TELIDON SOCIAL IMPACTS STUDY

(VOLUME III)

Peter J. Booth
Russel M. Wills

Department of Communications
Contract 12ST.36100-2-4017 OST-82-00106

WESCOM LIMITED

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In this work, the social impact issues of access, privacy, diversity, vulnerability and employment effects are first discussed, and this problem is examined; how to identify social impacts of Videotex in such a way that their negative facets may be alleviated and their socially positive facets may be strengthened.

It is noted that the social effects of a new technology such as Videotex are usually unanticipated, because there is virtually no real means of predicting them. Concern for Videotex's social

effects, however, must not be considered as separate from the broader field of the social effects of data communications, data banks and the merging of computer-communications systems in general. More properly, it is noted that Videotex should be viewed as a subset of developments which are taking place in this merging of two hitherto distinct technologies.

The notion is presented that social impact analyses should first begin with specific social problems which require urgent attention, and although any new information technologies such as Videotex contain certain technological limits on what may be achieved, the more relevant social impact questions concern specific alternatives within those limits which are selected by relevant institutions or organizations. Social problems, in other words, are not amenable merely to technological solutions but always involve changes in institutional structures.

The social impacts of Videotex are divided into short term and transformative social impacts, the latter comprising the long term impacts which may alter the way society is organized at its basic level. Such transformative social impacts become apparent, however, only after a widespread diffusion of the technology. Both short term and transformative social impacts of the technologies are of crucial importance; however, in governmental

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planning they are often relegated to a trivial status behind marketing and economic concerns.

With respect to transformative impacts, it is noted that the initial uses of any new technology are seldom, if ever, their eventual mass social uses, and correspondingly it is thus myopic to visualize Videotex in terms of its current uses. Also, given the fact that initial applications of a new technology often replicate those of existing technologies, there is little reason to assume that many current applications of Videotex listed in numerous studies will ultimately be its important ones, even if they survive.

After a critique of the "methodology" of expert panels to determine transformative impacts of a new technology, analogies are drawn from the ways previous information technologies* have transformed society and at what rates these transformations have occurred.

1. Technological and non-technological innovations tend to "cluster" in time. The western versions of monotheism, abstract science and codified law were all "invented" in a

* These are the invention of the phonetic alphabet and the printing press.

comparatively short time-slice. Similarly, Videotex, although providing one form of the much vaunted information utility, is but one development amongst many emerging from microprocessors. Others include personal computers, video cassette recorders, executive work stations, microprocessor controlled robots, word processors and computer-aided design. Thus, just as the invention of the alphabet provided a framework for the development of a cluster of innovations, similarly the above cluster of new technologies was facilitated by the invention of the microprocessor.

2. The time-frame of diffusion to general use of all of these technologies was of the order of several hundred years, while the time-frame of microprocessor-based technologies is a magnitude more rapid.

3. The transformative social impacts of these technologies involved the creation of entirely new social and cultural structures and not merely modifications of existing ones.

4. The social impacts and upheavals resulting from widespread diffusion of these technologies were not, and could not be, anticipated by persons of those eras.

It is thus concluded that even over a short time period of, say,

twenty years, it is impossible to predict the future effects of widespread adoption of a new technology.

Finally, the notion that we can anticipate long term social impacts in new technologies such as Videotex, it is noted, is based on the implicit (false) assumption that the technology which evolves over ten to twenty years will be only minimally affected by the future 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 from the late '60's to the present time.

Short Term Impacts

This report also examines the role of the field trials as a means of assessing the short term social issues raised by the development of Videotex. In most cases, the trials were characterized by small sample groups and extremely preliminary social impact data bases. The Telidon field trials actually included provision for three items relevant to social impacts:

1. Semi-systematic data collection relevant to social impact related issues.

2. Study of the impact and adequacy of content in the field trials in terms of societal goals such as educational uses of Telidon.

3. The funding of a CVCC sub-committee to develop social research areas for the field trials. (These were minimally used in the actual trials.)

Measuring even short term social impacts at best is only speculative unless reasonable time frames are developed for observation and assessment.

After first critiquing a number of applied approaches to determining short term social impacts of new technologies -- such as the quality of working life, socio/technology, leading edge analysis, the Delphi technique, time activity analysis, diary methods, network analysis, laboratory experiments and field trials -- the design limitations in the Canadian field trials are examined.

The majority of the Canadian field trials can be classified as of quasi-experimental design. Although design faults with respect to social impact assessment of individual trials is examined, collectively these faults may be summarized as follows:

1. Seldom was any systematic attempt made to select field trial participants, who for the most part were volunteers.

2. There was no control group against which to assess reactions of participants.

3. No distinct time frames were usually made for when measurements would be taken.

4. There were no clear statements of social impact hypotheses to be tested through the utilization of test and control groups.

5. There was no indication of whether a random assignment of individuals was used as the prime method of allocating subjects to test or control groups.

Although there were other faults, this review indicates the fundamental lack of rigor and adherence to very basic requirements for quasi-experimental designs in each of the sample field trials. This represents a major limitation on any attempt to extract from the field trials measures of social impacts. The results from the trials must therefore be considered descriptive of particular situations at particular times within a particular context, but it would be highly suspect to extract from this data broad general findings which can be used to substantiate social

impacts at any of the levels suggested in this study: macro, organizational and individual level.

Methodological Limitations

Throughout the field trials, then, there has been:

1. A lack of focus on direct or indirect measurement of social issues.

2. An emphasis placed on immediate or direct marketing impacts with a limited view of social impacts stemming from an over-reliance on analogies from "environmental" traditions. Longer term and indirect marketing, economic or social effects have not been addressed.

3. Measurement of direct social effects was limited to sub-sectors of the trials, representing small groups which are not necessarily reflective of their representation in society.

4. There has been undue emphasis on assessing impacts either from a negative perspective or from an emphasis on individual level concerns.

5. A number of issues, e.g. access, are dependent on examining

usage data. This data has, in many cases, not been collected by the field trial operators.

6. The field trial reports which have been reviewed to date reveal very limited direct assessment of social issues. Efforts have been directed where applicable to content -- related to community databases and public information. That, to a large extent, represents the attention given to social issues by field trial operators.

7. Where issues relating to social concerns have been raised, these have been directed toward existing service configurations -- primarily information retrieval. That context may not be the configuration of Videotex which emerges in its ultimate mass acceptance. Transactional capabilities and two-way services, if implemented, are likely to have significant transformative impacts on the individual as well as society. Very little assessment or evaluation of these issues has been conducted in the field trials.

8. Assessing impacts would require the extraction of change in key factors, with time a critical dependent measure. As well, control group comparisons are critical in sorting the real from the spurious results in the evaluations. In most cases, while initial design specifications raised the issue of control groups and adequate time periods for measurement

in practical terms, these criteria were made expendable. Thus, time frames of observation are extremely short in most cases, meaning that patterns of behaviour were not established or control groups were not monitored, thus severely limiting comparative assessments.

9. Trial implementation and operations have, quite naturally, been directed toward identifying "users" and the "target market". Assumptions in many of the trials have been made about who constitutes the "leading edge" user. Thus, assessments were not made on cross-sections of a community or group, but rather on a unique (usually affluent) sub-group.

In considering the quasi-experimental field trial approach, it is clearly appropriate for overcoming a number of limitations inherent in more rigourous methods for assessing technology or those which are basically case studies. This approach, however, may be more appropriate for evaluating responses to equipment performance, productivity, technical capabilities, networking, management provision and costing, than to assessing socio-psychological impacts and implications resulting from the introduction of these innovations on a population.

Thus, 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 is highly restricted, and this restriction is amplified when methods for data collection are employed which take very little account of fundamental design issues.

Alternative Approach for Assessing Short Term Social Impacts

One methodology offering promise for delineating some aspects of short term social impacts arising from Videotex adaption in the business environment is network analysis, coupled with a more sophisticated and extensive use of automated tracking data. Properly instigated, such procedures may enable researchers to gain useful data on changes in communication patterns within an organization or business arising from adoption of new technology. The assessment and evaluation of social impacts rest fundamentally on the need to include time to observe and evaluate change in particular behaviours and trends in society. Small scale experiments and cross-sectional studies provide opportunities for getting inside of these issues. However, substantiation requires either long term measurement and tracking or numerous replications of measures among the defined populations. When replication of studies is required, factorial designs become necessary in order to allow coverage of the various population sub-groups and to enable the identification of variations between and within

groups. Tracking and longitudinal measurements are often very costly and generate a large amount of data which must be subject to detailed analysis before results can be confidently reported. Measuring attitude change can only be accomplished over time and by imposing control on externalities which may impact on the formation of attitudes and perceptions.

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. While quasi-experimental field assessments are appropriate, their strength for obtaining measures is offset by limitations on sample size and length of observation time required to allow the attitudinal and perceptual change to occur. To date, there are no adequate standards for setting limits on time in non-experimental settings.

Development of a particular approach to measuring social impacts in either the office or home environment will often require the consideration of a variety of frameworks, designs and measurement tools. Studies, therefore, may require at one stage the application of quasi-controlled field tests, and at another either in-depth network analysis to define an interaction matrix, or a

cross-sectional survey to track attitudes and perceptions of workers towards the technology. In many ways it may not be feasible to attempt rigorous measurement but rather to focus on what are more aptly referred to as "social benefits" of the technology accruing from socially relevant applications.

Social Uses of Telidon

This report also examines the social impact of Telidon by looking at three specific areas of application which have been undertaken in the field trial settings:

1. educational applications of Telidon;
2. special groups use of Telidon; and
3. public and community uses of Telidon.

The necessity to examine the social uses of Videotex and Telidon services as opposed to assessing the measurement of "social impacts" stems fundamentally from the absence of any methodologically sound studies of Telidon to predict social impacts in the field trials.

Telidon and Education in Canada

The educational uses of Telidon remain basically uncertain, and although Videotex was initially conceived of as a mass market product, the nascent computer learning industry has already re-strategized its marketing focus in the area of private in-house systems within large business organizations; nevertheless, with the proper technological modifications, both Teletext and Videotex could conceivably be used to deliver pages for computer learning for virtually any application, and there have already been a number of experiments in Canada using Telidon in education.

However, Telidon terminals will have to be much cheaper than the current price of $2,000 to get any significant degree of market penetration in the educational field. Also, related 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 the downloading of Videotex software for local execution -- are yet to be really explored inCanada. A major problem here involves the fact that the menu approach in Telidon is especially limiting, and most Telidon units simply do not have keyboards which allow any degree of flexibility in response. Although the use of Telidon in computer learning may

occur in response to future market needs, the precise nature of this usage can be neither easily predicted nor imposed at this time.

In summary, with proper technological modifications, Telidon:

1. could provide a real network for the distribution of computer learning material; and

2. could also distribute computer learning software to microcomputer-based terminals or perscoms.

Educational Uses for Special Groups

Telidon could be used both by remedial learners and medical paraprofessionals for education and training, since these and many other vocational and professional fields necessitate continuous training, updating and more specific access to contemporary information. It also offers promise for special needs groups including the handicapped, the speech impaired, the visually impaired, the hard of hearing and the physically impaired. To date, however, efforts to include these groups in trial activities have been limited. The capabilities of Telidon make it particularly suitable for special communication needs with some hearing-impaired individuals.

Telidon, Preventative Health Care and Outreach

The application of Telidon to health programs is relevant in two areas. One is preventive health care programs presenting information on topics such as alcoholism, psychological stress, tobacco consumption, exercise and lifestyles, etc. Telidon link-ups to central information services for preventive health program delivery to remote locations would facilitate consistency in information provision. Indian and native peoples, and others in rural and remote communities, would, it is believed, benefit directly from these services. In conjunction with these types of information are those which provide basic knowledge to the public on a variety of diseases and disorders and their treatments.

A second area involves what is referred to as professional outreach services. Telidon could be expected to have applications assisting outreach health delivery systems in rural areas where services are currently unavailable and major health related problems are known to exist. For example, preliminary application of a diagnostic articulation profile to assess hearing and speech among pre-school children on Telidon is reported to have shown significant promise. Other diagnostic tests of psycholinguistic skills appear theoretically feasible, pending future technological advances. Other possible applications in this realm include

computer assisted testing for children in the area of mathematics, reading and general achievements. It is suggested that with limited adaption, diagnostic tests of cognitive and language functions could be adapted to Telidon.

The use of Telidon for the provision of services to the handicapped, specifically those with impairments of speech and hearing, has not yet taken the form of any active trials or test situations. Thus, while the appeal of the technology for these applications is high, questions about their actual capability and the feasibility of developing them still remain unanswered. Two main factors which should be addressed in the context of the handicapped relate to the design and the ergonomic factors for equipment, particularly terminals, keyboards, keypads, etc., and secondly for, the development of software which would be used in the actual interface between handicapped individuals and machines. These two areas have not received much attention to date. With respect to the deaf, Telidon may be used as a substitute for sound and telephone communication or as a means of substituting television broadcasts. Telidon, with its electronic messaging capabilities and feasibility for networking, clearly has potential for that group. As yet, however, once again no detailed or in-depth test has been planned to evaluate the technology.

With respect to hardware, specialized peripherals to serve the particular needs of various groups, e.g. the deaf, etc., should be developed. Peripherals would include braille printers for the partially blind, decoders for the deaf, and keyboards and terminals with special enhancements for the physically or visually impaired. Special skills which deaf people have in the use of symbols and graphics should be utilized in the design of specialized equipment and applications.

Community Information and Public Data Bases

Public information data bases may vary from those which are a result of government effort, such as the Cantel trial, to those which are the result of private or joint initiatives typified by the Community Information Centre in Toronto. In examining the provision of Telidon services for community groups, it is important at this stage to make a distinction between the provision of services in public and private sectors.

Within each of the Canadian field trials, there is considerable variation in response of system operators towards providing non-profit, non-commercial or community information. Infomart, for example, agreed to provide non-profit groups with 5% of the Teleguide data base free of storage costs. However, it did not

want to store information from libraries or government agencies, which were expected to pay storage costs. Infomart allows only charitable organizations to be included in the definition of "non-profit".

Although Infomart considered the Toronto Community Information Centre as a non-profit organization, it only allowed the Community Information Centre to list other non-profit groups in its community calendar. The events that are listed must be free or have a minimal charge. Infomart is willing to provide space to what it defines as "poor groups" but not to non-profit agencies such as the Visitors and Convention Bureau.

Major issues surrounding the provision of public interest information on Videotex involve the means of funding and support. The level and types of funding and support available for public interest information on Videotex are likely to affect both the quality and quantity of information produced.

At the present time the majority of applications being demonstrated in the current Videotex field trial activities are commercial in nature, since that segment has been the target of the system operators. As a result, non-commercial groups are receiving little in the way of support for their involvement from

system operators. Where community public interest information is offered, the system providers have chosen to use a rather broad classification of such information including such things as news, weather, movie listings, guides to entertainment, etc., rather than a more narrowly defined non-commercial definition.

The main findings from a review of experiences and case studies of Canadian community information groups show:

1. Start-up costs and the amount of organizational effort needed to initiate involvement in Videotex are usually much greater than initially anticipated and as a result have generally been underestimated in the plans and budgets provided for these groups.

2. Groups that already have experience in gathering community information have a clear advantage over those new to community information and coordinating resources and services. Generally, experienced groups have an infrastructure in place which allows them to coordinate and collect information which can subsequently be placed on the Telidon system. Those new to the system, on the other hand, must decide who should participate in such a trial and what organizations are legitimately defined as community and public interest. In most cases where an organization already exists, prior

determination takes place and information is merely shifted to the new media.

3. Despite the fact that information is available, other more pressing concerns still remain. These include: (1) what types of information should be offered; (2) how should the information be presented; (3) what use should be made of special symbols and graphics; (4) how can information be updated and kept accurate at a minimum cost; and (5) how should indexes be designed to make the information simple to find, since a large segment of the users are going to be lay persons who have very little knowledge and experience with a new technology such as Telidon.

4. The location of terminals, and understanding the composition of the target audience are especially critical, since in many of the trials terminal locations have been determined by trial operators who have generally been more interested in commercial applications and commercial success than they have in community information. The types of locations that are desirable for commercial success may be quite opposite to those appropriate for community information. Likewise, commercially viable targets for Videotex information are not likely to be those which are most in need of community information.

Most of the groups involved in various trials are still rather indeterminant in what they see as a future for Videotex for providing public and community information. It was generally felt that there are too many "unknowns" to be able to make any realistic forecasts about how public interest data bases will be supported.

Funding was one of the most critical aspects in encouraging community groups to investigate and experiment with these new services. Traditionally, community information centres have suffered from the vagaries of government support either through grant programs or endowments. Stability of funding is critical for long term commitment to the development of new information sources and services to the public. In only a very few instances, however, do community information centres have a dedicated and long term perspective on funding. Efforts should be directed at all levels of government to ensure that these new services are encouraged to develop in an environment equally conducive to those providing commercial services.

In almost all cases examined, the organizations providing community information were filling the role of an umbrella IP. They were coordinating the public interest data base, contacting other community groups and setting standards for content and design.

This is a rather difficult task and one which should be examined further if successful implementations are to take place.

Smaller groups generally had objections to the idea of an umbrella group, since it represented a threat to autonomy. In some cases, umbrella groups were viewed as attempts to centralize information and thereby undermine the functional needs of some of the small organizations. It is important to note, however, that where organizations can group together, fundamental cost advantages accrue since unit production costs can be spread over many more pages. Where costs can be shared and resources pooled, the likelihood for developing a better service to the public is enhanced.

In most cases the provision of community services has stemmed from the more traditional organizations providing a broader cross-section of community information than simply that provided on Telidon. Within each of these examples a number of common problems have been observed relating to such things as organization, funding and generally understanding and learning how to use the technology. The consensus of opinion seems to be that community information is a valuable social need, and that Telidon could enhance the provision of information and provide more access and equity to the public. At the same time, however,

there are a number of concerns about exactly how to proceed with these services.

In general, with the existing Videotex public data bases in Canada:

1. Content should be examined in more detail, and more effort should be placed on providing up-to-date, complete, reliable and easier to use information.

2. Efforts should be made to enhance the service's relative advantage and to provide benefits over traditional sources. Specific examples include the national job bank, which provides direct access to current information on jobs not listed at local employment centres.

3. Effort should be placed on assessing user needs and in providing information which has a degree of utility to the public, and which stems from expressions of public needs and requirements rather than simply transposing information from one media to another.

4. Spending time on a system and finding information which has little relevance or is much too general to be of use causes frustration and difficulties, and thereby creates a negative impression of the technology for the user.

5. The design of equipment must be modified for placement in public locations. Using terminals of the type designed for in-home use or within office settings is not appropriate when public applications are being considered. This stems, of course, from the high levels of use which are to be expected and the possibilities of vandalism.

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 determined 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 useful speculation on what issues could be measured, was optimistic 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, 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) 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 to delineate past technological developments and their social impacts, and relate these to 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 chips -- microprocessors, personal computers, work stations, etc.

The social impacts of Videotex will comprise but a 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 applications. Specific examples reviewed in the Wescom 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.

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INTRODUCTION

The microprocessor, or computer on a silicon chip the size of a fingernail, is a "transformative" technology. Its rate of adoption is considerably faster than the traditional time lag of fifty to a hundred years between invention and first commercial use of a new technology.

Videotex and Teletext, however, are merely two applications of microchips amongst virtually thousands, ranging from computer-aided design to perscoms (personal computers), and thus far the diffusion rate of Videotext/Teletext through businesses and homes is comparatively slow in relation to the diffusion patterns of their competing and complementary technologies such as personal computers and communicating word processors.

Nevertheless, should something resembling Telidon eventually become the much-heralded "information utility", it will have widespread social consequences affecting the nature of our institutions, our social and personal relations and our cultural/political structures. Some of the frequently predicted social impacts are presented in Exhibit 1.1.

EXHIBIT 1.1

Predicted Short and Long Term Social Impacts Arising from Widespread Adoption of Videotex/Teletext

- Employment impacts
- Effects on language and literacy
- Controls of information input
- Social isolation or increased leisure time
- Privacy concerns
- Access - for the inputting of information
- Computer crime
- Vulnerability of the system
- How to ensure diversity of content
- Impacts on lifestyles
- Equity of availability, e.g. terminal placements
- Institutional impacts, e.g. on banking, newspapers, travel agencies, etc.
- Autonomy
- Means of finance for community/public interest information
- Regulatory issues, e.g. separation of content and carriage
- Control over content - by whom, for whom
- Accountability
- Computer literacy - the public's familiarity with computers
- Health concerns
- Depersonalized form of information, lack of human interaction
- Lack of existing Canadian databases
- Impact of cross ownership, media concentration and joint ventures
- Disparities in income - information rich vs information poor
- Use by special needs groups (the handicapped)

Decisions on policy issues also involve social impacts, and Exhibit 1.2 presents the relation between selected policy and social issues.

