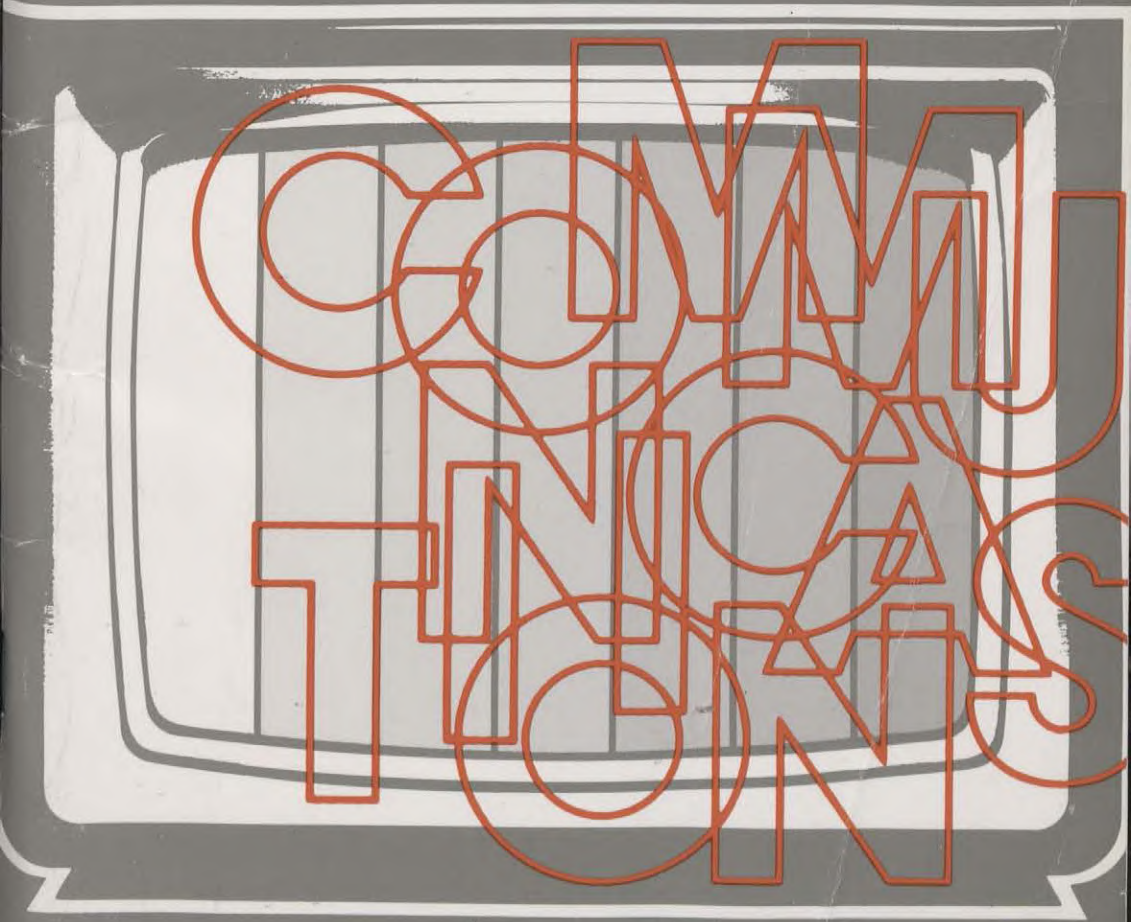
Videotex in Canada



Government of Canada
Department of Communications

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Ministère des Communications

Videotex in Canada

by
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Preface

This publication is based on a paper prepared for a Delta Project seminar held in Toronto on May 8, 1979, and sponsored by the Gamma Group of McGill University and the Université de Montréal. The Gamma Group established the Delta project to examine the future development of public telecommunications in Canada from 1976 to 1991.

Although the paper does not necessarily reflect the views of the department, it is being published by the department to stimulate public debate of the issues implicit in adoption of Telidon technology. Comments on this paper can be forwarded to John Madden, Special Research Programs, Department of Communications, Ottawa, Ontario, K1A 0C8.

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Introduction

Some say they will come early, some say they will come late, but almost everyone agrees that sooner or later videotex services will be available and widely used throughout Canada.

Some see the principal use for videotex as an information retrieval device, others as a sophisticated game machine, still others as a recreational educational system or as an electronic mail terminal. Videotex is capable of performing these functions and others as well, whence comes its potential importance to us.

We live in a pluralist society. No single player will determine the shape of the development of videotex in Canada, although some players clearly hold more cards than others. This paper is intended to set out for discussion some suggested rules of the game as well as to comment on what is at stake.

The over-all objective of the game should be to structure the play so that winners benefit society at large by their success, while there is a minimum of disruption and loss incurred by losers.*

In this paper, I have endeavored to provide an up-to-date background paper on the major issues facing videotex in Canada with particular emphasis on Telidon, the videotex system developed at the Communications Research Centre at Shirley Bay just outside Ottawa.

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* This is the concept of maximizing social synergy, a concept developed in some detail by Ruth Benedict and Abraham Maslow. I have discussed the application of social synergy to computer communications policy (reference 8), but the original and now well known paper by Maslow, "Synergy in the Society and the Individual" (reference 9), is probably the best description of social synergy available.

In so doing, I have covered a number of different aspects of the subject, including a review of policy issues, a brief history of Telidon development and a discussion of where we in Canada might go in the future.

By and large, the paper is a reflection of my personal views, although I think it is fair to say that many of these views are shared by my colleagues in the Department of Communications. Insofar as the policy aspects are concerned, I have leaned heavily on the thinking of Roger Kaye.**

** Kaye, Roger, "A Possible Structure for the Videotex Industry in Canada", for presentation at the First CCITT Symposium on New Non-Speech Services, Geneva, May 15, 1979. (Reference 6).

