industry is fragmented and involves numerous components: hardware, content, network provision, page creation, etc. The merging of skills among complementary sectors will have to be encouraged. Likewise, uniform standards will be required in all sectors to facilitate the independent development of unique service features which can be integrated into a common service.

12. Public and community data bases have a unique role in provision of Videotex services. An important short-term goal for governments is to encourage these services, but at the same time to not make them dependent on government funding. Support to investigate alternative funding arrangements through joint industry and agency projects should be pro-

vided. Long-term funding for content development will most likely have to be derived from commercial services, either in the form of user fees or through tax incentives directed to commercial operators.

13. While the ability to obtain information from all sources should be encouraged, there should be measures developed which will inhibit uncontrolled domination of networks and broadcast services by foreign controlled suppliers. Likewise, storage of content should be maintained to as high a degree as possible in Canada.

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. In many cases, the Canadian market may only serve as an efficient and subsidized test with the long-term benefits accruing to a U.S., Japanese or European parent company.

14. The assessments of the content provided in the field trials revealed that a significant amount of information is commercially oriented and is heavily biased towards advertising, marketing and promotion. Important questions will be raised with respect to how commercial messages are presented and the potential for misrepresentation to the consumer. In addition, there are problems of monitoring these new media

for ensuring that ethical practices, etc., are followed in the presentation of advertising messages.

15. As new technologies emerge and as the possibility for Telidon being combined with microcomputers becomes a reality, the difficulty of updating pages may be alleviated. In the interim, however, a mechanism for "on-line" updating and editing of user page files may be a popular service enhancement. It may also be useful for some standards of turn-around time to be established and used as a guideline when alterations to existing pages are required.

16. Public locations were shown in this study to have unique requirements for Telidon, and that market segment offers some realistic opportunities for Telidon. Consideration, however, is required in the design of terminals, equipment maintenance and content development. The development of simple access procedures and "quick pages" could enhance services in these locations where a minimal amount of time can be allocated to the use of Telidon. As well, the content should be directed to timely and easily identifiable topics of relevance to the cross-sections of people likely to require information at a particular site. Typical applications which have been suggested include transit and travel, news and entertainment, shopping guides and special service directories.

Social Issues

Thus far, the diffusion rate of Videotex and Teletext through business and homes is comparatively slow in relation to the diffusion pattern of the competing and complementary technologies such as personal computers and communicating word processors. Nevertheless, there is every reason to believe that if Telidon eventually becomes a much heralded information utility, it will have widespread social consequences affecting the nature of our institutions, social and personal relations, as well as cultural and political structures.

An important part of this series of studies was to attempt to assess what some of these social impacts would be, as demonstrated in the activities of the field trials and related events for Telidon over the last four years. The most important issues which have emerged in both literature and the actual field trials involve:

1. access;
2. privacy;
3. diversity of content;
4. vulnerability; and
5. employment impacts.

In reviewing the various reports and approaches to assessing

social impacts, considerable controversy has arisen. Thus far there is very little real evidence to clearly denote trends with respect to the identification of social issues. The problem with attempting to identify social effects of any new technology is that the prognosticators are invariably wrong. Social effects of a new technology such as Videotex are usually unanticipated because there is virtually no real means of predicting them. One is almost intelligently guessing, and while it is safe to say that there will be certain impacts, the ones which will ultimately emerge may not be clearly visible at the present time and no predictions about social impacts can be made for the longer term.

Social impacts of the new technology may be divided into short term and long term impacts. With respect to the long term impacts, it is the transformative impacts which are most important. Transformative impacts have been defined as those which have major social, cultural and economic consequences and which generally last for a number of years and whose impacts can not be initially visualized.

In assessing Videotex and looking at the longer term transformative effects, the approach used in this study was to examine the ways previous information technologies have transformed society, at what rates these have occurred, and then to utilize these lessons to orient ourselves to future possible impacts for Telidon.