EXHIBIT 1.2

Policy Issues re Social Impacts		Impact
(a)	What happens if access for all information providers is not guaranteed?	Access
(b)	Can controls be placed on unwanted advertising to the home?	Privacy
(c)	What protections should be put in place to protect individuals against impulse buying if there are transaction capabilities?	Consumer Protection
(d)	What standards should be developed to ensure a minimum standard of computer literacy?	Equity of Access
(e)	What potential exists for decreasing the stratification which might exist between the information rich and information poor in society, and what structures can be put in place to ensure access?	Equity of Access
(f)	What developments in hardware, software and firmware can be encouraged to facilitate the widest possible use and interaction with Telidon among all groups?	Access
(g)	What are the potential demands for training and skills development?	Employment

(h)	If Telidon is used for health and medical purposes, what safeguards should be placed on records and ensuring confidentiality?	Confidentiality
(i)	What are the legal issues which need to be addressed when community groups place "advice" on Telidon?	Consumer Protection
(j)	What laws apply in assessing the quality and taste of information placed on Telidon?	Consumer Protection
(k)	What are the implications of recording inquiries about information of national interest?	Social Integration
(l)	What laws and rules need to be put in place re fraud or piracy of information and software?	Consumer Protection
(m)	If electronic shopping comes into a mass appeal, what impact will there be on pricing, i.e., will pricing be analogous to the floating currency exchange?	Consumer Protection
(n)	What are the implications of publishing re electronic transfer and display of magazines or books? What controls can be placed on content to ensure cultural diversity?	Cultural Diversity
(o)	Will new rules and structures have to be developed with respect to job searching and skill assessment?	Employment
(p)	Are there mechanisms for individuals to define "privacy" levels for protection of information and messaging?	Privacy
(q)	If Telidon is used for electronic mail, how will users not connected be serviced?	Social Integration

(r)	If electronic funds transfer is used, what will be the impact on costs of service to customers who desire personal services?	Consumer Protection
(s)	What levels of security and confidentiality need to be ensured before such services are put into place?	Consumer Protection

Of all of these various issues, perhaps the most important to have emerged in both the literature and the actual field trials involve the following:

- access
- privacy
- diversity
- vulnerability
- employment impacts.

Access

Access referred to in this context involves the specific terms of access to Videotex systems facilities to input material. Videotex services may involve transactions such as funds transfer, banking and shopping, and information retrieval plus private messaging. Access is especially pertinent to information retrieval and deals with the issue of who precisely will have an opportunity to be an information provider. Access may also refer

to user access to the Videotex system. If only a selective segment of educated persons have access to Videotex content in the second sense, it is possible that a class of "information disenfranchised" may arise. Also, given the possibility that Videotex may actually become an information utility, access in the first sense becomes extremely important since it determines who controls the flow of Videotex information and data. In other words, if the middle class comprises the main users of Telidon, will widespread implementation of Videotex create a class of information disenfranchised? How can diversity be assured,and what are users attitudes toward this issue? Also, when users become information providers, who will maintain the quality of information carried by Videotex? Access, in the sense of who provides and who gets access to which files, is crucial. The issue also pertains directly to economic factors. If it costs $10 per month to store a page of information on a Videotex system, only a few persons will provide and have access to that information. In other words, the terms of access partially determine the diversity of information content.

Privacy

Privacy has been one of the most predominant issues concerning computer communications. Here there are three main concerns:

1. The right to know -- involving an individual's access to information stored about her or him.

2. Secondary use of records -- in which information which is collected and stored in a computer data base may be accessed by other parties or other data bases.

3. Elimination time -- involving an appropriate time after which computer stored information should be erased.

The first two points have been addressed by the Canadian Human Rights Act, Part IV. The right to know is also addressed by freedom of information legislation which has recently opened governmental files to the public. Privacy has been extensively studied by the Department of Communication in conjunction with the Department of Justice in the 1972 Task Force on Privacy in Computers. This task force focused on protecting the privacy of individual records which are available in computer-readable federal government data banks. The privacy issue has actually been examined by a number of government departments and committees ranging from the Ontario government and the CVCC Sub-Committee on the Individual and Society to the Science Council of Canada. The privacy issue relates to Telidon in two important aspects: first of all with respect to the privacy of specific information content, such as in computer messaging and banking; and also the

privacy of billing records since such records may reveal considerable information about an individual. Also, if the security of Videotex systems fail, privacy of individuals may be invaded. Thus, this issue also relates to accountability. In summation, since Telidon utilizes a central computer and personal records such as banking may be retained in the computer, issues of privacy are critical.

Diversity

Another crucial social impact area involves the actual diversity of information content. The terms of access, we have noted, partially at least determine the diversity of information content. There are also various implications for access and for diversity which follow from varying configurations of Videotex/Teletext trials. A major focus here with respect to diversity pertains to the inclusion of public interest data bases in Videotex/Teletext systems. How and to what extent should public interest data bases be financed and supplied?

Vulnerability

Computer communications systems such as Videotex and Teletext are extremely vulnerable to failures. For example, a system disruption might affect electronic banking, information retrieval, etc. Of particular interest here is computer crime. All of these

impacts raise social impact questions concerning the adequacy of security measures that should be placed into a Telidon system. A number of experts have suggested that until sufficiently sophisticated security systems may be devised, the use of Videotex for stock exchange, electronic banking and voting should simply be forbidden, or that productivity gains are insignificant compared with the risks involved. The vulnerability issue, then, raises questions such as: what sorts of security measures may be utilized effectively for computer communications systems such as Videotex? Also, what are the effects of different structuring of Videotex systems such as Videotex vs Teletext, decentralized vs centralized data bases, etc?

Employment Effects

In recent years the employment impacts of computer communications system such as Videotex have received considerable attention. Governmental organizations ranging from the Telecommunications Economic Branch of the Department of Communications to the Institute for Research on Public Policy have over the past few years examined the impacts of computer communications on employment. In general, no single consensus has been found, and also many works examining employment impacts are based more on speculation than on empirical observation. However, microelectronics innovations occurring over the next decade are expected to considerably change the role of work and to profoundly alter the labour force.

These employment effects of Videotex are not easy to measure since new systems are being introduced at differing rates and differing settings, and also since the introduction of such innovations occurring simultaneously with other events such as an economic recession, which also affects employment levels. Employment issues involve essentially job displacement and occupational shifts within the so-called information sector. The effects of the new technology are not simply limited to layoffs, but may involve:

1. Jobless Growth. When an organization simply expands its activities without increasing its staff, although no jobs are lost the unemployed fail to find new job openings.

2. Job Displacement. This involves the fact that while individuals may lose one job they may find further employment elsewhere. The problems faced are temporary unemployment and a possible need for a change of occupation.

3. Deskilling. Although skill requirements may rise with some occupations as a result of the adoption of the microelectronics innovations, a deskilling may occur with other jobs that are partially automated. That is, a computer might control most aspects of a pro-

cess, leaving relatively few bits of work for the individual to supply.

4. Widening Skills Gap. There is a possibility that the new Videotex technology might lead to widening the skills disparity between clerical and professional information work.

All of the above speculated employment impacts are the subject of considerable controversy, and thus far there has been little real empirical evidence to clearly denote trends with respect to any of the above issues.

The problem then arises of how to identify these social impacts in such a way that their negative facets may be alleviated and their socially positive facets may be strengthened.

The problem, however, with attempting to identify social effects of any new technology is that the prognosticators are inevitably wrong. The British, for example, were the original Cassandras in predicting dire labour displacements resulting from diffusion of chips,[1] and yet, in spite of certain industries such as the Swiss watchmakers being decimated by chip usage, these predictions have not yet emerged in western economies, (due, in part, to the job creating effects of microprocessors). Similarly, in a 1982 study by one of the authors of the labour displacement effects of the introduction of three computer telecommunication systems for

scheduling and billing in the Canadian transportation industry, it was found that although their introduction resulted in considerable job shifts and new occupation types, a minimal amount of net unemployment resulted.[2]

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. A number of governmental agencies ranging from the Department of Communications to the CVCC have conducted conferences and seminars to determine the potential areas which will be socially impacted by the new technology. In general it has been found that "Groups could be impacted which might not yet be clearly visible, and no predictions about social impacts can be made for the long term."[3]

Concern for Videotex's social effects, however, should not be considered as separate from the broader field of data communications, data banks and the merging of computer-communications systems in general. More properly, Videotex systems should be viewed as a subset of the developments which are taking place in this merging of two hitherto distinct technologies.[4] Privacy, for example, is considered to be a fundamental right of individuals and a right which should be assured for all involved with electronic data communications. However, the proliferation of computer-communications systems and the facility for developing large data banks with interlinking capabilities (and not merely

Videotex) may represent a real threat to personal freedom.

Accordingly, the protection of privacy and individual freedoms can be enhanced through developing a variety of system configurations for computer-communication systems (including Videotex). For example, encouragement of special user groups and open access to computer commmunication systems are necessary to avoid manipulation and covert uses of information and user files.[5]

We conclude this introduction with a brief discussion of Canadian attitudes toward technology. Such attitudes are significant because the ways that people feel toward technology are a real factor on the specific social impacts which the technology has. In a review of social issues related to new technology,[6] Gardiner noted quite aptly that when a new technology such as Telidon is introduced, vastly more resources are devoted to the development of the hardware than to considerations of its effects on people. It is noted further that one way to avoid the frustration of finding ourselves with machines or hardware without matching software, and supply without corresponding demand, is to explore the demand for specific uses before, or at least concurrent with, technical development.

In a review of public attitude towards new microelectronic technologies conducted by Bell Canada in 1982, the following key findings were reported:[7]

1. The majority of the public is unfamiliar with micro-electronic technology. Awareness is greatest among males, young people and those with college education.

2. A significant market appears to exist for several types of home-based technology and services. Lack of knowledge and perceived lack of utility appear to be partial factors determining intention not to purchase and inhibiting broader acceptance.

3. While more than three-quarters of the public believe that technological change is necessary and beneficial for the economy, a majority is also concerned about resulting unemployment, working conditions and community consequences. Only a few people were concerned about their own jobs being endangered by new technologies. However, there are indications of a possible polarization of outlook regarding specific aspects of job effects.

4. Employee involvement in, and government supervision of, technological change is favoured by a large majority of the Canadian public. These views are held even more strongly in Ontario and Quebec.

5. A majority of the public expects employers to take responsibility for retraining. Slightly less than a

majority hold the employers responsible for finding alternative employment for their displaced employees.

6. The privacy concern is universally high in different areas of the country. It seems to vary according to age and sex.

   Unlike the responses to other issues, the privacy concern (along with the issues of information control) increases with the level of knowledge about microelectronics.

In reviewing cumulative results from the various studies conducted in the Bell Canada research, a number of conclusions about the attitudes of the public towards high technology were drawn:

1. There is overall a general lack of awareness about microelectronics development, particularly among those sectors of society characterized by lower education levels. Women in general have lower awareness of various technological developments.

2. The purchase of home-based equipment and services appeared to be motivated by perceived utility and the expectation of life enhancement. In the work domain, the public seemed to view technological change positively when phrased in the abstract, i.e. results and

productivity gains offset by job creation, but negatively on more specific and concrete issues. For example, impact on working conditions or employment is particularly strong among the less affluent and non-college educated.

3. There was overwhelming public support for a disclosure of impact information, joint decision making, negotiation and government supervision of new technologies in the workplace. Employers were singled out by a majority of the individuals reported in these studies as the key group responsible for retraining technologically displaced employees. Slightly less than a majority also held employers responsible for finding their employees alternative employment.

4. The possibility that increasing use of computers will result in greater confusion and billing errors for services rendered was also a key concern.

A number of implications were reported in the Bell study. In the area of work, employment and production in general, several things were worth noting. On the positive side it was stated that there is a strong expectation that new technologies will result in various qualitative improvements in work.

At the same time, there also appears to be a high level of

uncertainty and possible confusion on what to expect from the introduction of new technologies in the workplace. (This confusion is typically present even in debates among "authorities" on the matter.) Among the public it is clear that such uncertainty encourages an attitude of protectionism.

The level of uncertainty and polarization of outlooks was considered important in explaining another aspect of the study. The overwhelming support among the public for more open and therefore a more cautious approach towards technological change is coupled with a concern for an interventionist role for government. Government is being accorded a supervisory role to ensure, for example, that employers fulfill the public's expectations regarding the implementation for these services. In the area of retraining and finding alternate employment, for example, the report suggests it is to employers and not to governments or unions that the public is looking for action. That situation places the bulk of perceived responsibility for mediating negative social impacts in the hands of employers and not governments.

The third implication noted from the findings concerned privacy and confidentiality of computer-stored information. Although privacy and information control are issues in the public's mind, the concern is by no means evenly distributed throughout the population. Concern is higher in the middle class than in the

lower class and in English-speaking areas of the country versus French-speaking areas.

The report further states that if the public and especially the middle class sectors are as concerned as they seem to be about issues of privacy and information control, the pace of technological change is likely to be constrained or at least modified compared to a situation in which these concerns did not exist.

In summary, two major dimensions of attitudes toward technology can be defined as utility and effect. That is, Canadians tend to view it either as a necessity or alternatively as an unfortunate burden. The same ambivalence is found with respect to attitudes toward the computer. On the one hand it is appreciated for the useful functions it performs, while on the other hand it is feared as an autonomous simulator of human functions.

The conclusions arrived at in the Bell Canada study indicate there is a need to carefully examine the attitudes and opinions of the general public towards technologies, and that as new technologies are developed, careful assessment of the way they are perceived and the likely effect they will have should be undertaken.

Gardner's conclusions, however, are perhaps more direct, and in fact one outcome of his review is the need to develop sensitive

scales to assess the response to technologies on a socio-psychological level. It is noted that whereas opinion research has tended to emphasize the "affective" dimension, and psychological research the "cognitive" dimension, attitude research has consistently struggled with all three dimensions, i.e. affective (feeling), cognitive (thinking) and conative (doing). Gardner, in fact, has proposed a "technophobia rating scale" and an "attitude-toward-new-information-machine-scale" (TRS, ANIM, respectively), as instruments to measure the affective and cognitive dimensions of attitudes to technology.

Logan,[8] in reviewing the various steps which have led up to the proliferation of microelectronics, stated that there is a clear tendency to regard the information and communications revolution as a consequence of a single technological breakthrough, namely the electrification of information. In actuality, Logan notes this transformation is considerably more complex and involves five separate technological breakthroughs. It is the integrative nature of the electronic information which has caused these five breakthroughs to be lumped together. These include:

1. Telecommunications.
2. Information storage.
3. Cybernetics.
4. Microelectronics.
5. Systems approach.

Telidon represents the first merger of all five technological breakthroughs. It is an interactive communications information system that has a number of social applications including electronic mail, teleshopping, funds transfer, polling, computer assisted learning, etc. That interpretation leads to the obvious conclusion that one cannot consider Telidon as a single technology, but must view it in relation to and as part of a much broader field of microelectronics which is just now emerging.

Social Implications of Computer Telecommunications Systems

Operating Videotex is merely another variety of computer telecommunications systems, and these have been around for over a decade now. Correspondingly, speculation and thought about their social impacts have also occurred for over a decade. One of the more lucid of these examinations by Parker[9] criticizes two of the most common approaches to determining social implications of computer telecommunications systems.

The first, technological forecasting, which we have been examining, is defined as involving techniques such as:

> "The Delphi technique pioneered at the Rand Corporation, to predict trends in the technology. Such predictions usually include an implicit assumption that there will be no significant change in the institutional structures controlling the technology.

> consensus to support their suppositions. Such speculation often includes an optimistic view of the potential of the technology, because the experts engaged in the forecasting exercise have a vested interest in the continued development of the technology in which they have expertise. Such an approach carries with it the risk of falsely assuming technological determinism and thus implicitly or explicitly arguing that no social-policy action should be taken (other than to promote the development of the technology itself) because the social results are inevitable."[10]

The technological determinism implicit in all such technological forecasting, oddly enough, is consistent with a Marxian view of historical causation, according to which the "means of production" (i.e. what economists call the underlying technology set) "determines" or "causes" (in some undefined way) the forms of institutional organization of the society.

A second approach rejected by Parker is technology assessment, involving attempts to measure the beneficial or negative consequences of a new technology. However, as several analysts have argued, in the short to medium term which is of interest to policy makers, the social impacts are not determined or caused merely by the technology itself but rather by the social and regulatory institutions in which the technology is embedded.

In his own approach to social impacts of information technology such as Videotex, Parker believes that social impact analysis should begin with specific social problems which require urgent attention, and although any new information technology such as

attention, and although any new information technology such as Videotex contains certain technological limits on what may be achieved with it, the more relevant social impact questions concern specific alternatives within those limits which are selected by relevant institutions and organizations. Social problems, in other words, are not amenable merely to technological solutions but always involve changes in institutional structures, and in times of rapid technological change such as the present era, conservative governmental and business institutions maybe radically disrupted, and the possibility of change becomes more apparent.

Social impacts of the new technology may be divided into short term and long term (or transformative) impacts. We begin this work with a discussion of the latter, since these are more interesting and important.

1.0 TRANSFORMATIVE SOCIAL IMPACTS

In this section we examine the transformative social impacts of Videotex and Teletext, i.e. the long term impacts which may alter the way society is organized at its basic level. It is best to admit at the beginning of this section that we are almost in the realm of speculation, since such transformative impacts in other technologies have been inevitably both unanticipated and unintentional. The telephone, for example, during the first decade after its invention, was conceived of as a comparatively trivial invention, and as we shall see, was first thought of as a device to pipe music into the home. Transformative social impacts become apparent only after a widespread diffusion of the technology. Both short term and transformative social impacts of new technologies are of crucial importance, however in governmental planning they are often relegated to a trivial status behind marketing and economic concerns.

1.1 Diffusion Rate

When Harold Innis, the Canadian economic historian, described changes brought about in the ancient world as hieroglyphs on stone were supplanted by writing on papyrus,[11] he described a transformative technology -- i.e. one whose use had major social, cultural and economic consequences which, for several hundred

years afterward, could not even be visualized. The microprocessor is a transformative technology.

In spite of limited data on the actual extent to which microprocessor-based technologies such as Videotex and Teletext have diffused through the developed economies of the world, it is now apparent that the rate of diffusion is extremely rapid, at least an order of magnitude faster than the traditional time lag of 50-100 years between the invention and first commercial use of any new technology.

Most previous diffusion research has indicated in fact that there is a significant time lag -- usually between 50 and 100 years -- between any basic discovery in science and technology and the first reaping of commercial benefits.[12] Examples of this time lag include Clark Maxwell's formulation of basic discoveries in electromagnetism in the early nineteenth century which did not bear real commercial fruit until 100 years later, and the early 20th century work of Cammerlingh Onnes, who was working with substances at extremely low temperatures and found that near to absolute zero there were metals which lose all of their electrical resistance and become so called "superconductors". It was only 80 years later that that discovery was commercialized in items such as diffusion reactors.

With microprocessors, however, the time lag is remarkably re-

duced. Integrated circuits were invented in 1969 and microprocessors in 1971. Now, a little over a decade later, there are already thousands of commercial applications of microprocessors, of which Videotex/Teletext is but one.

Secondly, it must also be noted that the initial uses of any new technology are seldom, if ever, their eventual mass social uses (this observation is subsequently examined in detail), and correspondingly, the initial social impacts of a new technology are often far removed from its final, mass, transformative impacts. It should not surprise us, then, since the "developed" economies of the West are characterized by planned obsolescence, a stimulation of continuous consumption and instantaneous gratification through advertising and through superfluous production of several varieties of virtually the same good, that the new communications media like Videotex are being initially used for purposes such as home shopping. But there is no reason to suppose that the eventual mass uses of Videotex/Teletext will involve home shopping or anything else currently listed.

It is quite myopic to visualize Videotex in terms of its current uses, since this technology is so new. Also, given the fact that initial applications of a new technology often replicate those of existing technologies, there is no reason to assume that many current applications of Videotex listed in numerous studies will ultimately be its important ones, even if they survive.

1.2 Assessment of Long Term Impacts

A common methodology, exemplified by Tydeman et al.,[13] involves using workshops of "expert" feedback, with all the concomitant methodological failures contained in this procedure. Assuming a general scenario of the widespread penetration of Videotex/Teletext, Tydeman asserts that it is possible to utilize expert panels to "devise, where possible, early warning signs to call attention to likely serious negative side effects of the new technology".[14] Although the inadequacy of such expert panels has been shown innumerable times, it is nevetheless instructive to examine Tydeman's transformative scenario, since this has become the most predominant recent U.S. work which examines the social impact of Videotex. It is first assumed that:

> Teletext/Videotex has achieved relatively widespread penetration. It may not be in every home but it is probably in a neighbour's home, or you might be considering getting the service yourself. It is used for all five classes of applications: information retrieval, messaging, transactions, computing, and telemonitoring...The service is paid for by information service providers, users, advertisers, and non-profit/public organizations.
>
> Networking capabilities are widely developed. Through packet switching networks and satellite and terrestrial communication links, data and broadband networks have vastly increased in numbers and in services offered. Low cost terminals are accepted and available much as cheap pocket calculators and digital watches were in the early 1980s...The dominant medium of the 60s and 70s -- television -- has become modular, with a variety of purposes, including program watching, terminal display, home movie pro-

> jector, and more. The television set has also become interactive for both the interconnect services (through telephone and cable) and for stand-alone uses (interactive videodiscs)."[15]

Having assumed the above scenario, the experts proceed to speculate about key areas of societal impact of Videotex, comprising the home and family life, the business office, the political arena and the consumer marketplace.