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Definition of Terms

Before launching into a discussion of videotex game rules, I think a brief definition of terms is in order, since no two writers ever seem to use the welter of generic and specific names associated with videotex in quite the same way.

By *videotex*, I shall mean the whole class of electronic systems which comprise at least the following five elements:

(a) a source of information remote from the user;

(b) a connection to the source via a telecommunications link, such as a radio wave, a coaxial cable, a copper wire or an optical fibre;

(c) an information display which will normally be a standard black and white or color TV set. The information will normally be shown as a still frame, although some animation of the images is possible;

(d) the information's appearing at the express command of the user as part of a larger selection made available by information providers; and

(e) a service designed for the mass market rather than a few specialist users.

In the future, the definition of videotex will doubtless be expanded to include functions such as banking, bill paying, teleshopping, electronic mail, opinion polling and telesoftware.

Please note that the word "information" is used here in a general sense. Included in the definition would be a message from

a friend, an advertisement, a TV game, a recreational educational program as well as the more traditional news, weather, sports, stock quotations and plane schedules which are normally subsumed under this heading.

Also included in the definition of videotex are systems in which a limited number of frames are broadcast at regular intervals so that the frames requested can be "grabbed" as they pass by the receiver for subsequent display. The amount of information available to the user can be relatively limited — as is the case with the 150-300 pages broadcast during the vertical blanking interval on the British publicly owned and commercial TV channels (called Ceefax and Oracle respectively and frequently referred to generically as teletext systems) — or relatively large as is the case with the business service delivered by Reuters Cable, where a choice of some 5,000 frames is offered. Such systems are referred to as *one-way* or *non-interactive* videotex systems, since the user cannot interact directly with the data base, but rather selects from a continuously broadcast series of frames, those which he requires.

In contrast, in *two-way* or *interactive* videotex systems, the user truly interacts with the information base by selecting from a theoretically unlimited number of pages of information those pages he wants. Of course, with an interactive videotex system, the user can do more. He can feed information back to the computer to do such things as pass a message to a friend, order a pair of jeans or play a game of chess (with another person or with a computer). The Prestel service, offered by the British Post Office, is the world's first commercial two-way videotex service. The Bell Canada Vista service is also an interactive videotex service, as is the version of Telidon which has thus far been demonstrated. A compatible one-way Telidon system will be demonstrated early in 1980. The French Antiope system can be either interactive using the Titan experimental data base or one-way using what is called their Didon broadcast data transmission system. The British one-way (i.e., teletext) and two-way (i.e., Prestel) services are also mutually compatible, although there is not a single name under which to classify the two services.

It should be clear that while videotex systems will, at least initially, normally display their output on a TV monitor, they are not restricted to this form of output. A hard copy terminal will be an important option, as will be a tape cassette or floppy disc for recording and playback. More sophisticated displays will be developed, especially for business applications.

The reader should be aware that the term "videotex" was first used to refer only to the two-way (interactive) systems, while the term teletext was reserved as a generic term for broadcast systems. However, there is a need for a term incorporating both types of systems, and the term videotex has now been used by some standards bodies to refer to both one-way and two-way systems. This usage has been adopted in this paper.

One other term requiring explanation is the word "page" which will be used here to refer to one frame of information as displayed on the TV screen. Using the North American NTSC TV standard, it is generally agreed that a maximum of 800 characters (20 lines of 40 characters each) can be displayed on a single page without scrolling.* For technical reasons, there is now a movement afoot to reserve the term "page" for other uses and to apply the term "leaf" to what I have here called a page. I have not adopted this convention in this paper since use of the term "leaf" is not yet sufficiently widespread to be well understood.

* It is generally agreed too that the full 800 characters are satisfactorily legible only if the signal is inserted directly onto the red-green-blue (or RGB) drive of the color TV set. If the signal is inserted on the much more easily accessible RF input, a much fuzzier signal results, so that the amount of information displayable is correspondingly decreased. Although all research avenues aimed at improving the quality of signal when using the RF input have not yet been explored, it has been suggested that 32 characters by 16 rows would be the maximum under such circumstances. Most black and white TV sets, on the other hand, could satisfactorily display the full 800 characters using an RF input.

3

Policy Objectives

As stated in the introduction, I believe it is important that the industry structure that evolves for videotex be one where the gain of individuals from the new services is also society's gain, and where there is a minimum of disruption and loss caused to those who are net losers from their introduction.

This is a rather general statement, however. More specific objectives are as follows:

1. Ensure that public access is provided to a wide variety of information providers through low cost and easy-to-use terminals from any part of Canada.
2. Give information providers access to the public and ensure that they encounter the lowest possible barrier to entry into the market place.
3. Ensure that the resultant industrial benefits accrue, to the maximum extent possible, to Canadian industry.
4. Ensure that the rights of individuals are not transgressed.

I believe these objectives provide the essential framework for policy formulation by any government in our democratic society.

Some readers will have noticed that the fundamental question of whether or not videotex services should be developed at all has not been addressed. This was deliberate. I have assumed that since competitive market forces are causing videotex systems to be developed simultaneously in several different countries, only a deliberate renunciation of a pluralist system and its substitution

with highly centralized government control could prevent videotex development — so that the question is academic. The more important question is how can we ensure videotex development serves Canada's best interests?