Secondly, it is important to realize that technology and innovations tend to cluster in time, and that Videotex, although providing one form of the much vonted information utility, is but one development amongst many emerging from microprocessors, others include personal computers, video cassette recorders, executive workstations, word processors, etc.

Perhaps the most important point to keep in mind when assessing these transformative effects of technology is that it should be intuitively obvious that even over a short term period, e.g. twenty years, it is quite impossible for one to predict the future course of history or the effects of a widespread adoption of a new technology. The notion that we can anticipate long term social impacts of new technologies such as Videotex is based on the implicit assumption that its evolution over ten to twenty years will be only minimally affected by the further development of human knowledge and will exist in a form which more or less resembles the way it is today. Such an assumption does not appear likely and has not been exemplified by developments in microelectronics in the late '60's to the present time.

The second area of investigation for the study involved the examination of what we refer to as short term impacts. The basis for that investigation stemmed from the 1980 report produced on the social aspects of Videotex services for the Department of

Communications. The report examined the role of field trials as a mechanism for assessing the social issues raised by the development of Videotex, and remarked that in most cases the trials were characterized by small sample groups and very preliminary data bases. It stressed that because of this situation it should not be expected that field trials would be an appropriate vehicle for research into the social issues. The DOC report, however, demonstrated an overriding belief that social issues could be measured by attitudinal and perception measures using survey-based approaches.

An in-depth review of methodological approaches indicated that in most cases the types of designs and the approaches to field trial evaluation for the Telidon services negates any possibility of measuring most social issues in any systematic or rigid way. There has been a lack of consideration of appropriate design for measuring these items, and further research and activity should concentrate on much more rigorous and well-defined approaches to the evaluation of these short term social issues.

A review of the field trials revealed there were a number of limitations, including:

1. sample selection;

2. an ad hoc application of trial assessment procedures, no distinct time frames had been set down for when measurements would be made;

3. no clear statements of social impact hypotheses to be tested through the utilization of control groups; and

4. no indication of whether a random assignment of individuals were used as a prime method of allocating subjects to test and control groups.

In most situations the trials can only be referred to as "anecdotal" or "case studies". This presents major limitations on any attempts to extract measures of social impacts. In these cases not only have violations occurred with respect to basic measurements and data collection techniques, but as well the time frame for measurement of such impacts is questionable. In most cases, trials lasted between six and eighteen months, with measurements scattered throughout those periods, often in a rather ad hoc way. Thus, the ability to attach any degree of confidence and reliability to the findings, particularly those dealing with social issues, is questionable.

In addition to the theoretical limitations, there are also a number of very applied problems which have occurred in the conduct of the various trials in Canada. The most fundamental problem has been the reluctance by service providers to observe

even the most fundamental rules for providing a control and test group for evaluation. Secondly, there was very little concern taken for the time required for such things as learning effects to emerge. Other more general problems included:

1. small sample sizes typically used in the studies; and
2. a lack of a systematic sampling procedure.

As well, in many cases there was an overriding concern for the collection of "marketing" or "commercial" information rather than those aspects or items which could be considered purely social in nature. Only lifestyle information was well represented.

Throughout the trials there has been:

1. a lack of focus on direct or indirect measurements of social issues; and
2. an emphasis placed on the immediate or direct marketing impacts with a limited view of social impacts stemming from an overall reliance on analogies from environmental traditions.

Transactional capabilities and two-way services, if implemented, are likely to have significant transformative effects on the individual as well as society. Very little assessment or evaluation of these issues has been conducted in the trials.

Time frames of observation used in each of the trials was extremely short in most cases, meaning the patterns of behaviour could not be established nor were control groups monitored. This limited the comparative assessments which could be made.

Assumptions in many of the trials have been made about who constitutes the "leading edge" user. Thus, assessments were not on a cross-section of society or group basis, but rather focused on unique, usually affluent, sub-groups. There is a need, then, to collect background information, particularly of a socio-demographic nature, in order to generalize any findings to the larger population. In most cases these types of profile activities were not undertaken. As a result there is very little information which details the distinct nature of the population being tested.