As an example of such speculative expert feedback concerning transformative effects of Videotex, it is asserted then that "in the area of home and the family life the electronic cottage is the perfect technological solution to the problem of how women can have traditional careers and rear children at the same time, e.g. use the electronic technology to participate in information-related tasks from secretarial services to real estate management"[16] (emphasis added). One has seen "perfect technological solutions" to human problems before,and the net effect of what the authors are talking about is likely to involve a further confinement of women in the home environment, with all the concomitant psychological stresses that such isolation entails. In fact, as anyone knows who spends most of their time in the house, it is a major event to get dressed up and go out to some environment where one actually meets other people, shopping for example, and it is only a group of executives who must commute daily several dozen miles in a car who could conceivably believe that people are happy working in continuous isolation of the home. A

related point, also ignored by the authors, is that anyone working in the home is not likely to get any degree of promotion, visibility or recognition from their coworkers. Since women are likely to be the ones working at Videotex terminals in the home, one likely long term social effect may involve a further lack of career advancement for women.

As a further example of expert feedback, the authors assert, "In the electronic cottage, familial ties of interdependence may be based on new skills. Spouses may be drawn to each other as much for their ability to manipulate data bases as for their ability to prepare gourmet meals or play racquet ball."[17] Later, still in the context of the electronic home, the authors note that, "Since the electronic home is `capital-intensive'...someone has to capitalize it. But who and how? One possibility is a kind of localized travel-communication trade-off: the family's second car might be traded for elaborate videotex and other electronic equipment. Ultimately, the government might issue `information stamps', just as they now issue food stamps if it becomes obvious that a lack of access to electronic information systems was creating a class of disenfranchised."[18] However, the information disenfranchised are not likely to be disenfranchised merely because they do not have access to information technology, but rather because this information technology has become so complicated that they do not have the abilities or intelligence to use it.

It is easy, however, to criticize the methodology of others from hindsight, but if we reject this method of feedback from expert panels and if the initial effects of any new technology are usually not their final mass social impacts, how are we to gain any insight whatsoever into the eventual transformative impacts of Videotex and Teletext?

1.3 Lessons from Past Technologies

One possibility is to briefly examine the ways previous information technologies have transformed society, at what rates these transformations have occurred, and utilize these lessons to orient ourselves toward future impacts. Two "technologies" are briefly examined: writing (the phonetic alphabet) and the printing press.

The invention of writing totally transformed the nature of human institutions, commerce, culture and pretty much everything else. The sudden appeareance of phonetic writing had enormous social impacts on the entire development of western scientific and philosophical thinking.

> "There developed in the West and only in the West, a group of innovations that constitute the basis of Western thought. These include (in addition to the alphabet) codified law, monotheism, abstract science, formal logic and individualism. All of these innova-

> tions, including the alphabet, arose within the very narrow geographic zone between the Tigris--Euphrates river system and the Aegean Sea and within the very narrow time-frame between 2,000 B.C. and 500 B.C. We do not consider this to be an accident. While not suggesting a causal connection between the alphabet and the other innovations, we do claim however, that the phonetic alphabet played a particular dynamic role within this constellation of events and provide the framework for the mutual development of these innovations."[19]

As Logan has noted, the invention of the alphabet essentially provided a model of abstract thinking, since words were segmented into meaningless phonemes which were then represented by basically arbitrary visual signs. "This procedure also provided a model for analysis in the linear connections of simple elements to build more complicated structures which formed the basis of logic. The alphabet transformed the oral tribal society of pre-classical Greeks into the world's first society based on abstract science, formal logic, rational philosophy and individualism all within 200 years of the first introduction of the phonetic alphabet in 700 B.C."[20]

Similar to the effects of the alphabet, the invention of the printing press brought forth an increased and renewed availability of the ancient scientific texts and presented a new way in which data might be stored and transmitted from one learning or scientific centre to another. But beyond this, it also essentially created conditions prerequisite for the enlightenment.

The invention of the phonetic writing is so dimly receded in time that there is little accurately known about its actual invention dates and diffusion rates in chunks of time less than centuries. Much more, of course, is known about the Gutenberg press with movable type.

The art of printing with movable type was invented between the late 1430's and the early 1450's by Johann Gutenberg in Mainz and Strasbourg;[21] conservatively assuming an invention date of 1440, it was 36 years before the press diffused to England, carried by William Caxton, a highly educated merchant who was the president of the English trading company in Brugges,[22] and although the art of printing was firmly established in Europe 40 years after its invention, due to religious and political censorship, printing was not established as a free activity until 1695, approximately 245 years after its invention.

The information technology of the printing press also culminated in socio-economic changes which had been first initiated with the inventions of writing and alphabet.

Logan relies heavily on Innis' theory that the bias of communication depends on the medium of communication; "According to its characteristics it may be better suited to the dissemination of knowledge over time than over space, particularly if the medium is heavy and durable and not suited to transportation, or to the

dissemination of knowledge over space than over time, particularly if the medium is light and easily transported."[23] According to such cyclical theorists, rapid extensions of communications media result in major cultural disturbances which are later accompanied by periods of quiescence.

What is the relevance of the development of these technologies to our perception of future Videotex developments?

1. Technological and non-technological innovations tend to "cluster" in time. The Western versions of monotheism, abstract science and codified law were all "invented" in a comparatively short time-slice. Similarly, Videotex, although providing one form of the much vaunted information utility, is but one development amongst many emerging from microprocessors. Other include personal computers, video cassette recorders, executive work stations, microprocessor controlled robots, word processors and computer-aided design. Thus, just as the invention of the alphabet provided a framework for the development of a cluster of innovations, similarly the above cluster of new technologies was facilitated by the invention of the microprocessor.

2. The time-frame of diffusion to general use of all of these technologies was of the order of several hundred years, while the time-frame of microprocessor-based technologies is a magnitude more rapid.

3. The transformative social impacts of these technologies involved the creation of entirely new social and cultural structures and not merely modifications of existing ones.

4. The social impacts and upheavals resulting from widespread diffusion of these technologies were not, and could not be, anticipated by persons of those eras.

Thus, although it should be intuitively obvious that even over a short term period (of say 20 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, given a repeated series of technological forecasts which attempt to do precisely this, it is perhaps relevant to introduce an argument of the British philosopher of science, Karl Popper, which illustrates the impossibility of accurate technological predictions. This argument is summarized in the following four statements:

1. "The course of human history is stronglyinfluenced by the growth of human knowledge. (The truth of this premise may be admitted even by those who see in our ideas, including our scien-

tific ideas, merely the byproducts of material development of some kind or another.)

2. We cannot predict, by rational or scientific methods, the future growth of our scientific knowledge ...

3. We cannot, therefore, predict the future course of human history.

4. This means that we must reject the possibility of a theoretical history."[24]

Popper's argument does not involve a refutation of the possibility of any type of social prediction; the argument is really quite compatible with the procedures of testing social theories -- for example, predicting under certain circumstances that specific developments will occur in the future. What the argument does repudiate is, "The possibility of predicting historical developments to the extent to which they may be influenced by the growth of our knowledge."[25]

How does this argument apply to the various social impact predictions made about Videotex and Telidon? The problem is this: all of these predictions, such as those of Tydeman et al., assume that the Videotex/Teletext technology that will be in place twenty years from now will essentially resemble that of today. First, extrapolating existing trends into the future -- such as lower death rates, higher income and longer labour force participation for the elderly, or rises in house financing resulting in more shared living space, etc. -- they then make what are basically intelligent guesses about the social impacts of the present

form of Videotex technology being in place in twenty years, in light of these various trends. The fault, however, with all such extrapolative speculations is that they assume that the versions of technologies in place fifteen to twenty years from now will essentially resemble those of today, perhaps with some minor modifications. They thus assume that future versions of the technology will be only minimally affected by the continuing growth in human knowledge.

The magnitude of these errors may be realized by remembering the speculative predictions made in the mid-1950s concerning future computer developments. In that era it was universally predicted that three or four large mainframe computers would satisfy the computing needs of North America.

1.4 Prediction vs Prophecy

If one accepts a further distinction of Popper's -- that of historical prophecy versus social engineering -- one realizes that many of the so-called technological predictions made about future impacts and uses of Videotex are actually prophecies. Popper writes:

> It has not always been realized that two different kinds of predictions can be distinguished ... and accordingly two different ways of being practical. We may predict (a) the coming of a typhoon, a prediction which may be of the greatest practical value

> because it may enable people to take shelter in time; but we may also predict (b) that if a certain shelter is to stand up to a typhoon, it must be constructed in a certain way, for instance with ferro concrete buttresses on its north side ... In the one case we are told about an event which we can do nothing to prevent. I shall call such a prediction a "prophecy". It's practical value lies in our being warned of the predictive event, so that we can sidestep or meet it prepared (possibly with the help of predictions of the other kind). Opposed to these are predictions of the second kind which we can describe as technological predictions, since predictions of this kind form a basis of engineering. They are, so to speak, constructive, intimating the steps open to us if we want to achieve certain results ... The distinction between these two sorts of predictions roughly coincides with the lesser or greater importance of the part played by designed experiment, as opposed to mere patient observations, in the science concerned."[26]

In other words, according to this distinction, it is only the experimental sciences which are capable of making technological predictions, while those employing for the large part non-experimental observations or speculation produce prophecies.

Even so, the basic notion behind a technological prophecy ultimately involves attempts to plan and modify social institutions with the end of controlling, mitigating or quickening impending social developments which might arise from the implementation of a new technology such as Videotex. Social and technological innovations seldom evolve through rational planning, but if we can make reasonable prophecies, we can also build our technologies to deal with possible eventualities.

1.5 The Emergence of Novelty

The emergence of novelty is also a frequently trivialized factor in many technological predictions. For example, speech synthesis and recognition are frequently considered to be merely a minor "add-on feature" of future Videotex and computer-telecommunication systems. However, speech recognition is perhaps one of the most transformative applications of microelectronics technology. Already in the west there is a wide range of microprocessor-based products which can both recognize and synthesize spoken voice.[27] These range from educational products such as Texas Instruments' Speak and Spell, a comparatively cheap hand-held educational tool for children, to $34,000 minicomputer-based voice recognition systems of firms like Interstate Electric, a California manufacturer, which have already been used for matters such as factor quality control and bank entry of numbers. It would seem likely that speech recognition systems will be widely used in the future to interact with computer telecommunications systems such as those involving Videotex, since speech is the most common natural form of communication and anyone will be able to use a speech recognition system without extensive training. This is not a minor modification to Videotex, and as yet we have little understanding of how computer communications systems may be transformed when they may easily be used.

In summation then, the notion that we can anticipate long term

social impacts of new technologies such as Videotex is based on the implicit assumption that the technology which evolves 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 from the late sixties to the present time.

1.6 The New Media Muddle

We have already noted that the first uses of new technologies are seldom their mass uses. In a series of works[28] Robert Arnold Russell has been examining what he calls the new media muddle. The muddle referred to here involves the fact that the people who invent a new communications technology inevitably first get its uses wrong. For example, several of the early telephone entrepreneurs initially visualized that the telephone would be used alternately as an office intercom system or as a device to pipe music into the home. Similarly, in the early years of the recording industry, entrepreneurs believed that they were selling reusable office dictaphones, and this industry "only accidentally discovered it was in the music business, just in time to save itself from still-birth and bankruptcy".[29]

In more recent times, the initially targeted market uses of new

communications media are involved in the same muddle. Both videodiscs and home computers in the early stages of their development were visualized as having uses that shortly proved to be failures.

Videodiscs, Russell observes, were initially introduced as "video versions of the record player, showing feature films which the public was to purchase for $20 or so, and play time after time."[30]

Personal computers were initially conceived of alternately as home hobbyist toys or as devices to talk to one's oven over the telephone (i.e. as controlled monitoring devices to regulate air conditioning, security and so forth).

The new media muddle has also been called the "electronic horse fallacy", according to which the initial uses of new technology tend to replicate those of older technologies. For example, Bell Canada's initial marketing efforts for its Vista trial in 1979 included a photograph of a Canadian family in front of the TV set looking at the news in the new dynamic medium of alphanumeric print. Presumably this was a family which, just as Tydeman had suggested, found their common bonds in their ability to manipulate data bases together.

The idea was the family had found a common interest in the new medium and would spend their evenings looking up information. They may not have had much choice, for the Videotex system tied up the phone line and the television set, thereby eliminating two entertaining alternatives to a fun evening of Videotex retrieval."[31]

2.0 SHORT TERM IMPACTS

2.1 Introduction

A 1980 report on social aspects of Videotex services produced for the Department of Communications outlined a number of directions research should take in evaluating new Telidon services.[32] It was noted in that report that the Department of Communications was involved in three main avenues of research directed at social aspects of Videotex. First, the broadcasting and social policy branch of the department gives specific attention to the social aspects of telecommunication services. Secondly, within the Telidon program there has been limited provision made to evaluate the social impacts within the context of the field trial activities. And thirdly, the Canadian Videotex Consultative Committee has focused on social implications of the new technologies.

The report also 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, very preliminary data bases, and 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. It did, however, suggest that the field trials should be used to examine and evaluate some measures of short term societal impacts upon the participants and, as well,

to direct attention to technical success and consumer demand.

The Telidon field trial program included provision for three items relevant to social impacts:

1. Semi-systematic data collection relevant to social impact-related issues.

2. Study of the impact and adequacy of content in the field trials in terms of societal goals such as educational uses of Telidon.

3. The funding of a CVCC sub-committee to develop social research areas for the field trials. (These were minimally used in the actual trials.)

The approaches to the social aspects of these services were defined from a research perspective in two ways:[33]

1. Research addressed to social issues generally.

2. Research to accompany the field trial activity. This included evaluation and the development of a general survey vehicle to foster consistent and compatible data across the field trials.

These recommendations indicate the overriding belief that social issues can be measured by attitudinal and perception measures using survey based approaches.

The D.O.C. report exhibits:

1. A belief in immediate short term impacts arising from the technology.

2. A failure to recognize that when new services are being evaluated by users they can only be examined in the most speculative of ways until there is more experience with the technology.

Measuring even short term impacts at best is only speculative unless reasonable time frames are developed for observation and assessment.

The main objective of the present study was initially defined as the utilization of field trial results to indicate social impacts on trial participants. Within that context, specific impacts which were thought to be relevant for measurement included, at the micro or individual level, such things as socio-psychological well-being; quality of life; sense of autonomy, privacy and vulnerability; learning and skill development; interpersonal relationships with family; work characteristics and consideration

of such things as the merging of home and office for activities related to work; changes in lifestyles; and changes in activities such as banking and shopping.

2.2 Measurement of Short Term Impacts

A number of research approaches have been applied in an attempt to measure social issues. These range from simple discussions with individuals or groups of individuals to highly structured experiments utilizing control or test groups and monitoring of their response to new technologies over time. The approaches can also be classified in terms of a measurement of impacts at the individual, group or societal level.

2.3 Applied Approaches

In a recent study conducted by the authors examining the social impacts of office automation,[34] a review of the various approaches revealed that these could be classified in two ways: applied approaches and general research methodologies for collecting and analyzing data in a rigorous fashion. Within the context of applied approaches are included the quality of working life and sociotechnology.

2.3.1 Quality of Working Life

The quality of working life, as the name implies, is designed to assess the individual's response to technology and how they are affected by technology within their work environment.[35] The basic objective of that approach is to create more challenging and satisfying work and improve organizational effectiveness. The organization stands to gain through more satisfied workers who, it is supposed, are thus more productive. These approaches stem from earlier work which relates to job enrichment to improve production through employee motivation. The conclusion of such early studies was that when employees have a sense of involvement in the work process, job satisfaction and positive motivation increase. These approaches, of course, relate to Telidon and Videotex from the perspective of their introduction into business environments. The approaches, which have been applied to the more general field of computerization in the work place, have direct application and should be considered as measurement instruments.

A major contributor to the development of social concerns related to the quality of working life has been the Tavistock Institute of Human Relations based in London.[36] This group looked beyond the individual employee to the organization of work itself in an effort to create more satisfying work and increase organizational effectiveness. During the late 40's and 50's members of the

institute began to recognize the influence of technology on both the nature of jobs and the social organization of the work place. Tavistock researchers noted that when engineers designed technical systems there resulted little understanding of the human or social systems that would result. The group developed the concept of an organization as a socio-technical system. Design, it was argued, should be a process of joint optimization of the social and technical system and effective organization that is required to meet the needs of employees as well as the requirements of the technical infrastructure.

As noted, the quality of working life covers a variety of programs, techniques, theories and management styles whereby organizations and jobs are designed to give workers more responsibility and autonomy. The quality of life technique emphasizes employee participation through:

1. Redesign of jobs and organizations so that the majority of workers can do meaningful work.

2. Increased responsibility and decision-making at worker level.

3. Employee training and development.

2.3.2 Socio-Technology

In assessing applied approaches to evaluating the social effects of new technologies in the business environment, the quality of working life approach is concerned broadly with the welfare of the individual worker, while the socio-technical approach focuses attention on the options available and the design of a social system that will utilize a particular technology. Socio-technology system design can be viewed as a tool used to achieve quality of working life objectives. It is, then, the application of formal analytic tools for the design optimization in terms of division of labour, job design, inter-organizational boundary setting and measures of performance.

In quality of working life it is believed that employee morale and productivity are expected to increase if the worker is a participant in the work process. A number of applied methodologies for collecting and analyzing information are associated with each of these approaches for assessment within the work environment. Fundamental to the quality of working life approach is that information is gathered through group discussions, interviews and questionnaires on how workers perceive their jobs and what changes they view as desirable. A steering group performs work analyses to examine the efficiency of the production and to identify holdups in the work flow.

Within the socio-technical approach the major analytical steps include:

1. Scanning - defined as an overview of the system to be designed.

2. Technical analysis, i.e. identification of unit operations.

3. Identification of key variances as points at which deviations from a desired standard or specification are likely to occur.

4. Table of variance control, which is a list of unit operations in which key variances are controlled, whom or what controls the variance and what actions are used to control them, the source of information on which these actions are based, and possible alternatives of social mechanisms, either technical, mechanical or human.

5. Social system analysis comprising three steps:

   a. Examination of the role relationship within the whole work system.

b. Examination of the role relationship between the work system and persons outside the system.

c. Analysis of how individuals view their roles.

In summary, studies of quality of working life and socio-technical techniques to the work place have been increasing and are two approaches gaining more use for measuring the social impact of the introduction of new technologies. These applied approaches have been shown to be moderately useful in assisting businesses and organizations to cope with ever increasing levels of complexity and uncertainty which result when new technologies are introduced into the work environment.

To date there have been no systematic studies of these types to assess or aid in the definition of the potential effects of the introduction of such things as Telidon in association with other microprocessor-based systems such as electronic messaging, word processing and communicating word processing into the work force.

2.4 Macro-Level Impacts

One might postulate a hierarchy of social impacts from macro level impacts down to micro level impacts. Macro level impacts, for example, include such things as employment impacts; labour shifts; training requirements; changes in social patterns such as

the allocation of time to new activities resulting from the introduction of a technology; altered leisure time budgets for a group or society; social integration; alterations in human interaction impacted by a new technology such as teleshopping or telebanking; cultural diversity; such things as access to information, alterations in control of information and creation of information; equity of access; and regional representation.

A number of methods for measuring impacts have been developed which can be applied to macro level issues. These types of impacts are associated most often with economic studies, women's studies, assessment of technological change and labour relations. The most popular types of measures at this level are those directed toward economic impacts, with particular emphasis on labour implications and training requirements in relation to the introduction of chip-based technologies.

2.5 Leading Edge Analysis

When innovations are introduced on a wide scale, it is recognized that certain leading edge companies or organizations are often most relevant to investigate in order to gain an understanding of the probable impacts new technology may have on a particular industry segment. Likewise, when new technologies are introduced into the residential environment, it is often the case that leading edge groups are considered as representatives of broader

populations. These groups often are the first to be introduced to a technology in test situations. In most studies using this method, the approach involves a detailed assessment of the experiences of a selected group of leading edge companies or individuals who are utilizing the technology, and in most instances this approach aids in providing a preliminary picture of the early stages of product and service introduction.

In many instances the leading edge approach is used to obtain basic measurements of interest and response to technology in gauging such things as attitudes and perceptions towards the technology. Where quantitative data is collected, the results are often used as a basis for forecasting the population or industry-wide response to the technology. The approach is based on direct observation of events amongst selected groups or individuals which have been defined according to their role in industry, business or society. These groups and segments are usually thought of as a primary source point for the further diffusion of the technology throughout a population.

Limitations in using this approach are quite obvious, particularly when issues of a social nature are being measured. One major limitation lies in the fact that there is an a priori selection of so-called leading edge companies or population segments, and generally there is a non-rigorous method in the measurement of the perceived impacts. Trend extrapolation of impacts throughout

the population are restricted using this approach since the base of the projection is not representative of a particular population segment, and further the models for extrapolation cannot be adequately paramatized since the population is usually unknown.

These methods are useful only for gaining a very preliminary understanding within a few selected companies or segments of the possible response to a new product. They are, in fact, highly limited when assessing social effects primarily because of the time required for observation and the need to adequately control for the variances which exist naturally in a population of individuals.

2.6 Delphi

As previously discussed in the chapter on transformative effects, concensus opinion techniques are often applied to anticipate the possible impacts of a new innovation, and this technique has also been used to attempt to forecast the probable long term effects of the introduction of a new technology. Some of the research which has been conducted for Telidon has utilized a variation of this approach.

It is not uncommon to find examples where so-called experts or seers are asked to consider a new innovation and to assess the probable impacts of its introduction. The impacts are often

defined in terms of economic, social, political or technical criteria.