The above-mentioned objectives logically imply a number of policy principles, some of which are still a little fuzzy and all of which merit public discussion, the stimulation of which is a major objective of this paper. They can be enunciated as follows:

(a) Content-carriage separation

As the videotex industry matures, functions related to the provision of information should be separated from functions related to the carriage of infomation from one point to another.*

The carrier traditionally earns his income by transporting information from one point to another. A basic principle of common carriage is that the carrier has no control over the message which you or I may choose to transmit over the system provided we are prepared to pay the published tariff for the service used. Because of the potential for abuse if the common carrier were to provide information services competitive with those of others using the carrier network, carriers are traditionally excluded from information provider activity except insofar as information directly related to the common carriage system itself is concerned.

This exclusion principle is already generally accepted by the telephone companies in Canada, but the broadcasting industry and, to a lesser extent, the cable TV industry have both traditionally been involved in both content and carriage. Indeed, a case can be made that broadcasters are primarily content (or information) providers. The fact that they also broadcast (or carry) programming is more or less incidental to their primary preoccupation with content. This case becomes stronger with every increase in the penetration of cable TV systems. More households now receive TV signals via cable than off-air.

Since the practical upper limit for the number of pages of information carried by utilizing the vertical blanking interval of a conventional TV broadcast is about 300 pages, how will it be decided which information providers are privileged to have access to those pages? Should the vertical blanking interval be licensed separately by the Canadian Radio-television and Telecommunications Commission (CRTC) or should the broadcaster have control? Should a cable operator be permitted to insert his own information pages on any TV channels? These questions are all debatable, but as a practical matter it is difficult to escape the conclusion that, as with the remainder of his or her TV broadcast channel bandwidth, the licencee should have control (subject to general regulations)

* This same point was made in more general terms by the Clyne Committee (reference 3).

over the content of any information inserted into the vertical blanking interval. This is particularly true where the information inserted could be subtitling for TV programs running on the channel. Thus, in terms of the principle of content-carriage separation, it seems to make most sense to consider broadcasters as content producers and not carriers.

The case of cable TV one-way videotex distribution using a full TV channel (à la Reuters) requires special consideration. Although additional TV channels can always be added (for example, by duplicating the hardware distribution system), there is in fact a practical limit to the number of TV channels available for broadcast videotex without incurring considerable extra expense. Hence a cable TV company cannot be reasonably expected to simply publish a tariff for use of its cable channel and service all comers at the published rates, unless subscribers are prepared to pay for a substantial increase in monthly rental because a second cable has to be laid in parallel when the capacity of the first cable is reached.

In the event that a choice between information providers is necessary, who should make the choice? The cable companies? The regulator? The subscribers? A case can be made for each of these options. Thus far, it has been the CRTC which, on receipt of an application from a cable TV company, has decided which TV channels can be carried and at what frequencies. Since it is conceivable that there will be more than one full channel broadcast videotex service commercially available (each with 5,000-10,000 pages of information), it seems logical that the same rules of content-carriage separation as apply to interactive telephone-company-delivered videotex should also apply to cable TV broadcast videotex in order to avoid conflicts of interest. The argument for content-carriage separation of interactive (two-way) videotex services delivered by cable are even stronger than for one-way service.

I would favor a system which gave subscribers the opportunity to voice an opinion on what comes down the cable to them wherever limited bandwidth makes a choice necessary. This could be accomplished through a system of voting, by setting up a subscribers' committee, or both. Such a system would, of course, have to apply to more than just videotex services to be viable and would, in practice, be subject to the imposition of some reserved channels for national, provincial and Canadian commercial broadcasts. In the absence of this form of viewer participation, the traditional method whereby the licencee applies to the regulator for permission to carry certain channels would seem to be extendable to videotex services.

(b) Data processing — carriage separation

A valid distinction can be made between the collection and formatting of information for videotex and its physical storage on a computer for user access and distribution. According to present federal policy,* the data processing functions (including storage and retrieval) must be conducted at arm's length from the carriage functions. This policy was put forward to avoid conflicts of interest insofar as common carriers are required to offer data transmission services to computer service bureaus with whom they might otherwise be in competition. It is difficult to believe that the situation would be substantially different for videotex data services, but this matter might usefully be discussed further.

Some common carriers have expressed an interest in acting as a bill collector for information providers. As a practical matter, this idea would seem to have a lot of merit since carriers already submit a regular bill to customers. Provided that the carrier does not exercise a monopoly over the billing and collection functions, carrier participation in this aspect of the business appears to be acceptable.

Existing government policy does not in any way restrict a common carrier from leasing or selling videotex terminals. No change in this policy is anticipated at present. On the other side of the coin, the certification program for foreign attachments is now fairly well advanced. Only the final phase, which concerns the attachment of dialing apparatus, has yet to be implemented.

(c) Access

To ensure freedom of access to the market by information providers, carriers delivering an interactive videotex service should be obliged to make their facilities or services available to any information provider and to any data processor providing videotex services. (The problem of providing unrestricted access by information providers to broadcast systems which have inherently a limited capacity has already been discussed in some detail under content-carriage separation.)

An information provider using interactive videotex has, in theory at least, a number of different ways to make information available to the public. He could, for example, acquire his own computing and billing system, rent the appropriate number of phone lines from a carrier and advertise his service along with the telephone number of his access lines. Or he could store information in his own computer but arrange for the routing to his data base (and possibly the billing too) to be carried out by someone else's computer. Alternatively, he could simply store his data pages, for a fee, in someone else's computer. There should be no institutional barriers which would artificially close off these three options.

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* Reference 4.

(d) Videotex networks

Doubtless much of the information accessed by subscribers will be stored locally, but there will be occasion to access remote data bases or, indeed, once electronic mail is introduced, to transmit messages to remote locations. Almost certainly long distance transmissions will be most efficiently effected using packet-switched transmission networks, but questions remain as to the structuring of the networks.