In most of the trials, data bases were changed daily and weekly. There was no ability to control these changes and to account for the impact these changes in page volumes and quality would have on the perceptions of individuals. Thus, measures taken at different time periods may be as much reflective of the changing quality of service as they are the changing attitudes of individuals being measured.

While field trials are most definitely a useful way of testing a technology and introducing sub-groups of particular populations

to a technology, their utility for measuring broader social issues was highly restricted.

Finally, it should be noted that the assessment and evaluation of social impacts rest fundamentally on the need to include time to observe and evaluate change in particular behaviours, attitudes, perceptions and trends in society. Small scale experiments and cross-sectional studies provide opportunities for gaining insights. However, substantiation requires either long term measurement and tracking or numerous replications of measures among a defined population.

Secondly, contextual or environmental factors constitute a second factor which must be considered. These are particularly relevant where casual relationships are desired and where specific impacts attributable to a particular technology is the goal. It may be that many of the types of impacts that have been mentioned are in fact not measurable in any controlled or even quasi-controlled way, but rather will be reflected in some other manner in longer term trends and measurements which are beyond the scope of even the most ambitious field trial project.

As a result of the limitations of the ability to assess long term and short term trends, as initially specified by the rather ambitious statements of the 1980 Department of Communications study, it has been suggested that a more fundamental approach to

assessing the social aspects of Telidon and Videotex be employed. This was to examine the social benefits and social uses for which the technology could be used. Within that context, the focus of the social assessment of Telidon was directed to three key areas:

1. educational applications;
2. special needs uses of Telidon; and
3. public and community data base development.

Within the perspective of a decade, Videotex and Telidon will offer a potential for the distribution of computer learning material at costs which are competitive with other computer-aided learning systems. Thus, with the proper technological modifications, Telidon and other Videotex systems could provide a network for the distribution of material and could also distribute computer learning software to micro-based terminals for personal computers. Telidon terminals will have to be extremely cheap to gain any significant degree of market penetration in the educational field. Secondly, linkages between Telidon and computer learning, e.g. involving the use of entire Videotex networks as an on-line delivery mechanism for computer learning or downloading of Videotex software, have yet to be fully explored. Two major problems involve the fact that most computer learning programs are usually more complex than the majority of the present Videotex applications, and the menu approach in Telidon is especially limited.

Most Telidon units simply do not have keyboards which allow any degree of flexibility for student response.

Another area which offers some promise for Telidon is educational uses for special needs groups such as the handicapped, the hard of hearing, etc. The provision of Videotex services to special needs groups includes:

1. the handicapped;
2. the speech impaired;
3. the visually impaired;
4. the hard of hearing; and
5. the physically impaired.

To date, efforts to include these groups in trial activities have been limited. Telidon could be used by speech impaired Canadians to communicate with each other, and between handicapped and non-handicapped individuals. In a broader sense, when introduced into the workplace, the technology can contribute to overall enhancement of the quality of rights for the handicapped.

Another significant application area is in health delivery systems, with particular reference to the identification of disorders, the assessment of severity of disabilities, and a provision of remedial programs and rehabilitation.

The use of Telidon for the provision of services to the handicapped, specifically those with speech and hearing impairments, has not as yet taken the form of any active trial or test situation. Thus, while the appeal of the technology for these applications is high, questions about their actual capability and feasibility of development remain unanswered. It is revealing that at this stage none of the current field trials that are being conducted across the country and which have been reviewed as part of this series of reports have made any special efforts to include these groups in their tests. There seems to be no incentive at this stage for commercial operators to see these groups as a possible source of subscribers for their services, and as a result the pervading commercial applications have dominated.

There are some very special needs which should be addressed through technical developments for hardware and designing special peripherals for attachment to conventional Telidon systems. It should be clear that a need exists to encourage development of such technology so that the interests, needs and skills of the handicapped may be served.