Delphi is one technique which can be used for soliciting opinion through the use of questionnaires whereby the researcher determines the expert's expectations and then compiles these in some sort of quantitative indication of central tendencies. These responses are then returned to the experts who are asked to compare the median response to their original responses and either shift their answers or explain their reasons for differing from group consensus.

The Delphi technique has been found to be useful for obtaining opinions from experts, but much less successful in providing accurate predictions about the direction and impacts associated with a particular technology. This has been found to be the case, particularly where there are no acknowledged areas of expertise and where little experience or familiarity with a new technology exists.

These limitations are relevant to Telidon since there are very few examples of its introduction in anything other than a field trial setting. Yet there seems to be no lack of opinion about what potential impacts of this new technology will have, despite the fact that the technology has not been in place for any longer

than a year or two in the majority of systems under investigation.

It is worth noting that in 1976 an assessment of Delphi was made by the Business Planning Group at Bell Canada.[37] They defined four fundamental weaknesses of this approach:

1. The concept of expert is virtually meaningless in experiments dealing with complex social phenomena.

2. Sole or primary reliance on expert opinion in the social sciences have long been discredited and has, in fact, very few serious advocates.

3. Panels chosen in unspecified ways generally enhance the possibility for a rather elitist approach to defining problems.

4. There exists an uncontrolled and unknown expert halo effect in Delphi, contributing to what is referred to as "expert oversell".

2.7 Time Activity Analysis

One approach which offers some limited potential for evaluating short term social impacts, particularly those which are likely to have effects on the time allocation and process-oriented aspects, includes time activity analysis. Macro level societal changes resulting from the introduction of new technologies have been assessed in some instances using what is referred to as a time and activity analysis. These types of studies examine such issues as the effects resulting from the introduction of a technology on daily life activities. Typical of these would be studies which look at factors leading to changes in the requirements for travel,[38] e.g. shopping, when interactive telecommunication services are introduced into the home or office environment. As well, changes in transportation requirements could occur when home banking or transactions services are introduced.

Generally surveys of travel and communication behaviour constitute the prime data gathering technique in these types of studies. Data is usually collected over several time periods using a longitudinal framework and is subjected to analysis using a variety of multivariate techniques. The models are based on the principal of tracking and identifying significant changes from one time period to another which can be attributable to the introduction of a new technology.

In studies of new office locations, the process has been used to identify which components of an organization could be shifted to rural areas. Results are used to make decisions about future investments in new office locations and the effect on employees. More recent work in this area attempts to view time allocation and activities in a systematic way. Strong reliance in these studies continues to be based, however, on traditional time budget survey methods. The limitations on such techniques to measure social phenomena include:

1. A short time perspective and concern with "average days". Such averaging reduces the subtleties of day-to-day time allocation and thereby fails to incorporate individual differences in the analysis.

2. Time-use analysis deals with actual behaviour, and as a result perceived choices and alternative options, which may not be selected or acted upon and thereby registered, become a form of non-behaviour and are not recorded. These may be relevant essentially because of the introduction of the new technology.

3. There is often very little attempt to understand the structure of the environment in which the individuals are acting out particular behaviours and roles. Only inference is made of the actual implications which can

be attributable to the technology. It has been discovered that time-use studies provide very little other than crude guidance on exactly how a particular environment can or should be changed to promote certain forms of time-using activities and thus improve the quality of the work place or home.

4. Time-use surveys and time-budget allocation methods generate enormous amounts of data, far more than can be adequately analysed by the researcher. This problem often leads to even further generalizations than are necessary.

5. Activity classification. If human action and behaviour is to be sorted out into discreet, quantifiable activities, there must be some criteria to define the various activities so that they do not overlap, becoming fused in some rather amorphous way. To this end, a good many activity classifications have been devised, and some have been designed with a particular problem in mind, such as the differences between male and female activities, the extent to which people are engaged in various forms of leisure activity, and time spent on television and its relation to optimum broadcasting hours for certain target populations and so on.

6. There is a reliance on rather broad categories which become catch-alls with very little differentiation. For example, typical activity time-studies refer to work-time. This deceptively familiar phrase contains numerous sub-classifications which are very rarely differentiated. Whether people were driving trucks, teaching or working at home writing novels, all are usually homogenized and subsumed under the heading of work. There is even very little differentiation between work at home and work in the office. Clearly, it is important that an adequate activity classification allowing for observation and variation between different work types and different activity classes must be developed if these types of approaches are to be useful for assessing impacts on various sectors of society.

2.8 Diary Methods

Related to time-budget activity analysis for assessing social-impacts resulting from new technologies is a method of collecting data by diaries. Respondents fill in the times at which they carried out each activity during the day. The problems with these methods include the financial costs of collecting and analyzing the very detailed and large amounts of information made

available. This problem can be particularly acute if the interval at which respondents are asked to record activity is too small. If the interval is too large on the other hand, the risk of losing many of the short-term activities of the day is very real. Another problem which occurs quite regularly is whether to use a predetermined activity classification.

Diary techniques have many advantages over recall interviews and participant observation when attempting to measure the impact of new technologies. However, a major drawback is the difficulty for large segments of the population to fill them out. This is particularly the case for children, the aged, the physically handicapped, the hard-of-hearing and the visually impaired.

In one case study conducted as part of the Canadian field trial[39] activities, a diary approach was used to collect information at public terminals. In that example, sets of diary sheets were placed at terminal locations. Individuals who interacted with the Telidon terminal were asked to fill out a form detailing their responses using eighteen predefined questions. The types of problems encountered in administering that activity mirrored those mentioned previously. That is:

1. There are serious questions of representation of the sampling group.

2. Responses were provided only by those individuals who are able to read and understand the diary questions. Children and the elderly, although users of the services, were not represented.

3. The use of predefined categories limited the variability in responses obtained from the sampled group.

The way in which a household member allocates her or his time is a function of the division of labour, the division of activities, the extent to which members delegate activities among themselves, the extent to which they share the use of equipment for viewing television, Telidon or Teletext. The fact that they share the same resources determines the viewing activities they are able to enage in to some extent. It is this organizational context which becomes important in understanding the way behaviour is organized, and as a result, some accounting of this context must be made.

In summary, the time-budget approach which has had much use in the analysis of social effects of innovations has failed primarily because the context of behaviour has not been incorporated into the measurements. As well, the actual method for collecting data has been somewhat cumbersome and usually has led to the collection of far more information than an analyst can possibly use and provide any sense of in terms of defining what are the

impacts which accrue from a given innovation in an organization or household setting. One of the most important aspects, then, is the concern for context.

2.9 Network Analysis

Network analysis has recently emerged as a method which offers potential for assessing the social impacts of technologies within an environment at the organizational level. The methodology attempts to define linkages between individuals or organizational units based on measures of interaction. Network analysis has been used to define the characteristics of the interaction as well as the complexity of the sets of interactions which may take place.

New information technologies such as Telidon can affect organizational structure in terms of how users relate to one another and can in turn affect the social interaction which is likely to take place between individuals within the organization. This contemporary approach to assessing the interaction of individuals represents a distinct shift to understanding the value of the relationships engaged in a process of convergence, rather than only isolated individuals. The value of this approach is what it offers in looking at relational communication processes and in understanding the nature of the way individuals interact within

an organization and how that interaction is affected by the introduction of new technologies.

Three approaches have been proposed for network analysis. These are:

1. Static comparison approaches.
2. Deterministic approaches.
3. Probablistic approaches.

Static comparison approaches include relational networks at the individual, group or system level. Individual level analysis is usually based on an anthropological perspective, and there is often a focus on time-use for individuals in specific environments, offices, corporations or households, for example. Techniques rely on observation, recording of time-use and the aggregation of time allocation for specific tasks. There may be attempts at establishing relationships between measures using frequencies and correlation analysis. In some studies, relational variables have been correlated and plotted with each other across time to show, for example, how later relationships associate with "communication strength". Other techniques applied in this type of study included repeated measures of variance and multi-dimensional scaling. These are used to define groups or clusters resulting from communication linkages. It's worth noting that numerous other clustering algorithms can be applied and used to

define the way sets of individuals combine to form units which can be thought of as having more homogeneity internally.

System level analysis utilizes matrix algebra. In such studies a matrix of interactions, i.e. a whom-to-who matrix, can be constructed and subjected to various types of contingency table analysis. Other approaches involve a co-variance matrix derived from the initial link or distance communication matrix. Related to these types of studies are those developed by sociologists which look at the communication structure through the formation of social networks using a measure of interaction such as the number of two-way connections between individuals.

Deterministic approaches in network analysis have been classified by Rice[40] as covariance based approaches and structural control approaches. Time series and regression analysis are two methods which have been applied to define communication networks and to assess change or impacts in a given group or population over time.

Critical problems in these types of approaches center on the large number of time periods necessary to gain a meaningful series of observations. This is particularly problematic when tracking human behaviour. The second problem inherent in such approaches is the unit of time used to observe events. This is commonly referred to as the window within which events are

measured. A very fine window increases the data requirements, while a very broad window introduces the problem of aggregation.

Probablistic approaches for assessing the impact and analysis of changes in communication patterns due to new services such as Videotex have been classified as information flow approaches and Markov chain approaches. These methods have been applied most often in the area of diffusion, structural information and stability modelling. These models and approaches consider networks over time and seek to define the likely outcome in a system from one time period to the next. The majority of work using these types of approaches have been applied to the analysis of interpersonal and mass communication mediation.

Stochastic modelling approaches to the analysis of networks for communication and interaction over time are gaining increased attention. Markov chain analysis represents one such approach. The essential aspects of this approach are its reliance on defining elements, processes, states for the elements and transitions in the relationship between elements over time. Rice[41] has pointed out some of the problems inherent in the application of Markov models and stochastic approaches to network analysis for assessing social impacts:

1. The need to assume a homogeneous population.

2. The assumption of constant transition rates through time.

3. The need to collect data from very small sampling units.

4. The requirements for the transition matrix to be imbedded in a more fundamental matrix.

The applications of this approach have been expanding with the result that new variants are constantly being devised which modify some of the more stringent assumptions associated with the original applications. The approaches, however, typically use rather complex modelling procedures such as linear and stochastic differential equations, and therefore a certain skill at mathematics and quantitative modelling is required in order for them to be usefully implemented.

When social impact assessment involves attempts to assess the short term or transformative effects of society, it is clear that time is a most critical element. It is also clear that allowing adequate time for measurement and observation is perhaps the most fundamental need when assessing all types of social impacts. The fundamental weakness of most approaches discussed in this section has been a failure to incorporate time as a necessary element in the measurement procedure. Too often, assessments have been

based purely on observation and on expert opinion using techniques described earlier within the context of Delphi and Leading Edge analysis.

Network approaches offer the opportunity of incorporating time as a unit of measurement, as an interval of observation and in terms of the time-scale of measurement. While data collection techniques rely on survey and self report diaries, these are mediated somewhat by the fact that both the context of social interaction and sub-behavioural activity are observed. With the introduction of computer mediated communications as provided by Telidon and Videotex, there are very real possibilities for overcoming problems associated with the manual collection of data. Of course, associated with automated data collection are the attendant problems of privacy and the monitoring of individual use of a system. Nevertheless, these approaches do have considerable utility for data collection.

Automated tracking is one development which is likely to be used more in the future and therefore to provide better opportunities for modelling the relational properties which actually exist between organizational structures and new technologies. These observations can be made within organizations and for sets of linked individuals within a community or even at the household level. These types of approaches are also useful for conducting unobtrusive longitudinal measurements.

Further advances in the use of network approaches are likely to provide better opportunities for the application of these models. Understanding the characteristics of the communications environment within which organizations and individuals operate will be enhanced along with the ability to evaluate short term social impacts.

2.10 Laboratory Experiments and Methods

Laboratory methods and experiments in communications research usually involve a controlled testing of some specific hypothesis concerning interaction and communication within an artificially defined setting. These types of approaches have been used most regularly in the assessment of human factors and issues, and they have been considered quite acceptable in studies of product development. Using these methods, however, raises a number of important concerns:

1. Limited external validity and generalized ability of the findings to broader cross sections of the population.

2. Current early stage of hypothesis formulation, making it difficult to test precise hypotheses.

3. Problems in obtaining appropriate sample respondents.

4. Time required for individuals to become proficient with the operation of the specific piece of equipment.

Controlled laboratory experiments for assessing social impacts are of dubious value. This stems essentially from the nature of the impacts to be measured and the fundamental need to allow the context of the organization or household to be part of the evaluation.

Time is again an imporant consideration, since there must be sufficient experience with system operation and system interface to allow aggregate patterns of behaviour to emerge and be observed. Finally, social impact assessments require numerous examples to be studied and numerous observations to be made so that adequate amounts of data can be collected in order to confirm the emergence of a social phenomenon or measurable social impact. As a result, while laboratory studies are an excellent method for asssessing the response to system features at the product development stage or for testing hypotheses about the socio-psychological response to technology, they have proven to be rather limited in terms of social research.

2.11 Field Trial Methods

Field trials have constituted the main thrust of research for assessing responses to the Telidon services. These offer an opportunity to evaluate new technologies within the context of a real world setting and with individuals who are actually users of the technology. These may be, for example, individuals in public locations interacting with a Telidon terminal, management staff interacting with a terminal, a word processor Telidon unit in an office setting, individuals in a library using Telidon for reference sources, or individuals in a household using Telidon to play games.

Field trials can be classified in three ways:

1. True experiments in field settings.
2. Quasi experiements.
3. Non-experimental designs.

The latter approach is more akin to the case study typified by very little or no control in the assignment of subjects to groups and in the use of control in test groups. Experimental designs are usually typified by full control over the items to be measured and the specification of individuals or subject -- to test or control groups. Quasi-experimental designs allow only partial control; they differ primarily in the lack of the random

assignment of subjects to groups. They usually include:

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

In assessing the applicability of a particular field trial method for understanding short term impacts of a new technology such as Telidon, it has been suggested that the quasi-experimental approach is the most appropriate. Its appeal lies in the fact that it's somewhat of a compromise between the highly structured controlled experiment and the often ad hoc approach used in a case study or non-experimental design. In the following chapter, we examine the actual design classifications of the Canadian field trials, specific limitations in these designs, and the types of social data which have been collected in the trials.

3.0 THE CANADIAN FIELD TRIALS

3.1 Design Limitations

A review of the following exhibit indicates the majority of field trials can be classified as quasi-experiment l designs. In most cases, however, the trials fail to meet all of the criteria identified in the last chapter necessary to qualify as true quasi experiments.

EXHIBIT 3.1

Selected Field Trials and Designs

1.	B.C. Telephone	Quasi-experimental design
2.	Alberta Government Telephone	Case study
3.	Project Eli	Quasi-experimental design
4.	Vista	Quasi-experimental design
5.	O.E.C.A.	Case study
6.	Project Mercury	Case study
7.	Cantel	Case study
8.	WETA	Quasi-experimental design

Significant limitations, for example, in the B.C. Tel trial included the fact that there was no control group against which to assess the participants. Secondly, no attempt was made to

systematically select field trial participants, who for the most part were volunteers. A third limitation involved the lack of ability to control for drop-out from the trial activity by participants. There was no mechanism instituted for the systematic replacement of individuals.

Data collection for Project Elie was based on the application of surveys with three groups: households scheduled to receive the trial services, households not participating in the service but in the Elie area, and a control sample outside of this area. All interviews were conducted on a one-to-one personal basis. While this design was the closest to a true quasi-experimental approach, limitations can still be specified:

1. There is no indication of how the sample was selected or whether they are matched on any basis.

2. There was an ad hoc application of trial assessment procedures; that is, no distinct time-frame has been set down for when measurements would be made.

3. There have been no clear statements of social impact hypotheses to be tested through the utilization of the test and control groups.

4. There was no indication of whether a random assignment of individuals was used as the prime method of allocating subjects to test or control groups.

The Bell Canada Vista trial measurment procedures included:

1. A set of mini focus groups conducted in Toronto and in Cap Rouge, Quebec. There were eleven family mini focus groups in total. These were conducted amongst trial households in each of the two service areas.

The initial stages of selection for the Vista field trial were designed to introduce a significant amount of rigour into how individuals could be selected for trial participation. The selection proceeded in the following way:

1. A sample of customers within the service territory for Vista in the Toronto district were sent questionnaires advising them of the possibility of participation in the field trial. Individuals were then asked to indicate an interest in trial activity. Those doing so were then sent a questionnaire which assessed a number of aspects pertaining to their use of technology, their socio-demographic status and also applied a socio-psychological measurement scale. Subjects were then selected from the sample group responding to the

initial questionnaire. Research which has been reported to date does not include any reference to a control group used in the Vista trial. Results from the trial are based solely on a test group of approximately 400 families.

2. Research conducted to date consists of sets of qualitative focus groups conducted shortly after the introduction of the service to the households. Questionnaires have also been administered by mail to individuals having Vista in the home for a number of months.

The OECA field trial can be classified as a case study using only a test group and three periods of observation. This included an interim report using structured interviews conducted with sixteen field trial participants, an in-depth testing of individuals at selected sites, and general data gathering across all sites. Instruments used included telephone interviews, personal interviews administered to participants and log books (diaries) for those using the system on a regular basis. Again, as in the other examples, a number of basic controls on data collection and subsequent evaluation were not undertaken. Specifically these included the lack of a control group, the inability to state specific times of measurements, and the inability to specify actual users.

The Project Mercury field trial was characterized by a small sample size composed of approximately 25 families. The measurement methods, while initially designed to include a test and control group, ultimately included only a test group experiencing service for at least six months. The observations of the test group were taken prior to the introduction of the technology, during the technology test period, and at the end of the trial. Information was collected by means of questionnaires, administered to the various participants.

The Project WETA Teletext trial included three periods of measurement: prior-to-trial, during the trial and subsequent to its completion. In all cases, interviews were conducted with participating households. Specific information was collected as well through the use of a household information sheet representing a form of self report. A mid-point interview covered such topics as preferences for services, adequacy of information, timeliness, etc. The final survey contained similar questions to those in the mid-point interview. These were directed at overall assessment of performance of the system, applicability, utility, etc. As well, a Teletext diary was included as part of the data collection package, including day of the week, time switched onto Teletext, numbers of first ten pages accessed, time switched off Teletext, TV channel watched before and after using Teletext, and

the main person watching Teletext. Finally, there were subjective evaluations of page design conducted in laboratory experiments.

This review indicates the fundamental lack of rigour and adherence to very basic requirements for quasi-experimental designs in each of the sample field trials. This represents a major limitation on any attempt to extract from the field trials measures of social impacts. In these cases, not only have violations occurred with respect to basic measurement 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, are questionable.

The results from the trials can therefore be considered descriptive of particular situations at particular times within a particular context, but it would be highly suspect to extract from this data broad general findings which can be used to substantiate social impacts at any of the levels suggested for this study: macro, organizational and micro individual level.

While field trials offer a number of opportunities to assess

impacts of new communication services, clearly a number of problems remain. This review provided an opportunity to see not only theoretical limitations to field trials, but as well, it has shown some of the 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 the most fundamental rules such as providing a control and test group for evaluation. Secondly, there has been little concern taken for time required for learning effects to emerge. Other more general problems can be associated with the field trial approach, including the small sample sizes typically used in these studies and the lack of a systematic sampling procedure. In almost all cases, the groups assessed in the field trials were merely convenience samples and were not systematically drawn from a broader population. Where attempts to follow the latter procedure were undertaken, they were generally abandoned at some point during trial operation.

3.2 Social Impact Data in the Trials

As an example of the paucity of useful social impact data in the field trials, we will examine a survey of the Elie/St. Eustache fibre optics field trial participants.[42] The type of social impact "data" in this trial is representative of social impact concerns throughout the Canadian field trial experience.

Social impact effects in this field trial were for the most part limited to effects of Telidon on participants' "lifestyles".

First of all, heavily biased questions were asked of participants such as, "Whether or not Telidon had increased their awareness of what goes on in their community." It is not surprising, then, that 59.3% of the respondents stated that Telidon had increased their awareness. 84.5% of the respondents did not feel that Telidon had affected their daily routine in any way, and respondents were also asked to evaluate four activities -- reading, TV, listening to music and going out (sic) -- in terms of whether or not they had spent more, less or about the same time on these activities viewing Telidon. Not surprisingly, a majority of the respondents in all cases stated that the amount of time devoted to the activities remained about the same after Telidon adoption.

Finally, respondents were asked whether or not they felt the Telidon system would be "an important part of their future" (sic). Again, not surprisingly, almost all respondents (93.5%) felt that Telidon would be a significant part of their future.

Beside the dubious theoretical use in all of these survey questions of categories such as "Very Much", "Somewhat", "A Little" and "Not At All", and the obvious fact that several of these questions are quite prejudicial in form, their responses simply do not show that much.

Throughout the Canadian field trial experience only sporadic attempts have been made to gather data relevant to social effects of Videotex/Teletext. Types of data collected have involved:

(a) Pre-trial qualitative research -- in many cases conducted in focus group or personal interview format, for example: Bell Canada Qualitative Groups held in Toronto and Montreal; B.C. Tel Pacific National Exhibition demonstration personal interviews; B.C. Tel pre-trial in-depth discussions; N.B. Tel initial qualitative discussions; N.B. Tel profiling information.

(b) Pre-trial interviews -- measuring attitudes, expectations, technology awareness, knowledge and awareness of services, media behaviour and demographics.