Some large information providers (IPs), such as mail order houses, may wish to establish their own value-added network using leased facilities. Smaller IPs might prefer to make use of a specialized videotex value-added network established by someone else. On the other hand, carriers could offer a videotex value-added network as part of the over-all service. At this time, carriers do not permit value-added networks other than those they themselves provide, but this situation could change.

The central policy question is whether the public interest is best served by one or a few regulated value-added videotex networks or whether this aspect of videotex service would best be left competitive.

(e) Standards

Standards-setting activities provide an unparalleled opportunity for waffle and bombast — waffle because it is often desirable to establish standards before everyone fully understands the issues and bombast because those who do understand the issues are often seeking to extract the utmost commercial advantage, logical technical arguments to the contrary. The international videotex standards scene is not devoid of these two categories of verbiage. Notwithstanding, early establishment of appropriate videotex standards in Canada seems essential if we are to avoid the proliferation of incompatible systems. The effect of a lack of appropriate videotex standards could be analogous to the chaos which would result if there were several different TV standards in Canada. Data bases would be accessible only to those with the "correct" terminal, which would greatly restrict the number of potential users and contribute to user frustration and expense, while imperilling the financial viability of the data base.

As is usual with computer-based systems, there are several levels of standardization of varying importance which require consideration. The more important of these are as follows:

(i) Page description and communications protocols

Because of the relatively large investment involved in assembling information for videotex systems and because such "service-ware" offers a text book example of economies of scale from access to a large pool of users, it is important that standard methods of describing and transmitting the contents of videotex pages be adopted. This standard should

offer as much potential for future growth and change as is technically and economically feasible. It is also important to us that the United States and others adopt compatible standards.

Three separate classes of standards in this category will require expert attention. These are:

(a) page formats for text, especially the number of rows and characters per page,

(b) protocols relating to information transfer between host computers and user terminals,

(c) information formats and protocols relating to preparation of pages for data bases.

(ii) *Interface standards for telecommuncations facilities*

Although of slightly lesser importance than (i), it is clearly desirable that all over-the-air broadcast videotex services in Canada be receivable using a single interface circuit in the videotex receiver. The same is true for cablecast services and for telephone system delivered services. A consumer who moves from one part of the country to another should not have to change his interface to the telephone or cable system.

(iii) *User access procedures*

There are a variety of different ways that users can access and manipulate data bases. While different data base structures will doubtless require different procedures, it is desirable that, as far as possible, and particularly with the ubiquitous tree structure of data bases, the access procedures be the same for all data bases.

The general procedures for putting forward a national position at the various international standards bodies are now well refined and generally work well. However, there is, in general, no obligation on Canadian entities to adopt international or any other standards. Later in the paper, I have suggested standards activities as one of the major tasks of a proposed Videotex Consultative Committee.

(f) Videotex delivery system

Vidotex services can be delivered in a variety of ways and can be either interactive or non-interactive. In the U.K., the limited non-interactive service provided by the BBC and ITV provides a complementary service to the interactive service offered by the British Post Office. By providing the "300 most wanted pages", broadcast videotex reduces the likelihood that the telephone switchboard will be jammed by calls for the latest scores or news flash.

In Canada, it seems likely that a non-interactive service of 5,000 pages or so will be offered over cable system plant. Some have expressed a concern that such a service could amount to a form of "cream-skimming" and could seriously endanger the financial viability of an interactive service which could offer an essentially unlimited variety of frames as well as additional services such as electronic mail and teleshopping.

Given the current lack of market information, it is difficult to substantiate such an argument, but it rests as one worthy of consideration. Thus far, the writer (and indeed the department) has tended to take a *laissez-faire* approach to the delivery of videotex services on the grounds that neither cable nor telephone wire videotex service delivery can be shown to be inherently superior at this time.

4

More Fundamental Concerns

I have already hedged the question of whether videotex should be developed at all by suggesting that those who might wish to oppose its introduction will first have to work to change the pluralistic social system in which we live. Personally, I am convinced that the potential benefits of videotex substantially outweigh the disadvantages, particularly if care is taken to minimize the latter.

No one could doubt that videotex systems are important not only in themselves, but because they symbolize a family of intelligent silicon chip devices which will invade our homes and work places. In the process, they may well strain the limits of human adaptability in a world where the pace of change is already generally believed to be too fast for comfort. The issues are too vast for satisfactory discussion in this paper, but too important to be ignored altogether. They will, therefore, be raised here only for future discussion.

At the head of my list, but so far making only a rare appearance on traditional lists of "social concerns", is the sense of frustration and alienation which is likely to occur from a further migration of control over one's existence from one's immediate frame of reference. Already there is a substantial shift from self-dependence towards increasing dependence on the social system. Machine intelligence is further eroding our independence and is about to erode it even more as virtually every device of any complexity is brought under computer control. We shall need to cultivate our own sense

of independence by "back to nature" activities on a larger scale and by more concentration on do-it-yourself activities. To a large extent, this is already happening. The trend will have to accelerate and will mesh well with the increased leisure time necessitated by the importance of sharing out the smaller number of jobs available. This latter transformation will not be accomplished easily. But it is, when one stops to think about it, strange that approximately one-tenth of our work force is looking for jobs while many of the rest of us are desperately looking forward to more leisure time!

Videotex itself is unlikely to cause a significant change in the total number of jobs available, although there is a possibility that jobs could be lost to Canada if we do not act quickly and in a concerted manner. There could be some shift of jobs from "hard copy" journalism to "soft copy" (videotex) journalism. There will be new jobs in manufacturing and in the creation of educational materials, but these could be offset by reductions in the pulp and paper industry. As videotex moves towards provision of electronic mail services, some displacement of postal workers is likely to occur.