The third area which was examined considered community and public information. These are directed to the development of sectors of information within various data banks which have applicability to unique or distinct sub-sectors of society. In most instances they were concerned with sectors not oriented around commercial

or profit motives. This aspect was reviewed with respect to both the government's efforts typified by the Cantel and by private or joint initiatives between private concerns and public agencies, as typfied by the Community Information Centre of Toronto and Bell Canada.

A review of the various field trials showed that within each there was considerable variation in the response taken by system operators towards providing non-profit, non-commercial or community information. As well, there was a wide variation in what constituted community information and in the way it was categorized in the various data bases. It was clear from this review that a pressing need is for a consistent policy on how to deal with non-commercial information, with more attention being directed to this aspect of service provision.

Three important concerns in the provision of services were defined:

1. the need for clarification of terms by which information can be designated as public interest;

2. a consideration of how Videotex competes with or complements other methods of disseminating public interest information; and

3. a consideration of the best way to fund and support available non-commercial groups providing services.

An assessment of the importance of these various points was made by reviewing five case studies for the provision of community information in Canada. The main findings from this review of case studies indicated four key points:

1. start-up costs and amount of organizational effort are usually much greater than initially anticipated;

2. groups that already have experience in gathering community information have clear advantages over those new to community information and co-ordinating resources and services;

3. those new to the system must decide not only how to participate but also what type of information they should begin to place on these new electronic media;

4. issues focused on what types of information should be offered, how should the information be presented, what uses should be made of special symbols and graphics, how can information be updated and kept accurate at a minimum cost, and how should indexes be designed to make the information simple to find since a large number of users are going to be novice and laypersons;

5. the location of terminals and understanding the composition of the target audience are especially critical, particularly where terminal locations are placed in public sites; and

6. perhaps the most critical point is that historically funding has been rather indeterminate for these types of services. In order to expand and utilize these new electronic media, more stable funding sources will be required.

A final aspect in this evaluation focused on the use of Telidon in public services. One of the major policy statements made by the Department of Communications, in justifying its initial investment and involvement in Telidon, was to encourage and support the development of a public service using the Telidon technology. Two aspects of services were examined:

1. the provision of dedicated public information service; and

2. the provision of publicly accessible terminals within the commercial field trial settings.

The first related to the Cantel service provided by the Department of Communications, while the second involved those services provided by telephone companies in the various field trials.

The importance of examining the Cantel trial was in effect that it represented a major effort by the federal government to enhance the access to government information services by the public.

The main findings of an evaluation study indicated the project has created a degree of awareness. It has familiarized the users with public services and public applications for Telidon. It has also demonstrated concern by the government for providing access. At the same time, it represents an effort to examine alternatives for the delivery of public information.

The key findings from the Cantel study indicated a concern for content and a need to upgrade the quality in terms of its structure and presentation. For users to find that information has little relevance or is too general or causes confusion and difficulties, and creates negative impressions.

The design of equipment must be modified for placement in public locations. Using terminals designed for in-home use or within office settings is not appropriate when public applications are being considered. At the same time, these locations are likely to experience a broader range of users -- the elderly, the young of both sexes -- all of whom have unique ways of interacting with the technology, and these variations will have to be taken into account when designing services.

Assessments of the private initiatives for the provision of public terminals was focused essentially on the only trial which provided any systematic evaluation. This was the B.C. Tel trial. In that situation almost 50% of the terminals were placed in what were described as public access locations. Forty-six terminals were located in malls, hotel lobbies, libraries, banks, credit unions, government offices and airports. The results from this trial evaluation and those of Cantel revealed a number of similar findings:

1. user profiles are similar and emphasize the predominance of males using public terminals;

2. assessments of the system were generally positive in terms of basic technical performance, with the most common negative concerns being directed towards content;

3. a need exists to ensure that data bases are designed in a way that is compatible for a broad cross-section of users, with varying degrees of sophistication in how to use key word search procedures or tree structures;

4. the need to utilize the information, even in a limited state, pointed to the need for providing information that was up-to-date and well maintained;

5. the job bank in both cases was considered to be well presented and useful, but also out-of-date, incomplete and lacking in depth; and

6. a concern was expressed about the need for hard-copy output.