(c) On-going trial assessment -- survey-based measures of on-going system performance, usage, preference for information, perceived utility of system attributes and information content, on-going measures of attitudes, perceptions and images.

(d) Tracking and recording of user statistics, taking account of:

- terminal location
- access time
- session length
- type of information accessed
- frequency of information access.

(e) Self-monitoring and administration of Telidon user diaries. (These methods indicate information consumption patterns, media behaviour, daily activities and Telidon usage).

(f) Post-trial qualitative assessments, group discussions and quantitative measures of attitudes, images and perceptions, follow-up measures of activity and time use behaviour.

3.3 Methodological Limitations

Throughout the field trials, then, there has been:

(a) A lack of focus on direct or indirect measurement of social issues.

(b) An emphasis placed on immediate or direct marketing impacts with a limited view of social impacts stemming from an over-reliance on analogies from "environmental"

traditions. Longer term and indirect marketing, economic or social effects have not been addressed.

(c) Measurement of direct social effects was limited to sub-sectors of the trials, representing small groups which are not necessarily reflective of their representation in society.

(d) Field tests have focused on response to a limited service offering which has not adequately reflected the possible implications of Videotex implementation in the future.

(e) There has been undue emphasis on assessing impacts either from a negative perspective or from an emphasis on individual level concerns.

(f) A number of issues, e.g. access, are dependent on examining usage data. This data has, in many cases, not been collected by the field trial operators.

(g) The field trial reports which have been reviewed to date reveal very limited direct assessment of social issues. Efforts have been directed where applicable to content -- related to community databases and public information. That, to a large extent, represents the attention given to social issues by field trial operators.

(h) Where issues relating to social concerns have been raised, these have been directed toward existing service configurations -- primarily information retrieval. That context may not be the configuration of Videotex which emerges in its ultimate mass acceptance. Transactional capabilities and two-way services, if implemented, are likely to have significant transformative impacts on the individual as well as society. Very little assessment or evaluation of these issues has been conducted in the field trials.

(i) Assessing impacts would require the extraction of changes in key factors, with time a critical dependent measure. As well, control group comparisons are critical in sorting the real from the spurious results in the evaluations. In most cases, while initial design specifications raised the issue of control groups and adequate time periods for measurement in practical terms, these criteria were made expendable. Thus, time frames of observation are extremely short in most cases, meaning that patterns of behaviour were not established or control groups were not monitored, thus severely limiting comparative assessments.

(j) Trial implementation and operations have, quite naturally, been directed toward identifying "users" and the "target market". Assumptions in many of the trials have been made

about who constitutes the "leading edge" user. Thus, assessments were not on cross-sections of a community or group, but rather on a unique (usually affluent) sub-group.

Exhibit 3.2 summarizes social issues, the corresponding types of data measures which have been taken in the various Canadian trials which pertain to these issues, their availability, and the methodology of obtaining them.

EXHIBIT 3.2

Issue	Types of Measures in Field Trials	Availability/Data Types/ Method
Privacy	Pre-trial discussions with users, IP's and industry experts (no direct measurement)	Pre-trial report, published paper and background studies, seminars and working sessions
Access to Current Services	Inference from trial designs, e.g. terminal placement operating hours, public terminal locations and community services	Tracking data, field trial operating plans. Requires: -inference from various trials about user response times, length of sessions -demographic segmentation
Vulnerability Dependency Technophobia	No direct measures, only some reference in pre-trial discussions	

Social Participation	Usage data from residential and community based trials; special user group evaluation	
Education	OECA, WETA - other trials evaluation of preference for information and new services	
Health & Safety	Impacts on handicapped & physically impaired	Various trial components proposed this but little data available
Autonomy	No direct measures	
Lifestyles	Pre-trial, post-trial impact on activity time use at the individual level	Most trials' evaluations contain limited reference to this area - comparisons between trials not possible
Family Structure	Pre and during trial measures; post trial measures	Evaluation studies from trials not available; comparisons not possible
Community Involvement	Response to community data bases; involvement of community organization; content of social and community relevance	Discussion with community operators on coordination of community data bases
Cultural Impacts	Only limited pre-trial assessment; background reports re: electronic publishing impact	Limited discussion with users and operators
Employment Impacts	No assessment of these issues to date; some reference from other studies on automation, labour displacement studies	No information directly available; some projection in economic studies and forecasts

Social Integration	Pre-trial discussions; assessments of emerging services, e.g. telebanking, teleshopping; some literature on substitution of travel	Examination of related studies dealing with altered patterns of behaviour, work times, recreation and leisure, learning
Computer Literacy	No direct measures; some discussion in literature; trial data examines user response	Inference based on target users vs actual users; analysis of variations between user groups across trials using evaluation studies
Access (Societal)	No direct assessment of broad implications; some discussion in background studies, e.g. telematique vs privatique	Studies of other technologies and analogous services
Consumer	No direct assessment; some discussions with consumers and potential users; some assessment in workshops and seminars, CVCC - work, etc.	Discussion required with agencies and advocacy groups, regulators
Office Impacts	Activity analysis in business trial context; pre-trials measured in B.C.; associated studies on office automation	Synthesis of business components of the various field trials; review of relevant ongoing office automation studies
Access to Knowledge	No direct measures available; some discussions with users and potential trial participants	Inference from other studies; computer industry experts; assessment of analogous technologies

In summary, throughout the trials:

1. There was often a need to work with very small units of measurement, primarily to maintain control over other factors and measurements being considered. While that limitation encourages a more in-depth assessment, it limits the extent to which any extrapolation of data and findings can be made.

2. There was a need to define a time frame of observation which may not be adequate to allow the novelty effects to be overcome or to ensure adequate familiarity to be fostered among users. In the various field trials, there was generally a rather ad hoc approach to this issue. No systematic assessment of when pre, during and post measures should be taken was made. Related to this point, only one time for measurement was allowed in most cases. Only in some of the trials were all three measurement periods actually undertaken.

3. There is a need to collect background information, particularly of a socio-demographic nature, in order to generalize to larger populations. In most of the trial activity, these types of profiling activities were not undertaken, and as a result, there is very

little information which accurately details the distinct nature of the population being tested.

4. There is a need to allow adequate time for attitude and perceptions to be changed as a result of working with the Telidon equipment or any new technology. In most of the field trials, a period of twelve to eighteen months was used as the test period. There was no evidence to suggest that this time period was adequate to take account of novelty effects, learning curve effects, etc.

5. In most of the trials, data bases changed daily and weekly. There was no ability to control for these changes and to account for the impact that these changes and 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.

In considering the quasi-experimental field trial approach, it is clearly appropriate for overcoming a number of limitations inherent in more rigourous methods for assessing technology or those which are basically case studies. The approach, however, may be more appropriate for evaluating responses to equipment performance, productivity, technical capabilities, networking, management provision and costing, than to assessing socio-psychological impacts and implications resulting from the introduction of these innovations on a population.

The value of these approaches to social research lies most clearly in the way insights are provided into rather complex social issues. Attitudes towards technology, for example, certainly cannot be adequately measured among a small group of subjects over a very restricted time period in a rather loosely defined experimental setting as typified by most field trials.

Thus, 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 is highly restricted, and this restriction is amplified when methods for data collection are employed which take very little account of fundamental design issues.

3.4 Alternative Approach for Assessing Short Term Social Impacts

It is useful to consider a method applied in office automation research developed by Conrath.[43] The approach stems from three basic questions:

1. What do people do?
2. What do people think they do?
3. What do people think about what they do?

The underlying purpose of evaluation is to provide insights into understanding what goes on in an environment and to provide a basis for measuring the impact of the introduction of a new technology. The types of methods employed to gather information include:

1. Questionnaires about the use of support services.

2. A form on which to write what one thinks one does in terms of functional activity and behaviour.

3. A diary form to recall all interpersonal communications.

4. An interview procedure to obtain details of individual tasks.

The service information is used to determine the potential for some of the features that one would find in the first generation of the new technology. The task record is designed as a stand-alone instrument which should yield the profiles of activities of workers in terms of types and frequency of tasks. The diary form is a self-report instrument used to provide an image of the organizational structure as it exists and as it is reflected in the communication networks actually in place.

A detailed task analysis in a structured format is performed to collect data on the processes to accomplish each task, where the tasks were performed and the types of support services which were relied upon.

This type of detailed empirical approach is useful for providing longitudinal measures for subsamples of individuals in office settings and could be used in other contexts. Results are usually aggregated to provide an overall picture of an office or organization. The major problem associated with the application of this method is a reliance placed on respondents to provide rather detailed self-reports of their activities, attitudes and perceptions. Recordings associated with the diary tasks typically required commitment by the respondent and constant monitoring by the researcher to ensure accuracy. Other problems involved

task definition and the need to provide enough task options to capture the essence of the range of activities to be reported.

The importance of such an alternative approach, however, is that it is concerned with the socio-psychological evaluation of the user's response not only to the technology but also to the context within which the technology is introduced. This is emphasized in the reliance of attitude perception measurements which represent a significant part of the empirical method. The use of the approach, when combined with the types of quasi-experimental methods discussed previously, does offer some opportunity for assessing impacts in a more rigourous way, but doesn't restrict observation to solely laboratory methods, which then disregard the context of use. When used in conjunction with pre/post surveys or large-scale cross-sectional sample surveys, it offers some advantages for social impact measurement over the more rigidly controlled small sample, quasi-experimental approaches which have typified most of the field trials conducted to date.

In many instances where social impacts are being assessed, a reliance must be placed on survey and correlation techniques. Basic requirements for these are the collection of data, either in a pre or post test period over some set time period, in either a cross-sectional fashion or a longitudinal time series. Essentially these involve surveys or tracking studies. This type of approach can be used for measuring such things as attitudes

towards technology or tracking statistics of labour change over time. These approaches can also be combined with other methods such as field trials; for example:

1. Surveys can be used to collect basic information prior to the introduction of a field trial, during a field trial or after a field trial. The results are then compared over time.

2. These methods can be used to collect information from a specified sample, prior to the introduction of a technology,

3. To assess in a retrospective way the response to a given technology,

4. To provide a monitoring of background measures among a specific sample, including such things as attitudes, perceptions, demographics,

5. To collect stated behaviour with respect to technologies where unobtrusive measures may not be available.

Surveys and tracking data can be incorporated into quasi-experimental designs as collection methodologies or used in more sim-

plified ways. This would, for example, be the case of a pre-post data collection or post test only exercise. Alternatively, surveys may be conducted across a variety of trial locations within specific populations. The purpose of such studies would be to gain information which can be generalized across groups or among a specific population. These types of methods are most helpful in assessing the general attitudes and opinions individuals have about particular phenomena. There are also particularly useful for providing a sense to the researcher of what types of concerns individuals have towards services, service performance and expectations in work environments.

These approaches have a number of advantages, particularly when large macro level impacts are being assessed. For example, if attitudes towards technology are an important aspect, then surveys across particular populations can be conducted. These can be designed in such a way that reliability and confidence limits can be defined such that the extent to which an attitude is held can be validated.

Another advantage of these approaches is that they can be conducted over a number of time periods. Observations are made and changes assessed such that a trend can be established, particularly with respect to such things as images, perceptions and attitudes towards technology. Limitations on the approach include:

1. New technologies which are not known to a given population or which have not been experienced by a population, cannot be assessed effectively through a survey procedure, primarily because individuals have had no experience with these technologies and therefore any responses that they give would be highly speculative.

2. Measuring attitudes requires the construction of scales, and these scales require the ability to be replicated. Scale validation requires a significant amount of time and effort to provide an appropriate measurement technique.

3. Measuring attitudes, perceptions and images within a population may be reflective also of the impact of news media and other sources of information, in addition to the actual technology being measured. In other words, asking people their attitudes and opinions about a technology may involve responses from individuals which reflect what they've read or heard about the technology in addition to what they actually believe about a technology.

The important considerations, then, in using these techniques where generalizations to populations are desired involve:

1. The need to consider the appropriate survey method.

2. The need to consider the population definition.

3. The need to develop an accurate sampling plan and sampling specification.

4. The need to have an effective sample selection.

5. The need to have scales which are replicable and can be validated.

Finally, another methodology offering promise for delineating some aspects of short term impacts arising from Telidon adaption in the business environment is network analysis, discussed in the last chapter, coupled with a more sophisticated and extensive use of automated tracking data. Properly instigated, such a procedure would enable the researcher to gain useful data on changes in communication patterns within the organization or business arising from adoption of the new technology.

3.5 Conclusions

This and the last chapter has focused attention on a number of methodologies which could be used to assess some short term social impacts, either in the business or residential environment stemming from the introduction of Telidon. The discussion has reviewed a number of approaches which are used and have been used in the field trials, and has also critiqued other methods suggested for use. Included were empirically-based methods for data collection and analysis, applied approaches for assessing the impacts of new technologies in office environments, those which are more theoretically based such as network analysis, as well as a review of field trials and the limitations which have accrued in their design and implementation.

Social impact issues are complex and very difficult to define. They involve attitudes and perceptions, as well as more tangible items such as equity of opportunity, access, employment, job availability, etc. To adequately measure this range of items requires a variety of techniques, measurement instruments and design approaches for applying the measures. The assessment and evaluation of social impacts rests fundamentally on the need to include time to observe and evaluate change in particular behaviours and trends in society. Small scale experiments and cross-sectional studies provide opportunities for gaining insights into issues. However, substantiation requires either long term

measurement and tracking or numerous replications of measures among the defined populations. When replication of studies is required, factorialdesigns become necessary in order to allow coverage of the various population sub-groups and to enable the identification of variations between and within groups. Tracking and longitudinal measurements are often very costly and generate a large amount of data which must be subject to detailed analysis before results can be confidently reported. Measuring attitude change can only be accomplished over time and by imposing control on externalities which may impact on the formation of attitudes and perceptions.

Contextual or environmental factors constitute a second factor which must be considered. These are particularly relevant where causal relationships are desired and where specific impacts attributable to a particular technology is the goal. While quasi-experimental field assessments are appropriate, their strength for obtaining measures is offset by limitations on sample size and length of observation time required to allow the attitudinal and perceptual change to occur. To date, there are no adequate standards for setting limits on time in non-experimental settings.

Development of a particular approach to measure social impacts in either the office or home environment will often require the consideration of a variety of frameworks, designs and measurement

tools. Studies, therefore, may require at one stage the application of quasi-controlled field tests, and at another either in-depth network analysis to define an interaction matrix, or a cross-sectional survey to track attitudes and perceptions of workers towards the technology. In many ways it may not be feasible to attempt rigorous measurement but rather to focus on what are more aptly referred to as "social benefits" of the technology accruing from socially relevant applications.

4.0 SOCIAL USES OF TELIDON

Discussing social uses of Videotex in Canada, Campbell[44] has noted that these can be examined in the public and private sectors. Within the public sector, initiatives include the promotion of access to federal government services and information through the Activities Task Force on Services to the Public, and the use of Telidon for experiments in education by TV Ontario and the Universities of Quebec and Alberta.

Within the private sector, initiatives have included the encouragement of umbrella groups to function as information brokers for voluntary and non-commercial sectors, and an examination of the use of videotex by individuals or groups with special communication needs.

This chapter examines the social impact of Telidon by looking at three specific areas of application that have been undertaken in the field trial settings:

1. Educational applications of Telidon.
2. Special groups' use of Telidon.
3. Public and community uses of Telidon.

Within the educational sector, examples derived from the field trial activity include the O.E.C.A. trial in Ontario and the

experiences of the University of Alberta. These will serve as case studies of the way Telidon has been used in specific educational settings.

The second area examined includes possible and proposed applications for tests of the use of Telidon for the deaf, the visually impaired and the physically handicapped.

Public and community initiatives for Telidon will be examined in two ways:

1. Community uses of information constitute another significant development for the application of Telidon. Those services are examined from the perspective of the activity of community information centres involved in the field trials.

2. Public services are examined by reviewing activities associated with Cantel and the B.C. Telephone field trials.

In the 1980 report produced by the Department of Communications dealing with social issues,[45] it was suggested that a number of consequences could be anticipated from the use of Telidon, including impacts on lifestyles, equity of availability, institutional impacts, diversity and access, among others. Since, in most

cases, the field trials failed to directly measure any of these specific impacts, this chapter attempts to look at the way Telidon has actually been used in the above two areas.

The necessity to examine the social uses of Videotex and Telidon services as opposed to assessing the measurement of "social impacts" stems fundamentally from the absence of any methodologically sound studies of Telidon to predict social impacts in the Canadian field trial setting, and it is useful to first summarize limitations which have emerged from the field trials and which limit the possibility for systematic assessment.

The specific limitations of the field trials involved:

1. A lack of focus on the direct measurement of social issues. In fact there are no examples reported to date which effectively "measure" any of the types of issues which have dominated the concern for social matters, such as privacy, access to information, equity of information, etc. The time limitations inherent in the way field trials have been operated mean that the longer and indirect effects have also not been addressed.

2. Where issues relating to social concerns have been raised, they have been directed toward existing ser-

vice configurations, primarily information retrieval, and that context may not be the configuration of Videotex which emerges in its ultimate mass acceptance. Transactional capabilities and two-way services are likely to have significant transformative effects.

3. Critical factors for assessing the types of impacts which have been suggested -- such as those on family structure, lifestyles, changing travel patterns, etc. -- require rigorous and controlled testing. They require the use of a longitudinal framework, with a clear (preferably long) time-frame for observation. They require the setting up a control group against which a test group receiving service can be evaluated. This is critical for sorting out the real versus the spurious results in evaluations.

It should be noted that initially, in most field trial designs, specifications were proposed which included control groups and allowance for adequate time periods to account for factors such as novelty effects. However, in practice, there are no instances where these rigorous controls were maintained and considered during the trial assessment.

4. Trial implementation and operations have, in many cases, been directed quite naturally towards identifying "users" and "target markets". In many instances, assumptions have been made about who the "leading edge users" are and these groups of individuals have been provided service. This is the case for each of the major trials. For example, in the New Brunswick Telephone territory, the field trial was administered among a group of middle-class residents in the suburb of Millageville. In the Bell Vista trial, most of the trial participants were selected on the basis of their scoring on a pre-trial measure which evaluated their willingness to try new things; most, as a result, were families in the middle-income range.

Likewise, in the Elie trial 45% of the household heads were either executives or business owners or listed as skilled labourers, and over 50% have an educational background with some university, college, technical school or graduate school. Ninety percent lived in detached, single family homes and 89% of them owned their own homes. Thirty-two percent of the respondents reported incomes over $25,000 a year.[46]

In the B.C. Tel trial, trial participants included businesses, public institutions such as libraries and schools and public locations such as shopping malls, airports, etc.

As a result of these limitations, it is clear that any assessments do not represent a cross-section of society, a community or group. Rather they reflect a most unique target, usually more affluent, subgroup of the population. Extrapolating any findings from these groups to the general population would be extremely tenuous and would not possess a high degree of validity.

The need exists, then, to consider social issues beyond such narrow confines if extrapolation to the broader population is desired. 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 long-term trends and measurements which are quite beyond the scope of even the most ambitious of field trial projects.

4.1 Social Uses of Videotex in Britain

In a recent study conducted by Champness dealing with the social uses of Videotex in Britain,[47] the author states that it is considerably easier and safer to survey the social uses of Videotex and Teletext than to predict their social impact. It is noted that the track record of forecasters is not particularly good, and as stated in previous parts of this work, the study of the impact of technology requires extremely rigorous methodology. To be credible, research studies of innovation must take full account of alternative means of accomplishing the same mission. He notes that failing this kind of rigorous research, it should be instructive to look at real users' experience of Teletext and Videotex systems which have been in use for at least some period of time. Predictions about social impacts derived thereby are likely to be at least as good as the "inflated optimism frequently derived from the engineers' technological determinism" or, conversely, "the equally biased messages of doom arising from the social scientists' apprehension about machines".[48]

In reporting the results of the British experience, Champness has noted that Prestel policy was in marked contrast to that in Canada. In this country the Broadcasting Policy Branch of the D.O.C. asked for special attention to be paid to be social aspects of new telecommunications services. In Britain, community and social groups have developed in spite of the pre-

vailing commercial nature of Prestel and general lack of government support.

British education experiments with teletext include 19 school projects set up in 1979 where special pages were provided on teletext to backup a variety of TV programs. Oracle's tele-software trial consisted of providing schools with computer terminals by means of which they could directly download computer programs broadcast over Oracle and CEEFAX. The use of Videotex includes a trial in 32 institutions, covering a range of education and training interests. The trial seeks to investigate the potential of Prestel as a teaching and learning resource, as a means of giving students experience in simple on-line computer information services and to influence the development of the service. In addition, there are experiments being conducted with the use of Prestel as an aid to processing university applications.

Community uses of Prestel include the placement of pages of information by government departments, including such things as consumer rights, how to make planning applications and current food prices. As well, a number of large charities in Britain are involved in the Prestel trial. Libraries have also taken a part, providing information funded, for example, by the British Library. Information includes advice on a wide range of issues, social welfare, employment and leisure, etc.

Another example of the social use of information in Britain has been the placement of local council information. In most cases it is too expensive for a local council to put information on the system and various approaches to overcome the pricing problem have been undertaken. For example, a consortium of local district councils has been formed in one case which rents pages out to local businesses, thereby enabling information to be provided at no charge to the local people.