Although one result may be a general upgrading of jobs, it does not necessarily follow that the incumbents of the jobs rendered obsolete will accede to the new positions. Thus there will be a need for careful consideration of such aspects as job training and worker consultation as the industry develops.

Perhaps the greatest social significance of videotex is the possibility it offers for much wider access to information and conversely, the much greater ease with which new concepts and ideas can be transmitted. Costs of "publication" on videotex should be very low. On the other hand, unknown authors may expect to face problems, similar to those of today's unknown authors, in being "read". Indeed, the technical problem of optimum indexing or "yellow pages" in a videotex system needs a great deal of attention.

By distributing information more quickly and effectively, videotex should remove the necessity for many centralized decisions and, if properly managed, provide a greater opportunity for more flexible rules and regulations. A countervailing tendency, already alluded to, could be our increased dependence on a technology few of us properly comprehend, which could lead to an increased dependence on technical specialists.

The combination of computers and communications, of which videotex is such an appropriate symbol, should lead to a further opening of bureaucracies (public and private) to inspection and criticism by all and sundry. Since almost all information will be stored in machine readable format and can thus be made available relatively easily, it seems likely that the public will demand that much of the information now carefully guarded by institutions be made generally available. Because of this, the structure of bureaucracies is sure to change, but how it will change, I am not competent to judge.

Personal privacy and its protection is by far the most popular, though probably not the most important, of what I have called the more fundamental concerns. That issue, at least, can be comprehended (more or less) and practical solutions can be and are being developed. Important advances in computer security technology are also being made. The human security problem remains, but computers are making it increasingly harder for human privacy invaders to escape detection. The major problem is to ensure that all the pros and cons are clearly understood by those concerned before the social trade-offs are made between protection against unwarranted interference and the freedom to perpetrate criminal acts under the protection of privacy regulations.

5

Telidon

Two distinctly different Canadian videotex systems have been developed — the Bell Canada Vista system, developed at Bell-Northern Research, which is essentially an improved version of the British Prestel system, and Telidon, which was developed at the Communications Research Centre of the DOC. Telidon uses a different data transmission and coding scheme which permits, among other features, greatly improved graphics.

Each system has a different origin and intent. Vista was designed to put Bell as quickly and inexpensively as possible in a position where it could get some "hands on" experience with videotex. Telidon was a spin-off from more fundamental applied research involving study of a class of problems requiring the creation and transmission of graphic data in as efficient a manner as possible.

Both systems are performing useful functions — Vista in providing the first practical experience with videotex in Canada, Telidon in demonstrating that computer graphics are a better technological antecedent than typewriters for systems designed for use with a color TV.

Indeed, Bell Canada, making use of the experience gained with its first generation Vista system, is now planning to implement extensive field trials using a second generation Vista terminal employing the basic Telidon communications protocols. These trials are scheduled to commence early in 1981.

The Telidon system has attracted a good deal of attention both at home and abroad. The Science Council of Canada has recently published two papers concerning videotex services.* In the latest of these (reference 2), a Telidon "Implementation Scenario" is provided, suggesting, among other things, the creation of a consultative committee to guide implementation of Telidon, the publication of a Telidon position paper, the creation of a technical advisory committee and the holding of public hearings. Many of these suggestions seem to me to be good ones. I shall be suggesting a modified version of some of these ideas later in this paper. The Clyne Committee has also urged the government to take a strong stance in promoting Telidon, and, as the Minister of Communications recently announced,** the federal government has itself decided to devote $9 million over the next four years to further the development and establishment of Telidon.

In this part, I shall attempt to explain how Telidon was developed, why it is technically the best videotex system currently available, what the government is doing about it and what others are or, in my view, should be doing about it.

(a) A little history

In 1973, following publication of the report of the Canadian Computer/Communications Task Force, a small research unit was established at the Communications Research Centre which quickly became immersed in a class of general problems related to the communication of graphical images down the ubiquitous voice-grade telephone line. This problem differed from standard computer graphics activity primarily in that it was necessary to devise a highly efficient method of communicating the information to avoid inordinate transmission delays occasioned by the relatively narrow bandwidth capacity of a telephone line.

Several special purpose systems were developed over the years for military and other applications. In 1976, a technology transfer agreement was signed with Norpak Limited of Pakenham, Ont., under which Norpak was licensed to use the CRC technology for the development and sale of commercial graphics terminals.

The CRC developments were primarily in software — that is, they related to development of the concepts and the necessary computer programs which allowed graphical images to be rapidly and easily created and efficiently transmitted. Norpak designed and developed the hardware in which the software was clothed.

In 1977, when the importance of the British Prestel development had penetrated to a sufficient depth in the department, Herb Bown, manager of the research unit, was asked to create a simulation of Prestel using his laboratory graphics system, to help senior departmental management grasp the importance of the British

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* References 2 and 11.
** Reference 10.

development. The simulation software was completed and operating within a week but, as the demonstration was given, Bown was heard to mutter that he wouldn't design a videotex system that way.

A short time later, using the experience gained since 1973, CRC developed the first Telidon system (though not yet of that name). It was used primarily for giving briefings, since its graphics, projected on a large screen display, make a most effective briefing tool. While being used in this way, the fledgling system atracted the attention of the Minister and Deputy Minister who were quick to understand its significance.

By mid-summer 1978, rumors were circulating that several broadcasting, cable TV and telephone companies in Canada were either copying or purchasing videotex systems, some of which were modelled on the French and some on the British videotex developments. The decision was taken to have a press conference to demonstrate the Telidon system (then called simply "Canadian Videotex"), so that those considering investing in videotex systems would at least add Telidon to their shopping list.