In general, Telidon in public locations has enhanced public access to information and has evolved as a major social use of Telidon over the past few years. As these services develop and improve, their importance to the public is likely to increase. The rate with which they become a part of the overall provision of information by governments and social agencies will depend to a large extent on the kinds of applications which are developed and the ways that these technologies are integrated with other technologies. The use of these systems to provide readily accessible, up-to-date and timely information about such things as transit services in large urban areas, tourist information, government information, employment information and community services is likely to increase. As these evolve, their value and benefit to society will increase. A major requirement, however, is the need to integrate planning for these services with emerging commercial services, and the development of effective funding mechanisms which allow long term commitment by service providers.

The major policy recommendations stemming from the social impact studies were:

1. A re-evaluation of the way that social impacts and social effects of this technology are evaluated should be undertaken. A review of the original DOC position paper on social impacts is required before any further work on the social evaluation of Telidon is undertaken. This report, while offering some interesting speculation on what issues could be measured, was rather naive in assuming that these things could actually be assessed in the short time period that has elapsed. Furthermore, the government should be very careful in setting up any kind of program which purports to be able to measure and assess these issues independent of looking at the broader trends in society, and particularly those in other areas of high technology.

2. If Telidon is integrated into the Department of Communication's office automation program, then selected areas of social impacts could be included in those studies, specifically such things as quality of working life and impact on organizational behaviour resulting from new technologies and new uses of technologies which include Telidon, should be considered. However, resistance should be placed on trying to assess these impacts through Telidon independent of other high technology products. Although it has been stated that

long term social impacts of the adoption of Videotex-like systems (such as employment effects) that are presently unknowable, it should nevertheless be useful to have some notion of probable effects. It is recommended that individual research programs in the areas of the history and philosophy of science and technology be undertaken by delineating the relevance of past technological developments and the social impacts, and relate these to the social impacts and possible future impacts of Videotex.

3. Broader scale assessments of the social impacts of a range of innovations within the evolution of technology should be attempted. Such an assessment should focus on understanding:

   a. how specific technologies cluster in time; and

   b. how Telidon fits into the contemporary cluster of innovations evolving from microprocessors, personal computers and work stations.

The social impacts of Videotex will comprise by the portion of social impacts of this entire cluster of microchip-based technologies.

4. Specific attention should be given to funding applications which might be satisfied by this technology rather than studying or speculating on the ways Videotex will "impact" these. Specific examples reviewed in the various studies include those for the handicapped and the hard of hearing. Emphasis should be placed on achieving certain social goals in selected settings. Public initiatives in health care, services to the handicapped, local community services and special education all deserve increased attention.

5. A significant amount of interest has been expressed in public access terminals. The public will respond to uses which have utility and which show net benefits over alternative forms of information provision.

6. Further investigation of appropriate applications, upgraded content, equipment and software design, terminal placement and funding should be encouraged. Investigation of special needs for the various groups specified previously should be addressed in co-operation with their associated agencies and action groups.

7. The federal government Cantel program should be maintained. However, the scope and scale of development must be examined, with attention given to data base design, management and content selection. The National Job Bank has received

positive responses in concept, but it requires constant upgrading and maintenance. Efforts should be directed to upgrading that service and to broadening its access opportunities.

8. Encouragement to community information centres for the development of Telidon-type services should be given, and this should be accompanied by assistance in training, data base development and service organization.

9. Libraries and existing information centres should be encouraged as good starting points for the further diffusion of this technology into the public sector. Encouragement for joint efforts of small community groups will assist in minimizing the cost of service development, duplication of effort and enhancing information exchange.

Videotex and Microelectronics Policy

A discussion of technological and industrial development policy in Canada must be founded on the realization that Canada, first of all, is not a large enough country that its internal market alone can support sales growth and product diversification of informatics products and services.