With respect to the provision of information to the disabled, it is noted that initially a social information committee was set up with the express purpose of developing a managed tree structure for all information and advice of a social kind. The social applications for special groups have been rather haphazard, although one group, Telemachus, provides pages for the physically disabled. They are reported to be getting approximately 500 accesses per month.

Other possible uses identified for Prestel have been for the visually handicapped, with "Dynamic Braille Machines" and enhanced text. Likewise, for the deaf community, the main applications have been in the Teletext area, using CEEFAX and Oracle. Response to these services has been reported as "quite positive".[49]

4.2 Telidon and Education in Canada

In the synthesis study of this series the authors have noted that (1) the educational uses of Telidon remain basically uncertain, and (2) although Videotex was initially conceived of as a mass market product, the nascent computer learning industry has already restrategized its marketing focus in the area of private in-house systems within large business organizations; nevertheless, with the proper technological modifications, both Teletext and Videotex could conceivably be used to deliver pages for computer learning for virtually any application, and there have already been a number of Canadian experiments using Telidon in education.

This section examines several of these uses. But it must be noted that Telidon terminals will have to be extremely cheap to gain any significant degree of market penetration in the educational field. Also, related 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 the downloading of Videotex software for local execution has yet to be really explored in Canada.[50] A major problem here involves the fact that the menu approach in Telidon is especially limiting, and mostTelidon units simply do not have keyboards which allow any degree of flexibility in student responses. Although the use of Telidon in computer learning may occur in

response to future market needs, the precise nature of this usage can be neither easily predicted or imposed at this time.

4.2.1 Telidon in Distance Education

In one Canadian experiment utilizing Telidon in distance education in an Alberta correspondence class for Mechanics 12,[51] the use of Telidon as a delivery means for computer-based distance education was tested. This project:

1. Examined the educational effectiveness of Telidon compared to traditional correspondence and in-school means of education.

2. Evaluated Telidon's effectiveness as a computer-assisted learning tool and the ability of Telidon to provide and maintain data on student use.

3. Evaluated the amount of training necessary to use a Telidon information provider system by program developers.

4. Evaluated the amount of training necessary to use Telidon terminals and the costs of developing and delivering Telidon pages.

In this study the author compared three different types of instruction:

1. Traditional school instruction which followed the same curriculum as that utilized in the correspondence courses.

2. Traditional correspondence instructions with exercises mailed by students to the Alberta Correspondence School.

3. Correspondence instructions with exercises completed over Telidon.

The major findings of this study were:

1. Although the Telidon graphics protocol might be an effective communications standard for delivery of computer-based learning, "The Telidon/Videotex system was inappropriate for computer-based learning,"[52] because of limited (menu) searching abilities. The problem, in other words, was not the Telidon system per se, but it's limited implementation.

2. The group utilizing Telidon achieved post-test scores equivalent to those of traditional correspondence groups and the in-school group. It was accordingly concluded that Telidon-based instruction was at least as effective as traditional correspondence methods and as in-school instruction.

3. There resulted a significantly higher completion rate for the Telidon group than for the other two correspondence groups combined.

Accordingly, although the authors recommended that Telidon graphics protocol should be used in the delivery of computer-based distance education, they also recommended that Telidon/Videotex systems should be replaced with a "true computer-based learning system, and that the current Telidon/Videotex system is inadequate to provide computer-assisted learning or computer-managed learning. Other systems provide much more comprehensive computer-based learning systems while still using the Telidon graphics protocol and the Telidon terminals,"[53] mainly because of superior software. As in many educational experiments, one of the major problems was the lack of good educational software. "Specifically, the Telidon/Videotex data base software in this project had no ability to store variable information as the student progressed through the course. Also, at the time of the beginning of this Mechanics 12 course, the Telidon/Videotex data software had no ability for

alphabetic input from any user."[54]

Since current Telidon data base software often falls short of meeting requirements of computer learning, there are a number of alternatives to such software. In fact, a major limitation of Telidon's use in computer learning is due to the fact that the system was designed around "the assumption that it would be used for information retrieval only. Although information retrieval is an important part of computer-based learning, it is not the only part.

"While a number of educators were trying to work within these constraints, staff at Athabasca University decided to use the Telidon terminal and protocol but to throw out the existing data base software, and instead developed a system more conducive to computer-based learning. The approach that Athabasca University took was quite different than that which the Department of Communications took. The Department of Communications developed the Telidon data base software to be a stand alone system on the computer, i.e. that the computer delivering the Telidon software would be totally dedicated to Telidon, and no other applications could occur at the same time. Athabasca University designed their system so that Telidon was simply another task which could be run under the Unix operating system on their general purpose computer."[55]

4.2.2 TV Ontario Trial

A second Telidon in education experiment involved a trial by TV Ontario, with more than 45 educational sites comprising secondary and educational schools, universities and colleges, libraries and special institutions. A formative evaluation of this project was conducted by Ontario's Office of Project Research to examine the impact and potential of Telidon in education.[56] The college and university students used Telidon as an information retrieval tool, while the lower grade students used Telidon as a device to learn about technology. In neither case was the experiment very satisfying to users. As the authors of one evaluation euphemistically state, "During the final year of the field trial, most Telidon use consisted of learning about the technology, rather than learning with Telidon."[57] Both TV Ontario's data base and searching procedures were extremely limited and, "A number of system players voiced general disappointment about the lack of things on the Telidon data bases."[58]

Major problems in this experiment involved:

1. A general dearth of curriculum material on the TV Ontario data base necessary to support any teacher's curriculum.

2. The general inadequacy of Telidon's branching structure for computer learning purposes.

"In the public schools, where teachers unsophisticated in Telidon technology wanted simply to apply it to their teaching, there was some difficulty in using and understanding the branching structure. Commonly, teachers did not have a sense of `where they were' in the tree structure; for instance they were not sure how to go back and repeat a page seen previously in the sequence."[59] Users complained that Telidon's hierarchical searching indices were almost impossible to use and required that a user always screen several pages of text to obtain any specific page desired.

An extremely important observation, however, emerging from this trial, relevant to the endless barrage of comments by analysts who claim that Videotex-based educational material and computer games are merging, pertains to the most popular sequence in the entire trial amongst all institutes, a game called Tag the Flag. This game begins with a user randomly choosing a flag of some country. He or she must then identify the country by choosing clues for the answer. When the user is incorrect, or if he asks for a clue, further information is provided about the country in question. However, "observation of elementary students indicated that there is a tendency for the user to run through the game, paying little attention to the information on the answer pages. The user assimilates only the information necessary to play the game."[60]

In summary, during this entire field trial it was "extremely difficult to find instructors/teachers who used Telidon sequences with sufficient numbers of students to prepare an evaluation." The authors conclude that although Telidon is extremely appealing to students, it's educational impact is uncertain.

4.2.3 Educational Conclusions

In spite of the above described limitations and problems in the Canadian Telidon education experiments, as Dave Godfrey and J.W. Brahan have noted,[61] these limitations are not really inherent in the notion of Videotex and could be overcome through the appropriate technological developments. Within the perspective of a decade, Videotex and Telidon offers a potential for distribution of computer learning material at costs which are competitive with other computer-aided learning systems. To illustrate these points, these authors undertook an experiment which linked Telidon with a Canadian computer-aided learning system based on NATAL -- the course authoring/programming language developed at Canada's National Research Council. (NATAL was developed to create a common programming language which would allow the transfer of educational software, or courseware, from one manufacturer's machine to another and thus minimize the costs in writing software for several incompatible machines, and also to create a high level language which would increase productivity.)

In summary, with the proper technological modifications, Telidon

and other Videotex systems:

1. Could provide a real network for the distribution of computer learning materials.

2. Could also distribute computer learning software to microcomputer-based terminals or perscoms.

In the words of Godfrey and Brahan, "The NATAL system provides the possibility of easier access to the Videotex data base as well as providing a facility which will extend the penetration of the Videotex service into education and training markets. In addition, the interactive nature of computer learning provides the possibility of augmenting the Videotex data base by permitting content to be delivered from any user terminal."[62]

4.3 Educational Uses for Special Groups

Many new approaches and areas to educational programming over Telidon are being considered in Canada -- including professional training and remedial education. As Elaine Pressman has noted,[63] Canada has a long-standing need for remedial services associated with educating disabled persons in remote areas. Telecommunication links such as Telidon could be used to provide individualized instruction for children in the north and other remote geographic regions. Also noting that there is some information

inferring that children amongst the Indian and Innuit peoples have a larger incidence of learning problems than other Canadian children, Pressman states that special remedial education services could be utilized over Telidon in the north. Such would also be a major step toward preventing educational deficits in school children in remote areas. Similarly, medical paraprofessional training could be updated over Telidon for native and Innuit communities in remote areas, since this and many other vocational and professional fields necessitate continuous training updating and more specific access to contemporary medical information.

4.4 Special Needs in Videotex Applications

The provision of Videotex services to special needs groups includes the handicapped, the speech impaired, the visually impaired, hard of hearing and the physically impaired. To date efforts to include these groups in trial activities have been limited. (It is worth emphasizing again that in the 1980 D.O.C. Report on Social Issues it is noted that equity and availability of services to individuals may become an issue, that at one extreme access to an information utility may become virtually essential for an individual to function in society. On the other hand, services may be highly discretionary, offering a kind of luxury convenience or service only necessary to certain elite "information workers".) To date, however, very little attempt to evaluate the equity of service provision to special needs groups has been undertaken.

Pressman[64] raised a number of important concerns related to the social issues of the provision of Telidon/Videotex services to various sectors of Canadian society. It was emphasized that there are a number of potential applications of Videotex which may provide social benefits to Canadians. These included:

1. A communication device to meet the needs of the speech impaired.

2. A delivery system for selected health care services.

3. Tele-services for remedial education programs and professional training.

In reviewing the use of these services to protect the physically handicapped, it was noted that Telidon applications of this sort may enhance the capabilities of the physically impaired to gain access and to function more effectively in their home and work environment and thereby to engage in more productive work.

Commenting on the lack of application of these new technologies for special uses which have "a social benefit", Pressman[65] considers that the reasons for this lack include a deficiency in fundamental data on consumer needs and/or disinterest among most professionals dealing with the issues and that a clear definition of social issues relevant to the emerging technologies are long overdue.

The Canadian Human Rights Act, Section 2, provides that every individual should have an equal opportunity as a member of society without being hindered by discriminatory practices, including discriminatory employment practices based on physical handicaps.[66] Physical handicaps are defined to include muteness or speech impediment as well as other physical disabilities. In further discussion, Pressman related a number of key points with

respect to the inclusion of rights for the physically handicapped in the Canadian Constitution, and noted that access to alternate communication systems for physically handicapped (and in her particular case those with severe speech impairments) should be considered a "reasonable accommodation".[67]

4.4.1 The Deaf Person's Telephone

Telidon is suggested here as one means to facilitate communication for these members of society. The capabilities of Telidon make it particularly suitable for special communication needs with some hearing-impaired individuals.

Children and adults with cerebral palsy and other disorders who use symbolic systems to communicate could also be served through the development of interactive two-way Videotex communication. Telidon, it is suggested, is one possible telecommunication system where aid for the workplace or home could enable the speech and hearing-impaired to communicate over distances. As such, it is not just a reasonable accommodation but an equalizer of communications between the speech impaired and the non-speech impaired. Two-way communication via Videotex, either internally in organizations or over distances between remote locations, can also be expected to facilitate job performance and social adjustment. The important distinction for Telidon is that it provides access between handicapped and non-handicapped indi-

viduals as opposed to merely facilitating interaction between people suffering from the same physical impairment. The elimination or reduction in the commonly held view of "communication isolation" could be a major social benefit resulting from the introduction of this technology.

4.4.2 Telidon, Preventive Health Care and Outreach

The application of Telidon to health programs is relevant in two areas. One is preventive health care programs presenting information on topics such as alcoholism, psychological stress, tobacco consumption, exercise and lifestyles, etc. Telidon link-ups to central information services for preventive health program delivery to remote locations would facilitate consistency in information provision.[68] Indian and native peoples, and others in rural and remote communities, would, it is believed, benefit directly from these services. In conjunction with these types of information are those which provide basic knowledge to the public on a variety of diseases and disorders and their treatments.

A second area involves what is referred to as professional outreach services. Telidon could be expected to have applications assisting outreach health delivery systems in rural areas where services are currently unavailable and major health related problems are known to exist. For example, preliminary application of a diagnostic articulation profile to assess hearing and speech

among pre-school children on Telidon is reported to have shown significant promise.[69] Other diagnostic tests of psycholinguistic skills appear theoretically feasible with some human interface, pending future technological advances. Other possible applications in this realm include computer assisted testing for children in the area of mathematics, reading and general achievement. It is suggested that with limited adaption, diagnostic tests of cognitive and language functions could be adapted to Telidon.

4.4.3 Special Needs Summary

In summary, Telidon could be used advantageously by the handicapped. It could be used by speech-impaired Canadians to communicate with each other using Videotex and between handicapped and non-handicapped individuals. In a broader sense, when introduced in the workplace the technology can contribute to an overall enhancement of the quality of rights for the handicapped. Another significant application area is in health delivery systems, with particular reference on the identification of disorders, the assessment of severity of disabilities, and the provision of remedial programs and rehabilitation.

Another study looking at the applications of Telidon for the handicapped, conducted by Levy of the University of Montreal,[70] also examined the provision of a Telidon-based facility for

persons with speech impairment. This study was designed to assess the feasibility of establishing a Bliss symbol Telidon facility at the Bliss Symbolics Communication Institute in Toronto. The objectives of such a Telidon-based facility were:

1. A demonstration project of the application of Telidon technology to the specialized needs of the disabled population in terms of their social, cultural, educational, economical, technical and psychological needs.

2. To demonstrate Telidon technology as viable for the family of the disabled individuals in terms of their collective needs.

3. To demonstrate Telidon technology as viable for professional groups who service the disabled.

4. To demonstrate to the public the Telidon system is compatible with the needs of special interest groups.

5. To demonstrate that Telidon-based facilities for persons with disabilities is an integral part of general education rehabilitation and information communication systems.

In addition to these broad general objectives, there was a set of

other more well defined objectives. These, for the most part, related to technical and networking capabilities and a demonstration of how a Telidon facility might be set up to accomplish these broader goals. In reviewing the feasibility of establishing a facility for special needs users, a number of important points were raised:[71]

1. The field of electronic communication aids for persons with disabilities is undergoing rapid growth over the last ten years.

2. Existing communication systems for persons with speech impairments require a high degree of effort to accomplish communication. A moving point, for example, must be watched and action must be taken at a precise time, or a movement must be coordinated and controlled by sight. Natural communication cannot be contained with systems currently available, and as a result the quality of communication achieved with these systems varies widely depending on each users' physical condition.

3. Currently available systems are generally described as slow. For example, the major problems involved in communication devices for the disabled relates to the interfacing technique used, i.e. the device or the

system which the user activates in order to control the communication.

There are as yet very few tested systems that can be applied to a particular individual to produce an optimum set of controls or signals for fast communication. As Levy goes on to point out, the crucial link between a disabled user and any electronic communication aid is the interface system between him or her and the device, whether it be a personal computer or a wider Telidon-based information system.[72]

In reviewing the work of other authors, notably Nelson and Vandeheiden,[73] Levy indicates that the potential benefits of computer communication technology can only be realized when a person with physical disability can gain "universal access" to these systems. One major advantage of Telidon-based network systems is that they allow multi-level program execution and multi-tasking capabilities.

In reviewing the various premises and situational factors with respect to the provision of new technologies to assist those with speech impairments, two issues are important in considering the applicability of Telidon. First, Telidon microcomputer technology is being rapidly developed and will obtain a measure of stability in the short to medium term. It is thought that Telidon communication networks should be able to provide information

communication and specialized services to encompass special needs for the disabled population within a five year time frame. Secondly, communication networks could be inaccessible to large numbers of disabled people if there are no universal interface systems available to augment the users abilities and thus facilitate their optimal use of a network. This study stated quite clearly that while there is a high degree of potential for the use of Telidon, the exact nature of its utility to the handicapped and particularly to those with speech impairments is not clear at this time, and that it would be imprudent to try to implement such a system presently. What is needed, then, is to consider the development of those elements in a system designed for the handicapped which will use Telidon when the technology has achieved further development. It is recommended, for example, that the first stage of any proposed project should be directed towards the development of interface systems. In addition to this vital area, it is also suggested that work station design be developed, since the disabled population have special needs. Finally, the initial program should be devoted to the development of specialized demonstration programs for the use of a particular disabled group to provide opportunity to access the system.

The use of Telidon for the provision of service to the handicapped, specifically those with impairments of speech and hearing, has not as yet taken the form of any active trials or test

situations. Thus, while the appeal of the technology for these applications is high, questions about their actual capability and the feasbility of developing them still remain unanswered.

In the feasibility study previously reported, it was noted that two of the main factors which should be addressed are those related to the design and the ergonomic factors for equipment, particularly terminals, keyboards, keypads, etc., and secondly, for the development of software which will be used in the actual interface between individuals and machines. These two areas have not received much attention to date.

In addition, then, to the types of applications which have been reviewed dealing with the speech impaired, two other possibilities have been raised with respect to Telidon usage. One is for the deaf, where Telidon may be used as a substitute for sound and telephone communication or as a means for substituting television broadcasts. Telidon, with its electronic messaging capabilities and feasibility for networking, clearly has potential for that group. As yet, however, once again no detailed or in-depth test has been planned to evaluate the technology. The second application involves the blind or those who are visually impaired. Since there are varying degrees of blindness, Telidon offers the opportunity for enhanced text and, when combined with peripheral

equipment interfacing with a computer, such as a Braille machine, there are possibilities for applications in that group.

In the early stages of the Bell Canada Vista trial, attempts were made to incorporate the various representatives from these possible user segments into the trial. However, at this time no activity has been undertaken.

As an indication of the attempt to understand the issue, the Social Impact Subcommittee of the CVCC conducted a series of workshops dealing with Videotex and special needs groups.[74] The results from that workshop, which were conducted in Toronto and Montreal, presented a series of recommendations:

1. An advisory committee of users with special needs be established by the Department of Communications on a national basis to work on the design, development and implementation of the hardware and software required to ensure that these groups' needs were met.

2. All levels of government, manufacturers and system suppliers be sensitized to the implications of Videotex for those who have special communication needs.

3. In addition to hardware development, there be a corresponding development in software and content to respond to basic needs for information related to such things as nutrition, housing, health, independence, etc.

With respect to hardware, specialized peripherals to serve the particular needs of various groups, e.g. the blind, the deaf, etc., should be developed. Peripherals would include braille printers for the blind, decoders for the deaf, and keyboards and terminals with special enhancements for the physically or visually impaired. With respect to such systems, specialized expertise of various groups should be utilized by those developing Videotex, and the CVCC specifically stated that the special skills which deaf people have in the use of symbols and graphics should be used in the design of specialized equipment and applications. Related to that point was a special concern expressed about the difficulty of using tree structures, and a recommendation that alternative methods should be used for searching information in large data banks.

Finally, another key point was raised with respect to the cost of developing such systems and the need to subsidize special users, i.e. the handicapped, the poor, the hard of hearing and senior citizens (particularly those on low income) in order to provide equity of access to these new technologies. It was a concern that

if costs were too high then present social inequalities which are known to exist could be increased, particularly among those at the low end of the socio-economic spectrum.

With specific reference to the handicapped, it was noted that if the government does not subsidize access to these services then the disabled would remain disadvantaged relative to the "able-bodied". These concerns and recommendations underline the importance which is attached to the provision and development of services which can be used by special needs groups. There is no doubt that efforts need to be mounted in order to allow positive social benefits to accrue to these groups from the use of these new technologies. It is, however, 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.

A significant amount of discussion seems to have been taken with respect to the need to provide these services, but very little action has in fact followed. Some efforts, it should be noted, have taken place, with particular emphasis placed on content development and the placement of information in the various data

banks which are being accessed during the field trial activities. These services are discussed in more detail in the sections dealing with the provision of community and public access information. At the same time, there are some very special needs which should be addressed through technical developments for hardware and designing special peripherals for attachment to more conventional Telidon systems. With respect to the policy implications of these developments, it should be clear that a need exists to encourage development of the technology so that the interests, needs and skills of the handicapped may be served.

Secondly, the concern for provision of access to service, particularly for the handicapped, should be set within the context of the broader concerns of human rights in Canada. The right to enhanced opportunities for employment through the application of new technologies should be a basis.

4.5 Community Information and Public Data Bases

While a number of efforts have been reviewed which relate to the development of specialized Videotex/Telidon systems for use by special needs groups, specifically the handicapped, these have generally been oriented around the concept of dedicated systems, i.e. hardware which can be used to help ameliorate a disability. These types of technologies and applications are generally meant to "normalize" the individual.

A second and more pervasive attempt to provide social benefits with Telidon occurs under the category of community and public information. These are directed to the development of sectors of information within data banks which have applicability to unique or distinct sub-sections of society. In most instances they are concerned with those sectors not oriented around commercial or profit motives. For example, in Toronto the Community Information Centre provides Videotex services for groups of voluntary and social agencies which provide information to the public. Likewise, in Project Mercury in New Brunswick a major effort in that trial was directed towards the provision of pages of community information.

This section examines the efforts which have been made for the provision of community and public data bases. These are reviewed with respect to both government efforts typified by, for example,

the Cantel trial, and by private or joint initiatives between private concerns and public agencies as typified by the community information centre in Toronto and Bell Canada.