The press conference and videotex demonstration were held on August 15, 1978, at CRC. Up to that time, approximately $2.4 million had been spent on videotex development ($1.4 million of this sum in outside contracts). Since that time, the pace of activity has quickened considerably. Almost all those in Canada previously committed to foreign technology are now either committed to side-by-side trials using Telidon as well or else have switched to Telidon technology completely. The Telidon picture description and transmission protocols have been introduced into the international standards arena where, we are assured, they have caused something of a sensation. Certainly they have generated a host of foreign enquiries.

Since June 1979, some 150 prototype Telidon terminals and some five information provider terminals have become operational, all scheduled for use in a variety of field trials and demonstrations.

By September 1979, the following firm commitments for trials of more than two or three terminals had been made:

1) The Ontario Educational Communications Authority is committed to trials of broadcast Telidon using over fifty terminals and starting in January 1980.

2) The Manitoba Telephone System will be conducting trials using about 20 Telidon terminals in a broadband urban experiment named Project IDA starting early in 1980 and, later, using 150 terminals in a rural fibre optics field trial at Elie, Manitoba. This latter trial is sponsored jointly with the Canadian Telecommunications Carriers Association and the Department of Communications.

3) Alberta Government Telephones will test at least 20 Telidon terminals in connection with its VIDON system in the Calgary area starting in early 1980.

4) Bell Canada will conduct field trials, primarily in the Toronto area, using over 1,000 Telidon terminals starting early in 1981.

5) The Winnipeg Commodities Exchange will use Telidon as part of their operational information system starting in mid-1980. The Manitoba Telephone System is providing the equipment under contract. Announcements of other trials by broadcasters, telephone companies and cable TV companies are expected over the next year.

(b) Why Telidon?

All videotex systems transmit information and almost all have a capacity to transmit and display some graphics. Telidon, which is the first of the second generation videotex systems, takes full advantage of new, low cost electronics to provide an immensely improved graphics capability as well as a remarkable versatility and adaptability to a variety of terminals and input devices. First generation videotex systems were textual information and communication systems with a rudimentary graphics capability rather ingeniously added on. Second generation videotex systems are graphical image and text communications systems simplified so as to be capable of manufacture at minimal cost. As the cost of electronics continues to decline, some users may opt to pay for the additional features such as improved resolution and greater grey scale or color capability inherent in the design.*

The technical superiority of Telidon is not contested. We are reliably informed that several laboratories in Europe are now hard at work on second generation videotex systems modelled on Telidon. Perhaps the most important feature of Telidon, which has probably not been adequately stressed thus far, is the fact that a range of terminals with a capability commensurate with price can all work from the same data base. When one considers that in the U.K., there are aready over 140,000 frames of data available (at a production cost in the tens of millions of dollars) and that it is estimated that the millionth Prestel frame will be in the system within two years, the importance of having one language to describe the data is evident.

Yet because we happen to think that a resolution of 240 x 320 picture elements best matches the resolution of the TV set and that systems with that resolution will be the most readily marketable, we find that some people are suggesting that Telidon makes a nice "Cadillac" system, while the first generation, alpha-mosaic systems provide a good reliable Volkswagen.**

* The method of graphics description and transmission employed by Telidon is described in "A General Description of Telidon: A Canadian Proposal for Videotex Systems", H. Bown et al., CRC Technical Note No. 697. The technical advantages of the system are also described in greater detail in the same technical note.

** Even the Clyne Committee report which is generally highly supportive of Telidon, makes the comment that the Bell Vista system "is less expensive than Telidon" (page 61).

If this were true, the implications could be serious indeed, for it is almost unthinkable to maintain two large scale videotex data bases in Canada.

Fortunately, it is not true. Comparing a first generation videotex terminal with a fixed resolution (for practical purposes) of 60 x 80 picture elements with a Telidon system with a resolution of 240 x 320 picture elements is neither rational nor responsible. Low resolution (60 x 80) Telidon systems can be built for a price entirely comparable to that of first generation videotex systems. The model we are now demonstrating has 16 times that resolution and, in full production in three or four years time, may well sell for $100 or so more than a low resolution terminal. No one knows which grade of resolution is likely to be most popular, though most have opinions on the subject. In the circumstances, the advantages of not having to make an arbitrary choice are obvious. If Telidon terminals with a resolution of only 60 x 80 picture elements are required, they can be produced in a matter of months.

It is this cardinal advantage — the ability of Telidon to provide a screen resolution appropriate for every pocketbook, coupled with the considerably greater ease with which images can be created and stored — that makes it such an exciting product.

Better resolution, full color capability,* full grey scale capability and photographic reproduction — all these are available at the cost of extra memory in the receiving terminal. The data base need not be reconfigured as each technical improvement is implemented, which thus makes the cost/benefit trade-offs a matter of individual choice rather than arbitrary standardization.

A question I am often asked is whether someone else might not invent a third generation terminal next week or next year which would quickly render our efforts here obsolete. My answer is this: I would expect that there will be improvements made to the Telidon communications protocols much as the French Antiope and the Bell Canada Vista systems improved on Prestel, and I would also expect that foreign manufacturers will apply their talents to using the considerable flexibility offered by the Telidon protocols to produce some highly competitive and innovative terminal designs. We ourselves can foresee future additions to the communications protocols to permit easier manipulation of data, but we do not expect to see an entirely new third generation of videotex for at least a decade. After all, the principles of computer graphics on which Telidon is based have not changed fundamentally in many years.

* All videotex systems are currently limited to the display of eight colors, i.e., red, green, blue, yellow, cyan, magenta, black and white.