For reasons of size and because of our proximity and close trade ties to the U.S., Canada, unlike Brazil and Japan, must implement a technology strategy which does not involve a protected market stage; we cannot protect our nascent microelectronics industry from imports from our major market, the U.S. We cannot create a microelectronics industry behind high protective barriers, even if the Japanese and Brazilians have.

The underlying assumption of this analysis is that the competitive edge of virtually all microelectronics technologies now emerging in industrialized economies -- Videotex and Teletext, office and switching equipment, speech recognition, robotics, telecommunications, artificial intelligence, personal computers and educational computing -- will lie increasingly in the software and serviceware rather than the hardware component. It is now not predominantly the people who manufacture equipment, but also those who devise and implement ingenius new uses for the equipment who will benefit. However, devising new uses, model-

ling a human task which has not been automated before, it accomplished through software.

Technology policy and industrial strategies in the NIC's such as Brazil and South Korea is of relevance to Canada. In many of these countries one component of several developing countries' industrial/technology strategies involves the creation of expertise in software writing for integration in production techniques and for export to other countries. Many have realized that, "By avoiding imports of services, the foreign exchange savings could be greater in the medium term than the cost of installing equipment, while at the same time developing local expertise and capabilities."

This realization is of direct relevance to Canada, whose balance of payments in computer hardware continues to grow and whose domestic computer and office automation industry cannot supply the demand. In fact, Canadian trade deficits for office equipment and computers exceeded $2 billion in 1982. Although exports amount to $890 million, imports rose to $3 billion, creating a new trade imbalance in this section of $2.1 billion (mainly accounted for by the import of word processors and perscoms). This trade imbalance is almost $1 billion greater than the 1980 imbalance of $1.2 billion. Predictions have been made of a $5 billion deficit in this area by 1986.

It is clear then that:

1. Future balance of payment considerations will depend more directly on software and serviceware for information utilities than on hardware production.

2. If this is the case, national marketing strategies and technology policies are required which optimize the use of Canadian software expertise through the support of a selectivity of applications -- involving higher level applications software and serviceware (information content and interactive services) for information utilities.

Videotex and Microelectronics Policy Initiatives

In the following recommendations, Videotex-related measures are examined and then more general measures related to microelectronics hardware and software in Canada are considered:

1. Given the rapid diffusion and new uses of perscoms, financial/tax support should be made available to firms to provide cheap software packages which convert commercially-produced personal computers, work stations and word processors into Telidon-compatible user and information provider terminals. Some perscoms, such as the Apple II and the IBM, now possess some of those capabilities. Many do not, and

Telidon should be marketed worldwide as software for perscoms, work stations and other equipment.

2. Government incentives to the Telidon industry will still be required over the next five years. However, direct grants and subsidies alone are not effective. Alternative approaches such as low cost loans and tax incentives for research, development and marketing of Videotex software should be instigated.

3. Telidon services should be integrated into the federal government's commitment to office automation, satellite programs, mobile communication services, etc.

4. Telidon product development for business applications should be encouraged as part of on-going research conducted by the federal government.

5. Further government funding should be directed predominantly to those firms which have a demonstrated need for assistance due to undercapitalization. Restrictions should be placed on direct assistance to foreign controlled IP subsidiaries operating in Canada.

6. Uniform standards for the Telidon industry should be implemented.

7. Initiatives for the use of Telidon in public locations, libraries, etc., should be undertaken. These will aid in market awareness and provide experience and familiarity with Telidon services. Such initiatives require that more efforts be placed on content development and software.

8. The social impacts and effects which can be attributable to Videotex are unknown. Attempts at "assessing" these have proven to be elusive, and such efforts have tended to "create" issues. Research in this area should, rather, be directed toward realistic short term social impacts of Videotex adoption.

9. Approaches to Telidon product marketing should consider service tiering, which will encourage the presentation of "grades" of services such as information retrieval. These should be considered in tandem with tiered pricing which reflects the cost of the service offering.

10. Teletext services should be developed on the CBC in both official languages.

11. Appropriate Canadian industries, such as banking, should be encouraged to provide capabilities for Telidon transaction

services and be provided with the appropriate regulatory environment to offer such services.