Consideration of community and public data base applications for Telidon requires consideration of three elements: the concepts of community, non-commercial information and public interest data bases.

"Non-commercial" is usually taken to refer to the orientation of the information provider within the Videotex context rather than to the information itself. "Non-commercial" describes the motivation of the information provider who makes information available in order to inform the public and provide a service rather than to make a profit. In general, this can be seen as permitting the dissemination of information that elevates the level of public debate and understanding. Kerchak[75] designated six non-commercial information providers. These were:

1. Public broadcasters.
2. Governments.
3. Community information organizations.
4. Libraries.
5. Children's organizations.
6. Educational institutions.

Public interest information is comprised of community and non-commercial information. It is useful to designate information as "public interest" in terms of three categories:

1. Source, i.e. the group or individual providing the non-commercial information.

2. Content, i.e. the information being educational in nature or providing answers about how to, where to and when to receive services provided by non-commercial sources.

3. Purpose, i.e. information designed to inform the public.

Users of public interest information generally fall into three categories:

1. Information service providers.
2. Health care professionals.
3. Consumers.

Information centres that act as satellites or intermediaries to centralized information providers are major users of public interest information. Most of these provide information in a specialized manner for special interest groups such as seniors or the disabled. Health care professionals such as social workers,

doctors and therapists use public interest information to assist in dealing with their clients. In terms of consumers using these services, individuals who do not require an intermediary are usually able to make direct inquiries for information either through a specialized service or a centralized information centre.

In presenting a rationale for developing community oriented computer networks on Telidon, Weinstein[76] considered four points:

1. To create and broaden information sources for all Canadians by establishing mutually beneficial electronic networks between institutions and people in this country.

2. To encourage Canadians to become better informed and to assist them in obtaining information for better decision making.

3. To enlarge the context in which Canadians can relate to each other as improved and expanded information services emerge.

4. To show and demonstrate to the Canadian community as a whole the potential uses of computerized information and dissemination in order to ensure maximum participation in Telidon technology for Canadians.

Weinstein's concerns focus on what are referred to as community oriented computerized networks. These consist of groups of two or more people within a community who regularly transmit information of concern to the group as a whole. Information networks can comprise members of special interest groups, women's groups, natives, ethnic communities, handicapped, etc.

Types of information which could be included in such a system are job information, child care services, day care centres, information about retraining and community noticeboards, etc. In most instances community information providers are expected to come from four main groups:[77]

1. Government (federal, municipal and provincial).
2. Independent and quasi-independent agencies and associations.
3. Individual information providers, lobbyists and hobbyists.
4. Commercial enterprises.

In examining the provision of Telidon services for community

groups, it is important at this stage to make a distinction between the provision of services in the public and private sectors. Libraries and community information centres typically collect and disseminate information supplied by government and non-profit service providers to individuals within the community. These centres provide socially oriented information that is designed to link individuals of like interests. This may be achieved, for example, through the provision of a community bulletin board located within a centre or library, or it may occur through the facilitation of access to a data bank containing community-based information.

As an example of how other countries are dealing with community information one can look at the Japanese.[78] The High Ovis system was considered as a means to help communities become more cohesive in both a geographic and social sense. The system provides people with the opportunity to communicate with each other via a two-way cable system, allowing them to produce their own programs and to request information from an information centre. The system was created to provide a means of communication in which anyone can participate, and to respond to the demand for a subjective choice of information.

Captain, Japan's entry in the Videotex market, is being utilized to provide public interest information in Tokyo for 310,000 households. These households receive a twice-monthly bulletin

keeping them informed of the activities and services of the municipal administration. An initial trial was launched in an area of 100 households to determine the viability of placing printed information on Videotex. The kinds of information provided in the Japanese trial were:

1. Community solidarity:

   - guide to various kinds of meetings
   - guide to facilities for family ceremonies
   - guide and presentations of kinds of groups in social circles
   - guide to events and activities.

2. Social welfare:

   - guide to senior citizens' facilities
   - guide to juvenile services
   - guide to facilities for the handicapped
   - guide to volunteers
   - guide to special events.

3. Health:

   - guide to medical care facilities
   - presentation of medical care systems

4. Safety:

   - disaster prevention services facilities
   - guide to disaster prevention systems.

5. Sports activities:

- guide to various sports organizations
- guide to sport events.

6. Cultural activities:

- guide to various types of cultural organizations
- guide to events.

7. Hobbies and education:

- guide to various facilities
- guide to educational events.

8. Recreational activities:

- guide to various facilities
- guide to events and activities
- children and senior citizens.

9. Consumer lifestyle:

- guide to various facilities
- guide to events
- consumers' cooperatives.

10. Support and fostering of local industries:

- guide to consultation offices
- guide to events and activities.

11. Residence participation and community affairs:

- guide to community facilities
- guide to various consultation offices
- guide to complaint offices
- guide to offices for applications.

Within each of the Canadian field trials there is considerable variation in response taken by system operators towards providing non-profit, non-commercial or community information. Infomart, for example, agreed to provide non-profit groups with 5% of the Teleguide data base free of storage costs. However, it did not want to store information from libraries or government agencies which were expected to pay storage costs. Infomart allows only charitable organizations to be included in the definition of "non-profit".

Although Infomart considered the Toronto Community Information Centre as a non-profit organization, it only allowed the community information centre to list other non-profit groups in its community calendar. The events that are listed must be free or have a minimal charge. Infomart is willing to provide space to what it defines as "poor groups" but not to non-profit agencies such as the Visitors and Convention Bureau.

Other field trials currently being evaluated also show varying treatment of community information. A study undertaken on behalf of Manitoba Tel, for example, characterized community information

as weather and news. Exhibit 4.1 shows a list of Videotex applications for community services compiled by the Institute for the Future in the U.S. It is evident from that example that providers of services are from a wide range of both profit and non-profit sectors, emphasizing the ambiguity continually arising in any discussions of what constitutes community or public interest information. Further to that point, it is worth examining the definition provided by Weinstein.[80]

> "Some applications may be clearly commercial, such as an Eatons catalogue, while others may be clearly public service applications, such as entitlement to insurance benefits. Somewhere between lies a large ambiguous area. For example, consumer advice comparing prices of drugs is no less commercial than advertising for a restaurant serving meals under $5.

It is clear from this discussion that system operators require a consistent policy on how to deal with the non-commercial information and that more attention must be directed to this aspect of service provision.

EXHIBIT 4.1

Application Area: Community Services

Application	Description	Providers	Users
Community bulletin board	Listing of local events accessible by subject type, place, etc. Also proposed as a public information utility. Electronic referral services.	City government, local newspaper, community groups	Local residents
Transit/ travel information	Bus, train and airline route schedules plus intercity connections. In enhanced version, trip planning capabilities are available.	Transit authority, airlines, travel agents, AAA	Travellers
Emergency information	Latest reports on accidents, road conditions, weather, air pollution, etc.	Local government, highway patrol	Local residents
Government information	List of meetings and hearings. Meeting agenda. Notice of reports, regulation changes, etc.	Local government	Local
Housing availability	Multiple listing services. House, apartment, condominium sales and rentals. Hotel and motel space available.	Landlords, realtors, hotels and motels	House hunters, travellers

EXHIBIT 4.1

Application Area: Community Services

(continued)

Application	Description	Providers	Users
Comparison shopping	Umbrella group collects information on current prices for particular products.	Non-profit community group	Consumers
Electronic hotlines	Match requests to information (e.g. poison control information -- type of poison entered and recommended action immediately displayed).	Special interest groups (e.g. poison control problems centre)	Residents with emergencies
Foreign language service	Translations of community announcements and other information	Local government, ethnic community groups	Non-English speakers
Captioning	Subtitling of TV programs, news, etc.	Caption centre, broadcasters	Hearing impaired
Electronic directories	Open or closed systems for providing listings of employees, buildings, stores, hours of service, etc. Telephone white pages.	Companies, associations, phone company	Employees, customers, group members, phone users

Source: Tydeman, J., Lipinski, H., Adler, R., Nyhem, M., Zwimpter, L., Teletext and Videotex in the United States: Market Potential, Technology, Public Policy Issues, McGraw-Hill, New York, 1982.

4.6 The Role of Videotex in Community and Public Interest Data Bases

Videotex information retrieval capabilities seem to make Videotex worth considering as a vehicle for community information. For information providers the ability to store and update data is an attractive feature. For users the opportunity to access public interest information through a home or public terminal at any time of the day or night offers an appealing service. With respect to community information centres, Videotex offers the following opportunities:

1. To increase public awareness of the services offered by the community information centre.

2. To provide answers to the public to commonly asked questions, which in turn allows the centres more time to deal with individuals who require personalized attention.

A major issue surrounding the provision of public interest information on Videotex is the means of funding and support. The level and types of funding and support available for public interest information on Videotex is likely to affect both the quantity and quality of the information produced.

Groups such as the Consumers Association have continually gone on record as saying that the government needs to involve consumers in the design of software and data base structures for the provision of such information, and that they should play a leading role in ensuring the access and equity of information to all groups.

At the present time the majority of applications being demonstrated in the current Videotex field trial activities are commercial in nature, since that segment has been the target of the system operators. As a result, non-commercial groups are receiving little in the way of support for their involvement from system operators. Where community public interest information is offered, the system providers have chosen to use a rather broad classification of such information including such things as news, weather, movie listings, guides to entertainment, etc., rather than the more narrowly defined non-commercial definition considered previously.

Three important concerns in the provision of such services are:

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

2. A consideration of how Videotex competes with or complements other methods for dissemination public interest information.

3. A consideration of the best way to fund and support available non-commercial groups in providing services on Videotex.

Early indications from the present field trial activity point to the need for stronger policies to ensure that commercial interests do not preclude the involvement of non-commercial groups.

4.7 Community Information - Case Examples

The following examples present a cross-section of the community information programs associated with the Canadian Videotex field trials. This does not include all of the activity that is going on but rather focuses on a few key centres to illustrate the nature of the way services for public interest have been provided. Attention is focused on activities in the B.C. Tel trial supported by the Greater Vancouver Information and Referral Service, the efforts of the Community Information Centre of Toronto, with the Bell Vista trial including Cap Rouge in Quebec and the information and referral centre of Greater Montreal, and

finally the New Brunswick public library activity in Project Mercury.

The examples provided by the Greater Vancouver Information Referral Service, the Community Information Centre of Toronto and the Information Referral Centre of Montreal represent well established community information centres currently examining Videotex as a way to augment existing services. The New Brunswick library is functioning as a community information centre for the first time through the use of Videotex. The Cap Rouge field trial activity is serviced by Edimedia, a commercial operation.

Exhibit 4.2 provides background information about each of the six services and provides a framework for understanding the various roles if providing Videotex activity. These include types of communities served, types of service providers, users, funding and support.

EXHIBIT 4.2

Location and Name of Service	Size of Community Served	Organizations Represented by Service
GVIRS - Greater Vancouver Information and Referral Service	Lower Mainland Mainly urban	All public services, government & non-profit Some commercial, e.g. Home Aid Lists business information directories
Toronto Community Information Centre - CIC	Metropolitan Toronto Mainly urban	Non-profit, government and selected commercial services which assist people in the quality of life
New Brunswick Public Library, St. Johns, N.B.	100,000 people, Metropolitan St. Johns	Social services Business groups Clubs Recreational groups Essentially non-profit groups
Cap Rouge, Quebec	10,000 people	Local government Schools Sports and cultural groups Non-commercial groups
Information and Referral Centre of Greater Montreal (Le Group Videotex Communitaire)	Greater Montreal Area (2-2.5 million people)	Private, public, two para-public organizations involved in all social fields

EXHIBIT 4.2
(continued)

Location and Name of Service	Users of Centre's Information Services	Centre's Current Sources of Support and Funding
GVIRS - Greater Vancouver Information and Referral Service	13,000 users 5,000 professionals, agencies 8,000 consumers, individuals	Member agency of United Way Contract with B.C. Ministry of Human Resources Small grant from City of Vancouver Revenue from sales and services 55% grants, 45% earned revenues
Toronto Community Information Centre - CIC	50% general public 50% other information providers Actual phone calls: 2/3 public, 1/3 professionals Responded to almost 100,000 inquiries(21% of their inquiries related to services for seniors)	Province of Ontario Metropolitan Toronto United Way Self (donations, publications, fees) Approximately 25% from each source Centre has made a major commitment to generate revenues (in 1981, 30% of the budget was raised from general grants as compared to 27% in 1980)

EXHIBIT 4.2
(continued)

Location and Name of Service	Users of Centre's Information Services	Centre's Current Sources of Support and Funding
New Brunswick Public Library, St. Johns,	Not able to provide estimates	Funded provincially and by city Funded by D.O.C. for Telidon project
Cap Rouge, Quebec	Don't know at this point	Own funding (Edimedia)
Information and Referral Centre of Greater Montreal (Le Group Videotex Communitaire)	61,322 calls 51,000 calls from public 10,000 calls from agencies, organizations, professionals	Centraide (United Way) Ministre des Affaires Sociales City of Montreal Foundations Own revenue (from directories)

EXHIBIT 4.2
(continued)

Location and Name of Service	Problems in Support
GVIRS - Greater Vancouver Information and Referral Service	Always some uncertainty about funding
	Trying to be more independent so less reliant on grants
	Need more funds for advertising to let people know what their services are
Toronto Community Information Centre - CIC	Constant problem of obtaining enough money
Cap Rouge, Quebec	Not applicable
Information and Referral Centre of Greater Montreal (Le Group Videotex Communitaire)	Want to ensure survival, autonomy and expansion
	Sought tripartite type of financing to reduce dependence on one source

4.7.1 G.V.I.R.S.

The Greater Vancouver Information Referral Service has been involved in the British Columbia field trial as a user of services rather than as an information provider. It received funding and an IPS terminal from the Department of Communications to develop and coordinate a data base. A Telidon committee has been set up to oversee these activities, and a further grant has been received from the Department of Communications' Public Initiative Program. The results of their activity to date have been rather unspectacular. It is reported that of 43 women's groups contacted to discuss putting information up on such a system, very few showed any immediate interest. It appears, according to GVIRS[81] officials, that a negative feeling exists towards the technology among precisely the group it was designed to serve. At the present time this group views the experiences with Telidon as part of an experiment and will be proceeding independently of the B.C. Tel field trial to develop data bases.

4.7.2 Community Information Centre of Toronto

The Community Information Centre of Toronto is perhaps the most well known community group in terms of its role for providing information on Telidon. This function evolved almost two years ago when Bell Canada was interested in encouraging community input for development of its Vista data base. At that time a number of groups were contacted and asked to provide ideas about how such a data base might be structured. Subsequent to those early discussions, the Community Information Centre of Toronto expressed an interest in acting as a community information provider. Bell has to date provided approximately $25,000 to the CIC to help in developing content plans and IP training. Their level of support has now broadened and includes Employment and Immigration, Wintario and the federal government. The Telidon division at the CIC consists of five staff members, two researchers, two page creators and one clerk/typist as well as a manager. Their budget is $180,000 which runs through to the end of March 1983.

Perhaps of most relevance to the overall context of this study are some of the problems which have been identified by the Community Information Centre in its provision of public information in the Vista trial. One major problem has involved reaching their desired audience. Since the Vista trial is mainly residential, with terminals placed in the homes of mid-to-upper income families, there are only seven publicly accessible terminals

available in Toronto. This severely limits access to those persons with the greatest need or who have been defined as the prime target group for the CIC.

Other problems are more operational and relate specifically to page creation. This is particularly relevant since the centre now creates their own pages rather than contracting out to a commercial IP. This has been necessitated since the costs of commercial production and updating are high and the available funds for community information are so limited.

One of the major functions of the CIC is the sharing of information between other groups. Between April 30 and July 1982, for example,[82] the Telidon division spent over 30 hours giving Telidon demonstrations and talks to numerous groups, providing a leading role for other community information centres interested in the provision of Telidon services.

Their role, at the present time, in terms of information provision sees them evolving services more reflective of public preferences. It is instructive to realize they have now begun to adapt to the ever growing interest of games, quizzes and entertainment so popular among the commercial sectors. Applications being developed are community calendars, day care and recreation services, and an electronic directory. Currently the CIC has approximately 300 pages on the Vista data base.

Community information in the Greater Montreal area is provided by the Greater Montreal Information and Referral Centre. This is one of eight organizations in Montreal involved in community uses of Videotex. This group has been receiving support from Bell Canada through the provision of page creation, equipment and consultation for development and implementation of their project. The information centre has provided all of the data for creating the data base and contacted other organizations for inclusion in the data base. The actual production, however, is done by an outside page creation company. At the present time there are no breakdowns for this organization in terms of the costs of page creation, etc., and therefore these are not reported. It should be noted that this group has only recently become involved with Videotex, and as a result their experiences to date are not extensive. Problems have been reported concerning the difficulty of coordinating a wide variety of groups to ensure representation on the data base. At the present time they have created approximately 300-400 pages for the Vista trial.

In the Cap Rouge section of the Bell Vista trial, Edimedia is providing community information services. This is a commercial IP providing community information as part of their overall service. They have received no funding from Bell Canada or D.O.C. at the present time. Edimedia is a publishing company involved in providing commercial Videotex services as well as

community information. This role has gradually expanded to the point where the community information has become one of the most popular sections within the Cap Rouge Vista service.

Meetings with individuals and groups to determine how to structure information and to orient their data base to the needs of the various community groups has been a major activity. Edimedia is currently exchanging information with other IP's through meetings organized by Bell Canada.

In discussions about their experiences in the Vista trial, Edimedia[83] stated they had learned a lot in their year and a half involvement and regarded their experiences as successful. It should be noted that their data base tends to be more commercial than the community data bases found in other field trials. The Cap Rouge data base, for example, includes, among other things, restaurant and film listings which, although they are locally produced, cannot truly be considered community in the sense of being solely in the public interest.

4.7.3 New Brunswick Telephone Project Mercury

A final example discussed in this section is activity of the New Brunswick Public Library. In the early stages of planning for Project Mercury, a need was expressed to encourage the implementation and development of a community information data base. At that time there was no established community information centre in St. Johns to provide this service. Based on the activities which were occurring at the CIC in Toronto and the associations with the Bell Canada Vista trial, recommendations were put forth to the management of New Brunswick Tel to consider encouraging some form of community data base to be placed on the system. The main information providers for Project Mercury at that time were L.M. Berry, the directory company, as well as New Brunswick Tel. Discussions were subsequently held between the company, associated consultants and D.O.C. to develop an approach which would allow an unbiased presentation of community information on the Mercury data base. New Brunswick Tel subsequently approached the public library to offer community information. The library was provided with initial planning and background information about how they might get involved in the trial. The company provided management support as well as the use of IP terminals to the library. An advisory board comprised of a cross-section of community groups, businesses, social service representatives and the media and the library was formed to provide these services.

The three parties involved in the provision of services were New Brunswick Tel, the public library and representatives from the D.O.C. Funding has been provided through New Brunswick Tel, local service organizations as well as the federal government.

The library acts as an umbrella for other community groups and associations who wish to place non-commercial information on the Telidon system. Groups were allowed to do their own write-ups and to make decisions about such things as page formats and content.

The major problems encountered in this trial are similar to those in other examples. Specifically, the need to coordinate groups of organizations and agencies under one umbrella for the provision of services has been more difficult than anticipated. The library has also acted as a coordinator of information and has attempted to ensure the quality of information. Since community information requires a significant amount of updating, that role has also had to be taken on by the library. Problems have also been experienced in collecting information from the various groups in the trial, and subsequently in updating the information. This has proven to be very time consuming and has added substantially to the costs of maintaining the data bases.

This organization sees its primary role during the field trial activities as exemplifying to other groups how to provide com-

munity information on a Telidon system. They, like others involved in these various trials, see this as an experiment for evaluating new communication services. At the same time their experiences indicate that a significant amount of alteration should be made in the way information is organized and in enhancing the technical capabilities of the system. With respect to the technical concerns, development of a simplified search procedure is required since it is the general public who have to interact with these terminals when attempting to attain public information. In most instances no intermediary is provided, and as a result total reliance is placed on the end user to obtain the required information.

The main findings from this review of experiences and case studies of community information groups show:

1. Start-up costs and the amount of organizational effort needed to initiate involvement in Videotex are usually much greater than initially anticipated, and as a result have generally been underestimated in the plans and budgets provided for these groups.

2. Groups that already have experience in gathering community information have a clear advantage over those new to community information and coordinating resources and services. Generally, experienced groups

have an infrastructure in place which allows them to coordinate and collect information which can subsequently be placed on the Telidon system. Those new to the system, on the other hand, must decide who should participate in such a trial and what organizations are legitimately defined as community and public interest. In most cases where an organization already exists, prior determination takes place and information is merely shifted to the new media.

3. Despite the fact that information is available, other more pressing concerns still remain. These include: (1) what types of information should be offered; (2) how should the information be presented; (3) what use should be made of special symbols and graphics; (4) how can information be updated and kept accurate at a minimum cost; and (5) how should indexes be designed to make the information simple to find, since a large segment of the users are going to be lay persons who have very little knowledge and experience with a new technology such as Telidon.

4. The location of terminals, and understanding the composition of the target audience are especially critical since in many of the trials terminal locations have been determined by trial operators who have

generally been more interested in commercial applications and commercial success than they have in community information. The types of locations that are desirable for commercial success may be quite opposite to those appropriate for community information. Likewise, commercially viable targets for Videotex information are not likely to be those which are most in need of community information.