In summary, then, we are backing Telidon because it appears to be the best videotex system around. We believe that the ever growing number of knowledgeable Telidon enthusiasts provides strong supporting evidence for this assertion. If a better standard should appear and have the backing of those planning to offer videotex services in Canada, we would be duty-bound to back such a standard. But we haven't seen it yet.

(c) The government Telidon program

Since the public announcement of Telidon in August 1978, the government program has altered from a purely R&D activity to an advance on a broader front which is endeavoring to see the Telidon concept widely accepted both at home and abroad. This activity has two primary objectives — the establishment of the appropriate Canadian standards (for reasons already explained in Part I of this paper) and the maximization of the number of jobs available to Canadians in both the services and the manufacturing aspects of videotex.

On April 2, 1979, the Minister of Communications announced a four-year Telidon program (reference 10). During this period, the federal government is prepared to invest up to $9 million, providing industry responds with similar investments — and there is every indication that it will. The spending plans foresee the major expenditures occurring in the first two years of the program with a sharp decline in subsequent years, so that by year five government participation would, for practical purposes, cease. The idea is to provide what we believe to be an essential initial impetus, following which Telidon should be, indeed must be, self-sustaining.

Before outlining the program, let me emphasize that I do *not* see it as part of our role to try to convince Canadian broadcasters, telephone companies and cable TV operators that they should be offering a videotex service. That is a business decision which they will make individually, based on their own assessment of the market opportunities. However, we are involved in endeavoring to persuade organizations, once they have decided that they are interested in offering a videotex service, that it is in their interest to opt for Telidon.

In order for these organizations to be convinced that this is so, a number of program elements need to be either in place or visibly on the way to being put in place — and it is these elements with which we are principally concerned. In brief, they are as follows:

(i) *Product development activities*

Anyone contemplating a service offering needs to be assured that a complete suit of hardware and computer software will be available at the right price. Perhaps the single most important element in this category is the consumer Teledon terminal. Using a variety of means at our disposal,

we are assisting the development of the necessary system components on an accelerated schedule.

(ii) Field trial activities

The Telidon program is several years behind that of its competitors, hence the hardware has not yet had time to reach a competitively low price, although we are catching up rapidly. In order, therefore, that organizations sponsoring field and market trials not suffer undue costs during their trials, the government is prepared to lend some Telidon equipment.

(iii) Standards activities

The importance of videotex standards has already been addressed. We are working with the appropriate Canadian standards organizations to ensure that Canadian views are well represented at international standards meetings. It should be clear that we must and are being careful to ensure that the views put forward represent a true Canadian position, and not just that of the Telidon enthusiasts at the DOC. Standards, which in any case are largely voluntary, will not be helped by attempts to impose them or to rush them through unwilling committees.

(iv) Information provider activities and the Telidon Consortium Inc.

Although all the foregoing activities in which we are engaged are vital to the success of the program, the importance of having valuable and interesting information available for potential Telidon users, even for the relatively small numbers of users who will access the system over the next two years, is at least as great as all the other activities just described. Yet this is a difficult area for government involvement. The media are among those with the greatest interest in Telidon, yet any hint of entanglement between government and the media is potentially damaging to both parties.

Videotex is a system which benefits from economies of scale. Conversely, it is expensive to provide for only a few users. This is particularly true of the information content of the system which costs as much to produce and format for one viewer as it does for one million viewers. Given that the success of Telidon is dependent on the content, it is essential that potential information providers should have access to as wide a market as possible and as quickly as possible in order that the venture be worth their while. As well, a large store of high quality content must be rapidly accumulated to allow the Telidon market to expand rapidly — in short, a classic chicken and egg market problem.

In non-commercial areas of information provision, there are activities we can pursue to help strengthen the

available data base. These include assisting federal departments to prepare relevant information for distribution on Telidon systems and, more importantly, helping the community of educators to become expert in the use of Telidon for both formal and recreational educational purposes. The Ontario Educational Communications Authority (OECA) has shown an early and enthusiastic interest in the educational implications of Telidon and we are frankly looking to them to provide the initial focus for educational Telidon.

Yet Telidon vitally needs information providers in the private as well as the public sectors. In that connection, I was most gratified to learn that Torstar, Southam, The Globe and Mail and others have formed a consortium which will provide a Telidon information service. This consortium plans to invest several million dollars over the next few years, and expects to offer for sale not only the information which its own principal shareholders provide as an offshoot of their regular activities, but also information provided by other entities. In the latter case, they would be acting as agents for the information provider in question.

Thus it would appear that those planning to offer a Telidon service will not be lacking in information to put onto the system. Indeed I would hope that the example set by Torstar *et al* will soon be followed by others.

(d) Industrial strategy

A number of people have asked me for a statement on Telidon industrial strategy. While I sympathize with their question, up to this time, it has been difficult to say much more than the obvious — that we are doing and will continue to do all we can to assist Canadian manufacturers to stake out and maintain a lead over foreign videotex competition. The program I have just outlined has described the activities we foresee to assist in that endeavor.

However, such a statement still leaves many questions in the mind of the prospective videotex entrepreneur. Some of these questions relate to matters of government policy. Others relate more directly to matters such as patent protection, probable structure of the industry and market projections.

The government does not hold all of the cards in the Telidon game. Conscious that some entrepreneurs might have different ideas and may be quite successful in realizing them to the greater benefit of all of us, I will, at some hazard, give you my own impressions of the way the industry might develop.

First of all, let me stress that Telidon is first and foremost a communications protocol, a way of storing and transmitting graphical and other information with a high degree of efficiency. As such, it is not patentable. Anyone can take the published specifications for the Picture Description Instructions (or PDIs) which are at the heart of Telidon and develop a Telidon system. All it takes is time

and money, neither of which are required in large quantities by modern industrial standards. The necessary expertise exists in many laboratories around the world.