(We now turn to more general recommendations pertaining not merely to Videotex/Teletext in Canada, but to the entire area of microelectronics hardware and software.)

12. One instrument used by some countries is a more flexible taxation system than that of Canada to support software and research and development in general. In some countries, for example Singapore, 200 percent of reinvestment of any firm's profits in R&D activities are tax-exempt, and before the manufacturing use of any new innovative process, tax exemptions are granted to prototype development and manufacture start-up phases.

    It is recommended that Canadian R&D incentives involving microelectronics products (not merely Videotex/Teletext) should be extended to cover engineering design and manufacture start-up costs, and firms should also be able to write off costs of training personnel in microelectronics/software areas. The precise amount of exemption should also be significantly increased, i.e. doubled, so Canadian initiations will be competitive with other nations.

13. Export diversification incentives -- in several countries a series of tax drawbacks have been implemented for firms

which export high technology goods and services with a specified percentage of national content. Such a graded drawback scale should be established in Canada, giving priority to exports of high technology goods and software/services, and low priority to exports of raw and semi-processed natural resources. Since one of the intentions of such diversification incentives is to enlarge the Canadian export market from predominantly the U.S., export incentives in the form of drawbacks and tax exemptions should be region-specific -- they should be higher for Pacific Rim and South American countries.

14. Additionally, Canada should instigate tax exemptions for all imported informatics components used in the production of exported informatics products, goods and services such as Videotex, Teletext, software and such, and should instigate a significant reduction in business taxes on exporting informatics revenues to non-U.S. areas. To encourage the formation of Canadian informatics exports consortia, further export tax concessions should be granted when informatics exports such as Telidon are done by Canadian controlled export consortia.

15. Of particular interest to Canadian planners is Singapore's industrial strategy to convert itself into an area of software expertise for Asia and the world.

Specific incentives directed toward software development and exports include the Capital Pioneer Status Incentive, under which Singapore allows total exemption of any firm's taxes for up to ten years, with these exemptions being granted only to firms which engage in local Singaporian software training and development, and the International Consultancy Service Incentive, which makes available a 20 percent tax rate qualifying software export products. A minimum requirement here, however, is $1 million revenue per year for overseas projects. It is recommended that Canada make available to foreign firms the appropriate equivalents of Singapore's International Consultancy Service Incentive and Capital Pioneer Status Incentive.

16. Given the rapid and current commercial developments in AI (artificial intelligence) in the U.S., Japan and other countries, the considerable range of its present and potential industrial and business applications, and the cost savings involved in substituting expert systems for human consultants, it is apparent that Canada must develop expertise in this field. Accordingly, it is recommended that the government:

    a. survey and identify the potential commercial applications of artificial intelligence, with special attention to expert systems;

b. determine priority areas (such as limited natural language query of business data bases) in which AI will have major short term economic effects of the range of the next five years;

c. examine the software training requirements requisite for AI programming proficiency and for the incorporation of AI software into commercial products; and

d. examine policy options and development strategies for best appropriating the benefits of Japanese and U.S. AI research, and for stimulating Canadian research and product development in AI applications.

17. Since the Canadian software and computer sector is comprised mainly of small and medium sized firms, and these have extreme difficulty in obtaining development financing, especially of software, their capacity to obtain financing must be enhanced. Since it is also almost impossible to establish barriers to physical importation of software produced offshore, it is recommended that the Canadian government cooperate with funding agencies to ensure that financing is provided for the development of Canadian software and serviceware.

This funding should encompass all phases of software manufacturing and also software marketing during its first year.

18. It is further recommended that the Canadian government co-operate with Canadian funding agencies to give priority to develop Canadian data processing software to replace that purchased from foreign subsidiaries.

19. It is further recommended that the government instigate a program of fiscal and taxation incentives for firms which have ongoing investments in the development of software products.

20. Since the informatics market is a world market, it is recommended that the government promote fiscal incentives and activities aimed at increasing exports of software, service-ware and computer services.