Most of the groups involved in these various trials are still rather indeterminant in what they see as a future for Videotex for providing public and community information. It was generally felt that there are too many "unknowns" to be able to make any realistic forecasts about how public interest data bases will be supported.

Funding was one of the most critical aspects in encouraging community groups to investigate and experiment with these new services. Traditionally, community information centres have suffered from the vagaries of government support either through grant programs or endowments. Stability of funding is critical for long term commitment to the development of new information sources and services to the public. In only a very few instances, however, do community information centres have a dedicated and long term perspective on funding. Efforts should be directed at all levels of government to ensure that these new

services are encouraged to develop in an environment equally conducive to those providing commercial services.

In almost all cases examined, the organizations providing community information were filling the role of an umbrella IP. They were coordinating the public interest data base, contacting other community groups and setting standards for content and design. This is a rather difficult task and one which should be examined further if successful implementations are to take place.

Smaller groups generally had objections to the idea of an umbrella group, since it represented a threat to autonomy. In some cases, umbrella groups were viewed as attempts to centralize information and thereby undermine the functional needs of some of the small organizations. It is important to note, however, that where organizations can group together, fundamental cost advantages accrue since unit production costs can be spread over many more pages. Where costs can be shared and resources pooled, the likelihood for developing a better service to the public is enhanced.

This section has shown there are a number of examples which have emerged in the Canadian field trials where community information is being provided. In most cases the provision of these services has stemmed from the more traditional organizations providing a broader cross-section of community information than simply that

provided on Telidon. Within each of these examples a number of common problems have been observed relating to such things as organization, funding and generally understanding and learning how to use the technology. The consensus of opinion seems to be that community information is a valuable social need, and that Telidon could enhance the provision of information and provide more access and equity to the public. At the same time, however, there are a number of concerns about exactly how to proceed with these services.

4.8 Community Information in the Field Trial Data Bases

Each of the major field trials provide examples of community and public interest information. Direct comparisons of the extent of provision of these services, however, cannot be made between the trials due essentially to a lack of quantitative data. Specifically, it is unclear exactly how many pages in each of the trial data bases are related to community information. This is because most of the trial operators have not provided up-to-date counts of pages within classes or categories but have simply listed pages by code numbers. Secondly, a major problem exists in the definition of community information used by each of the trial operators. In some instances all that can be shown are the number of IP's offering community and public interest information in the various trials. For example, in the Bell Vista trial there are currently five sub-IP's providing community informa-

tion. The largest of these is the Community Information Centre. In the B.C. Tel trial, of a total of 129 IP's seven could be classified as public service, 13 were providing government information of a non-commercial nature, and eight were classified as education institutions and libraries.

The B.C. Tel field trial tracking data enabled the calculation of not only the number of sub-IP's offering community and public interest information, but also the proportion of pages relative to other content. Non-commercial information comprised approximately 38% of the data base compared to 50% for commercial and 11.4% for system operation and instruction pages. Community services information, however, comprised only 0.9% of the data base. These pages were provided by two IP's -- the Kinsmen Rehabilitation Foundation and the Greater Vancouver Referral Service. Government information accounted for almost half of all of the pages classified as non-commercial. Caution should be exercised in extrapolating or comparing these results to the other field trials since methods of classification and the reporting of statistical data were not consistent between the various trials.

4.9 Public Services and Telidon

The final part of this chapter discusses attempts which have been made to provide Videotex services to the public. These are considered distinct from community information services, since they generally encompass a much broader range including commercial information and as well are typified by terminals which are located in publicly accessible locations. Two aspects of services are examined in this section. One is the provision of a dedicated public information service, and the second is the provision of publicly accessible terminals within the commercial field trial settings. The first concern relates to the efforts of the federal government within the context of the task force on service to the public. This is commonly referred to as Cantel. The Cantel service represents the efforts of the federal government to accomplish one of the primary goals of its initial commitment to Telidon, which was to utilize these new technologies for providing services to the public. The second concern relates to the efforts of the field trial operators to provide and place terminals in public locations.

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. Cantel was conceived by the Department of Communications as a way to utilize Telidon

technology through providing terminals in public locations such that the public could access government information. Specifically, as a Telidon data base, Cantel consists of 50,000 pages or screens of information dealing with a wide range of topics related to federal government programs and activities. It was designed to allow access through 45 terminals located across Canada in public places such as shopping malls, libraries, Canada Service Bureaus and exhibitions. The data base is also available through the Telidon trials conducted by B.C. Telephone, Saskatchewan Tel and Grassroots. The cost of this service has been estimated at nearly $4 million.[84]

A study conducted by Price Waterhouse in 1982 evaluated the initial developments for Cantel. Their report outlines some of the key results and responses to this service. Included were the views of managers of five Telidon projects.

The initial objectives of this program were:[85]

1. To test in a demonstration setting the use of Telidon as an attractive and convenient means of making selected government information accessible to the general public.

2. To provide experience to the government in the selection, organization and utility of electronically-based information services.

3. To act by example as an incentive to other organizations to use Telidon as an information dissemination device and to display the competence of the government in the Telidon program.

4. To provide a basis for planning overall government requirements for telecommunication networks and services of which public access requirements are an important element.

4.10 Project Features

At the present time there are 34 public information terminals comprising the Cantel trial. Fourteen are located in Task Force Service Bureaus and 30 in unmanned kiosks and public places such as shopping malls and libraries.

Development of the data bank for the Cantel system was provided by Infomart, who were also selected as the system operator. Their role includes operating the computer, developing the software, most of the page creation activity and providing consulting advice on the project.

Criteria established for developing the data bank included:[86]

1. Coverage should be made of all departments and agencies.

2. Content should be available to the public, should be broad in nature and of general interest, and should use both official languages.

3. The content should be updated promptly, and user feedback and evaluation should be undertaken to assess need and demand for further development.

At the present time the main content areas for the data base include an index to government programs and services providing:[87]

1. Comprehensive and accurate capsule descriptions of programs and services by departments using a key word subject index and a geographic index of departmental offices by province and city.

2. Feature packages -- these are more dynamic information sources and include weather, national job bank, Statistics Canada information, sports quizzes and a tourism package.

4.11 Evaluation of Cantel

To assist government departments in evaluating Cantel, a research study by Price Waterhouse was conducted composed of 103 interviews with people who had used the service. As well, a set of interviews were conducted with individuals who were associated with the program, including managers from 13 government departments, agencies and crown corporations, representatives of companies in the Telidon field trial, representatives of the Department of Communications, and managers from other Telidon projects including Pathfinder, Grassroots, Teleguide, Project Iris and Inet.

Users for the Cantel trial were reportedly drawn from a relatively small segment of the population, most of whom were primarily interested in experimenting with the technology rather than obtaining specific information. 85% of the users were male and 90% were under 40 years of age. Generally they had a higher level of education than is average for the population, with 40% indicating they had attended university. In terms of occupation, 38% of the voluntary users were students, 25% skilled workers and 19% unemployed.

Over 60% of the voluntary users indicated they were novice or first time users of the system, while 78% of all those inter-

viewed indicated they were browsing or only "playing" when using Cantel. The most popular topics accessed were:

1. Jobs and work; with particular reference to the national job bank.
2. Statistics, facts and quizzes.
3. Weather information.

Accessing these content areas is reported to have accounted for approximately 66% of the total time spent using Cantel.[89] One month's usage accounted for 557,000 pages, or 400 per location per day.

The assessment of content on Cantel indicated most users felt it should concentrate more on current information. As well, among departments and industry sources, there was a belief that "fast changing" "dynamic" content on current issues, events and programs of interest to the public would be more appropriate for a public access Telidon system than a stable, directory type of information which now predominates.[90]

The most often noted problem was related to indexing. Specifically, respondents experienced difficulty in the following areas:

1. Finding their way back to the main menu or index pages.

2. There were too many steps to reach a desired topic.

3. The information desired was not on Cantel.

Other problems related to the indexing was the use of topic titles which were confusing and not appropriate for the information actually available.

The level of detail of the data base was viewed as not sufficient, and there were remarks about the disproportionate nature of the large number of steps necessary to find information. The accuracy and timeliness of information was rated as acceptable, but it was noted as well that there was very little basis for judgment. The graphics were rated in some cases as rather unnecessary and tended to slow the process of viewing information. Instructions were generally found to be helpful and to assist the user in operating Telidon services. However, there was also some suggestions that a clearer and more simplified procedure should be developed in subsequent applications of the technology.

As part of this overall evaluation, individuals were asked to assess the Cantel service relative to other alternative services of information. Virtually all of the information provided on Cantel is also available to the public through print or existing computer information. In most cases these were considered to be more detailed, more complete and more useful than Cantel. Of the users who were interviewed, 54% indicated they would prefer to

use sources of information other than Cantel for all of the topics covered. The primary reason was that the Cantel system was too time consuming.

The evaluation report identified the national job bank as an application where timely information is a major output of a government activity. Telidon could become an important channel of service delivery.

Another noted benefit of the program was the contribution in some degree to public awareness and interest about Telidon, thus helping to pave the way for larger public access or home use systems in the future.

A major task of the federal government's involvement in Telidon is to improve the access to government services. At the present time, however, the experiences with Cantel to assist in enhancing access to information are considered to be rather limited. This is primarily due to: (1) the limited number of terminal placements; (2) the overall lack of publicity about the system; (3) the need to enhance the design of search procedures; and (4) the need to improve content.

The major recommendations stemming from this report emphasize a number of points which are also raised with respect to the services reviewed in the next section.

1. Content should be examined in more detail, and more effort should be placed on providing up to date, complete, reliable and easier to use information.

2. Efforts should be made to enhance the service's relative advantage and to provide benefits over traditional sources. Specific examples include the national job bank which provides direct access to current information on jobs not listed at local employment centres.

3. Effort should be placed on assessing user needs and in providing information which has a degree of utility to the public, and which stems from expressions of public needs and requirements rather than simply transposing information from one media to another.

Suggestions for future programs include an expansion of the number of terminals available but at the same time a more careful assessment of locations for these terminals. The report suggests that choice of location should be made carefully based on such considerations as:

1. Types of users to which the content is expected to appeal.

2. The extent to which location encourages serious as opposed to occasional use. This would favour libraries over shopping malls.

3. The number of passers-by who become aware of the terminal by seeing it on a regular basis.

4. Protection against vandalism.

5. Ensuring a much broader and more equitable geographic coverage.[92]

The importance of examining the Cantel trial lies in the fact that this represents a major effort by the Canadian federal government to enhance the access to government information by the public. The project has created a degree of awareness; it has familiarized users with public services and public applications for Telidon; it also demonstrates a concern by the government for providing access to information, and at the same time it represents an effort to examine alternatives for the delivery of public information. The results of the initial evaluation, while limited, have proved useful. It is interesting that many of the findings from the evaluation of this government trial correspond to the findings from the evaluation of commercial or public location terminals included in the commercial trial activities. Specifically, these comprise:

1. Concern for content and a need to upgrade the quality of content in terms of its structure and presentation. Spending time on a system and finding information which has little relevance or is much too general to be of use causes frustration and difficulties, and thereby creates a negative impression of the technology for the user.

2. The design of equipment must be modified for placement in public locations. Using terminals of the type designed for in-home use or within office settings is not appropriate when public applications are being considered. This stems, of course, from the high levels of use which are to be expected and the possibilities of vandalism. At the same time, these locations are likely to experience a broader range of users -- the elderly, the young of both sexes -- all of which have unique ways of interacting with technology. Those variations should be taken into account when services are being planned.

As evidence from this and other trials have shown, there seems to be a preponderance of adult males using the system. At the other extreme, children also have a definite attraction to the equipment. As a result, the consideration of a publicly accessible Videotex/Telidon service must consider all sectors before placement is made.

4.12 Private Initiative for the Provision of Public Terminals; Case Study - B.C. Tel Field Trial

There are, within each of the various field trials conducted in Canada, examples of the placement of terminals in public locations. These include, for example, malls, hotel lobbies, libraries, government offices, etc. This was the case for Vista (where eight terminals are in public locations), Elie and the B.C. Tel trial. In only one instance, however, has any systematic evaluation of the public locations been provided.

The B.C. Tel trial had almost 50% of its terminals located 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.

In-depth personal interviews were conducted by Wescom with users at these public locations as part of the field trial evaluation. In fact, users at all of the locations in the trial were evaluated using five different methods. These included:

1. Pre-installation surveys and discussions.

2. In-depth user and manager interviews.

3. Diary questionnaires administered to users of all terminals on a daily basis for two periods of ten days each.

4. In-depth interviews with users at public location terminals.

5. Focus groups conducted with IP's and terminal users.

The results presented in this section are based on this data. These provided detailed information about the public Telidon user, highlighting experiences and opinions towards the provision of service.

4.13 User Response in B.C. Tel Public Locations

The user profile for these services indicated that 54%[93] were under 25 and the majority tended to be male and have occupations associated with the upper socio-economic levels.

With respect to service usage, the majority, 84%, indicated they had only used Telidon a maximum of one to five times, with the majority indicating one or two. Only 5% said that they used Telidon public services more than 11 times.

The preference for information was evaluated and indicated that third-party data bases - Vista, Grassroots and Cantel -- were the

most popular choice among those using the public terminals. Within that category the job bank was one of the most commonly accessed types of information. Other popular items were travel and tourism, education and government services, all of which were in the top half of the most preferred pages.

As in the Cantel trial, participants were asked to indicate how they assessed particular pages of information or how they assessed the system as a whole. In general it is clear that most of the respondents felt that the information was generally well presented. However, a number of sectors of the data base received rather mixed ratings. The job bank, for example, was rated as "well presented and interesting" but was also described as being incomplete and out of date. Many of the public users favoured the idea of being able to access job information but were concerned that in the future listings be kept more up to date. Consistent with the Cantel trial, the major criticism was incomplete and insufficient information.

The response to public terminals, in terms of the activities used for obtaining information, revealed that procedures to get on the system -- indexing, searching for the right piece of information, getting off the system and correcting errors -- were assessed favourably. The most favourable responses were provided for the procedures to get on the system, the procedures for finding the index pages and the procedures for getting off the system. Lower

responses were given for searching for information and correcting errors.

Over 60% of the respondents indicated that public Telidon services had a clear relative advantage over other methods of obtaining similar types of information.

One of the major differences observed compared to the Cantel trial was that 71% of the public users agreed that Telidon provided a clear saving in time for obtaining information.

Evaluation of graphics and text showed that the public users were impressed with the way pages of information appeared on the screen, and they gave good ratings to the visual clarity of the information. The lowest ratings, however, were given for such things as the way pages formed on the screen and the way information is organized in the data base -- findings consistent with those obtained in the Cantel study.

The majority of criticisms focused on the slowness of the system due to the time consuming nature of the graphics and page formation. While graphics are viewed positively from the point of view of their design, they were viewed negatively in terms of the impact on response time. In public locations, where there may be large numbers of people interacting with the terminal, or where an individual requires immediate response to a request, slowing

down that process by unnecessary graphics was seen as an inhibiting factor.

The technical performance of the system was also evaluated in this case study. Participants indicated what they liked most and least about the equipment as well as providing some suggestions for how to improve its operation. In most instances participants experienced more problems with system performance, i.e. networking and accessing pages, than with the actual operation of the equipment such as the screen or keypad. A recurring criticism amongst this group was that the system was down or busy in too many instances. As illustrated in the Cantel trial, in the provision of public services it is critical that the system provider have the maximum number of ports available to service a large number of users simultaneously.

Suggestions for enhancements to Telidon were similar to those raised in the Cantel example, where users felt a hard copy output or at least an ability to obtain a hard copy at some point would be useful. Public users rated hard copy output, quicker access to the system and two-way interactive capabilities as some of the most important enhancements to Telidon.

In summary, comparisons of the results from the B.C. Tel case study and the those of Cantel revealed these similarities. Specifically:

1. The user profiles are similar and emphasize the dominance of males using public terminals.

2. Assessments of the system were generally positive in terms of its basic technical performance, with the most common negative concerns being directed towards content. There is also the need 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.

3. The need to utilize the information, even in its limited state, pointed to the need for providing more of this type of information and to ensure that it was up to date and well maintained.

4. The job bank, in both cases, was considered to be well presented and useful, but also out of date, incomplete and lacking in depth.

5. In the Cantel and B.C. Tel examples, the need for a hard copy output was expressed. This could be achieved either through attachment of peripherals to existing equipment or by developing a procedure for

direct ordering of documents and reports through the Telidon network.

4.14 Summary

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 types of 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 services evolve, their value and benefit to society will also increase. A major requirement, however, is the need to integrate planning for these services with emerging commercial services and to develop a funding mechanism which allows long term commitment by service providers.

5.0 POLICY RECOMMENDATIONS

1. The social impacts and effects which can be attributable to Videotex/Teletext, should they be more widely adopted, are unknown and unknowable at this time. Attempts at "assessing" these have proved to be elusive, and such efforts have sometimes tended to create issues. Therefore, the government should resist the temptation, as has elsewhere been recommended, to instigate a national task force on social effects of Videotex/Teletext.

2. By adopting some of the methodologies critiqued in this work, it is feasible to delineate some very short term social impacts of Videotex, predominantly in office settings. These effects pertain to changes in communication patterns which may arise from Videotex adoption. Should Telidon be integrated into the Department of Communications' office automation program, as is recommended in the "Telidon Synthesis Study" (Volume 4 of this evaluation), selected office automation field trials currently planned by the Department of Communications might provide appropriate vehicles for researching some of these very short term impacts.

3. Although important, long term social impacts of the adoption of Videotex-like systems (such as employment effects)

are presently unknowable, it would nevertheless be useful to policy makers to have some notion of probable effects. Such probable effects are more likely to be delineated by individual researchers than by expert panels or government committees. However, examining even probable or likely social impacts is a matter of speculation, but such speculation may be informed or uninformed. Far from understanding future impacts of Videotex and computer-telecommunications systems, as yet we have little understanding of the social impacts of past communications technologies such as the telephone and television, despite the plethora of works on this topic. It is thus recommended that individual research projects in the areas of the history and philosophy of science and technology be undertaken to delineate the relevance of past technologies' social impacts to possible future impacts of Videotex. Researchers schooled in these disciplines would be qualified to examine analogous impacts from past technologies and perhaps make relevant arguments concerning the future social impacts of Videotex.

4. Present Canadian research on the social impacts of Videotex has excessively concentrated on individual level concerns and attitude studies. However, psychological investigations of individual level impacts, albeit interesting research topics, do not lead anywhere in terms of telling

us how to best use the technology or what social benefits might accrue. There is a need, then, for broader scale, in-depth assessments of the social impacts of a range of innovations within the evolution of technology. Such assessments should focus on understanding:

a. How technologies cluster in time.
b. How Telidon fits into the contemporary cluster of innovations evolving from microprocessors -- perscoms, work stations, local area networks, etc., as examined in the "competing and complementary technologies" section of the Telidon synthesis study.

The social impacts of Videotex will comprise but a portion of the social impacts of this entire cluster of chip-based technologies. Such assessments would also give us a more realistic understanding of the time scales involved in adoption.

5. In future work, specific attention should be given to funding applications which may be satisfied by this technology rather than studying or speculating on the ways Videotex will "impact" these needs. We have examined several such uses in this work, such as Videotex's use as a phone for the deaf.

In other words, there are now definite and knowable ways

of using the technology to achieve social goals in selected settings. These should be investigated and pursued. Specifically, public initiatives in health care, services to the handicapped, local community services and special education all deserve increased attention.

6. As in commercial areas, the need to investigate applications is no less important where community and public information is concerned. The public will respond to uses which have utility and which show net benefits over alternative forms of information provision. Further investigation of appropriate applications, upgraded content, equipment and software design, terminal placement and funding should be encouraged either in field trials or as part of a broader investigation of services to the public.

7. In none of the field trials have services to the physically and mentally disabled been provided. In most cases test services have been aimed at the upper economic levels of society where the lowest proportion of physically disabled individuals resides. Investigations of "special needs" for these groups should be addressed in cooperation with their associated agencies and action groups.

8. The federal government's Cantel trial has shown moderate levels of success. This 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 response in concept but requires competent and constant updating and maintenance. Efforts should be directed to upgrading that service and to broadening the access opportunities.

9. Incentives and grants should be directed to investigations of public uses for Telidon services. As in the commercial sector, the linkage of Telidon to other available technologies should be examined and combined where possible to enhance information provision. Linkage to applications such as those emerging in health care, transportation and special education offer possible avenues for development.

10. The emergence of special needs applications and special services requires attention to be directed to the development of standards. These will be required to ensure equity of service quality and consistency in service provision. Particular attention will be required with respect to:

a. Data base organization and structure.

b. Networking and gateways for linking various data bases and services.

c. Service operation, maintenance and monitoring.

d. Integrating Telidon technology with other existing technologies.

11. Encouraging community information centres to adopt Telidon technology should be accompanied by assistance in training, data base development and service organization.

12. Developing Telidon capabilities for special needs groups such as the deaf and the physically handicapped will require services in a number of application areas. These should initially include:

a. Information retrieval.
b. Interactive services such as banking and shopping.
c. Electronic messaging.
d. Job and employment opportunities.

13. Experience has revealed that existing information service bureaus have been the most adept at providing Telidon-based services. 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 with smaller community groups will assist in minimizing cost of service development, duplication of effort and enhancing information exchange.

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