Indeed, we debated for some time internally before we decided to "go public" by introducing our PDIs as a proposed standard at the international level in the fall of 1978. In the end, we decided that the penalties of silence (which could have resulted in the adoption of an inferior world standard) were worse than the loss of lead time which resulted from revealing our methods.

The task of implementing the Telidon concepts into a system using advanced hardware and efficient software, however, is not a trivial one. At this point, we think we have about a year of lead time over direct foreign competition and make no mistake that there will be foreign competition. We understand that work has started in at least two foreign laboratories already and we might normally expect to be among the last to know.

However public the PDIs might be, the all important software, which enables data pages to be created, stored and transmitted on demand and then recreated in the receiving terminal, is the property of the Crown. It is currently being made available to Norpak Limited under licensing agreement via Canadian Patents and Development Limited. We expect that Norpak will shortly be empowered to sublicense the technology and software.

(e) The Telidon market

In my experience, most meetings concerned with videotex start with questions concerning the potential market. Phrased in that way, the question is easily answered. The potential market is every household with a television set and every place of business. A much harder question to answer is how and when that market might develop. One is tempted to write, in the manner of some stockbrokers of my acquaintance, that the market will develop much more slowly than some people imagine but, on the other hand, much faster than some predictions. I rather expect that you are looking for more precision!

While I cannot be precise, some perspectives might be helpful.

(i) In Britain, where the first public interactive videotex service started at the end of March, the British Post Office estimates that there will be 100,000 Prestel subscribers by the end of 1980.

(ii) A multiclient study carried out by LINK — Butler-Cox (an American-U.K. consortium) estimated that by 1983, 20 per cent of all color TV sets sold in the U.K. would be equipped with Prestel. This would amount to 400,000 sets. In Canada, the current sales of TV sets are about $500 million per annum or about 900,000 sets per annum. Were sales in Canada to be prorated as per U.K. projected sales, there

would be 180,000 new Telidon subscribers added in 1983. A more reasonable extrapolation of the U.K. projection would also introduce a two or three-year lag in the Canadian market for a projected 180,000 *new* subscribers in 1985 or 1986.

(iii) This projection corresponds with an independent estimate of the Canadian market made by Hickling-Johnston Ltd. for the department which estimated a total number of subscribers for Telidon of 200,000 in 1984 and 620,000 in 1986. The following table summarizes the Hickling-Johnston findings. Given the current state of development of Telidon in Canada, the 1981 estimates (at least) appear to be optimistic. It seems unlikely that there will be a commercial service offering much before 1982, although there will be extensive market trial activity in the intervening period.

	1981	**1984**	**1986**
No. of subscribers	40,000	200,000	620,000
Total expenditures (in millions of 1975 dollars)*	$25.8	$72	$147
Estimated direct employment	1,400	4,100	8,400

These estimates are based on an assumed all-up cost (i.e. including amortization of the terminal) of $30 a month and continued growth of personal expenditures on "recreational, entertainment, educational and cultural services" at their current annual 7.7 per cent real growth rate.* A much more detailed explanation of the assumptions made is contained in the Hickling-Johnston report (reference 4).

While these Telidon market projections are probably as good as any available, all such estimates should be viewed with considerable caution. Despite the large investments in videotex systems, particularly in the U.K., no marketing trials of such systems have yet been completed anywhere. In the circumstances, any assumptions regarding consumer acceptance or otherwise of videotex systems are open to legitimate question.

In the nearer term, there are prospects for a relatively small but nonetheless significant market to supply systems and terminals for field trials. This market, which could easily comprise 5,000 terminals over the next two or three years, is vital to the orderly development of the industry in Canada.

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* A saturation market of $2.8 billion "in the early 1990s" was also projected.

* It should be noted that many believe the Hickling-Johnston $30/month estimate to be too high, and quote $5-10/month (usually *excluding* the cost of the terminal) as a more reasonable consumer expenditure expectation.

6

Summary

In this paper, I have attempted to summarize the major policy issues associated with videotex and to outline my view of the way Telidon technology will develop. However, these are early days yet and there is much hard work and fundamental thought needed over the next four or five years to ensure that we in Canada make the most of the opportunities presented.

At least since the onset of the Industrial Revolution, western civilization has made its economic gains primarily through an institutional structure which stressed competition. By and large, it has served us well, but the recent successes of more co-operative modes of operation, particularly in Japan, have given us all reason to pause for thought.

Videotex could easily be the most important and most pervasive electronics technology of the 1980s. It will be highly counterproductive if we cannot arrive at a single satisfactory standard for communicating between videotex terminals in Canada and, indeed, in North America. It would be even better if we could achieve a world standard.

I believe that the technical superiority of an alpha-geometric (i.e., Telidon-like) standard over an alpha-mosaic (i.e., Prestel-like) standard has now been clearly demonstrated and is accepted by most knowledgeable observers. Telidon is superior not only because of the possibility of better graphics that it offers, but also because it offers immeasurably greater flexibility for future

developments. However, even a cursory examination of history shows that technical superiority is no guarantee of general acceptance. Commercial and political forces are generally the deciding factors. I think it is no great exaggeration to say that it would be tragedy if through greed, mismanagement or undue factionalization we failed to get the alpha-geometric videotex system established at the outset in Canada. Success in this venture is likely to demand not only a certain amount of industrial accommodation and co-operation at home, but may well require both negotiating skills and an openness of spirit abroad.

My primary concern at this time is to ensure that the appropriate structures are put in place so that, to the maximum extent possible, there is a co-operative and co-ordinated development in Canada. Once the right co-ordinating mechanisms are in place, the debate on a variety of specific issues surrounding videotex can proceed in a constructive manner.

7

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