21. In order to expand domestic and export markets for Canadian producers of software and computer services, it is recommended that the government issue regulations and fiscal incentives which give preference to software services and equipment produced by the Canadian private sector, excluding those cases in which purchase within Canada is considered uneconomical.

22. Since it is in the Canadian national interest to create a software market not tied to specific foreign computer manu-

facturers, given the extent of multi-national penetration of Canadian industry, especially in the informatics area, it is recommended that computer and software costs be more clearly defined and separated with respect to imports and that the government adopt regulations which preclude the inclusion of software prices or services on the same import licence with hardware equipment.

23. Given the fact that the Canadian education/training system does not provide sufficient levels of software training, it is necessary to improve the efficiency of Canadian software production. It is thus recommended that the government rapidly examine the necessary measures to ensure that Canada has sufficient personnel necessary for training in software production. Here it is further recommended that the government evaluate the quality of existing software training courses and assess their relationship to the job market, that existing graduate study programs in computer software be maintained and enlarged, and that special incentives be granted to multi-national subsidiaries located in Canada which will engage in sophisticated software training of Canadians.

24. Given the fact that it is imperative to increase training in the production of industrial automation software, it is recommended that research, training and teaching in process

automation software be encouraged within the Canadian university system.

25. Preferential immigration support treatment should be given to microelectronic technicians, engineers and programmers from partially English speaking countries, such as Singapore, Hong Kong, South Korea and India, who could work in microelectronic areas such as Videotex and Teletext software, resource software, artificial intelligence and such.

26. As in Brazil and Singapore, the federal government must use tax incentives and procurement policy to promote software development, especially in the areas of applications generators, natural resource software and artificial intelligence. The present government initiatives for software are quite inadequate, and comprise either direct subsidies or limited tax write-offs.

27. Software and serviceware fiscal support must include support for the development, commercialization and export of Canadian products; also, the use of procurement to support software in all government industrial retraining programs; fiscal assistance of government enterprises to invest in innovative new software companies; and also to make available to them special credit lines and low interest loans.

In general there are two sets of initiatives which might be carried out in connection with the international marketing of Telidon. The first set comprises activities such as showing Telidon technology at international and domestic trade fairs and efforts to have Telidon-compatible standards for Videotex adopted by national and international standards agencies and equipment manufacturers. Such activities have been carried out by the government and are necessary but not sufficient to engender international Telidon sales.

The second set of activities, which has been only sporadically engaged in by the government, and less so by the Telidon industry, involves the formulations of international marketing plans in terms of specific applications:

1. Market Assessment: The first stage of such a market plan involves a market assessment of trends in competing and complementary technologies -- of the type which is described in the accompanying marketing study. No one is going to purchase a Telidon terminal costing over $2,000 when one can purchase, say, a Commodore personal computer in the same price range and convert it into a Videotex terminal by purchasing a cheap software packet. Such a market assessment, in other words, examines the ways Telidon may be bundled into related technologies and sold as a package.

2. Market Intelligence: This second stage involves the determination of specific applications and application areas in which Telidon might have uses. It is the appropriateness of applications rather than inherent technological capabilities -- the much-heralded graphics capability -- which will sell Telidon. This determination of applications areas should be carried out along geographical lines, by regions of the world, and must contain in-depth assessments of the main firms operating in that application area in a specific region of the world (size of firm, industrial infrastructure, means of penetration, export potential, etc.).

3. The third stage of such a marketing plan involves the prioritization of areas of market potential by geographical region. For example, a number of city governments in the newly industrialized countries of the Pacific Rim are in the process of installing major rapid transit systems and have expressed interest in Videotex-based public transit information systems. Brazil, as we shall see, is in the process of converting from industrial to agricultural development as a national strategy. In spite of sales already lost to the French in the Sao Paulo Videotex trials, Canadians already have a considerable expertise in agricultural-based Videotex systems.

4. The fourth stage of such a plan involves identification within a specific market area of the key firms and agencies operating in that area, with the idea of making exemplary sales in terms of specific applications.