VIDEOTEX

An Economic and Policy

Assessment

by

Maurice Estabrooks

Communications Economics Branch

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DOC File:5417-2-6

DGCE Document No. 179

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Summary

Videotex is primarily a two-way, low-cost, easy-to-use information service designed for use in the home over cable or telephone networks or in a broadcast mode. Several versions of videotex have been developed, notably the British and French versions. Perhaps the most sophisticated version which has been developed to date is the Canadian version called Telidon which has more advanced graphics features and unique protocol.

The information technology incorporated in videotex is not new. Information retrieval services have been developed for private business organizations, governments, the airlines and banking industries and so on, and a thriving commerical data bank industry already exists in the marketplace. What is new and unique about videotex is its orientation to the home or mass market where a great deal of uncertainty exists as to the economic viability of the service. More specifically, it is not clear what factors will influence the development of videotex services in this market, nor what time frame over which this development is likely to occur.

Videotex is a product of the revolution in microelectronics and one of many new products and services on the horizon that may find their way into mass use. Of the many products, services and applications that are feasible to develop, the majority probably will not find a market because of economic and marketing deficiencies. Elements of this technology include processing, storage and communications functions, keyboard, display and print features, specialized software features, and so on. Technological trends point toward the integration of data, voice, graphics and video from storage, transmission, switching, processing and interactive perspectives. As well, there are trends toward dispersed use and an increasing dependence on communications primarily in business and government organizations. Development of and applications for the mass market may be part of these trends. Direct applications such as information retrieval, electronic mail, message and transactions services are possible as are indirect applications such as security, alarm and telemetering services, pay television, and so on.

At least five markets can be identified for videotex services. They include the in-house business and government market, the closed-user business market, the commerical online databank market, the special interest group consumer market and the home or mass market. Based on a simple diffusion model of information technology involving the interplay of free market forces, one could expect the markets for videotex to develop in the above sequence, i.e., the information retrieval and electronic mail services should be more likely to develop in the mass market only after the other markets have developed. An explaination of this diffusion is quite simple. In the initial stages of the development of the market for new information products and services, the costs of development, manufacturing and marketing are very high. In this stage, only large business and government organizations have the ability and willingness to pay for and experiment with the use of information technology. As the technology and the market mature, costs drop due to economies of scale and the dynamics of the experience curve. Price decreases expand the markets due to the effect of the price elasticity of demand. The price elasticity of demand for

the mass market is probably high at very low price levels relative to the other markets. In other words, mass information retrieval services will probably be slow to develop unless the service can be provided at very low cost to the home.

An analysis of the home or mass market for information and communications services, such as postal, telephone, library, publishing and broadcasting services, could provide some insight into the economics of demand and supply of videotex services. There is, of course, a demand for entertainment in the home but videotex does not readily appear to be an entertainment medium. On the contrary, it appears to be primarily an information medium. For all the media which provide information in the home, including broadcasting and publishing, advertising plays a major role in financing the supply of the information. For newspapers, for example, advertising revenues constitute about 80 percent of total revenues in Canada. The other 20 percent are derived from subscription. In general then, information is either free to the household or where households pay for information, subscription fees contribute only a small fraction of the costs of provision.

Non-economic issues aside for the moment, videotex can be expected to compete with newspapers, magazines, broadcasting, and so on, in the supply of information, only if it can do so on an equivalent economic basis, i.e., provide the same level of service or better in terms of timeliness, accessibility, facility of use and so on, at an equivalent price which in some cases is free to the household and in others is of the order of cents per day or several dollars per month.

It is not at all clear that revenues from the home market would be sufficient to cover the cost of videotex service even if the terminals were given to the household free of charge. Although rate structures are complex and more study is necessary to confirm this, evidence seems to suggest that hourly connect fees for videotex service would have to be of the order of $5 per hour and perhaps more to cover all costs of the provision of the service. This is the case of the online service industry and it is difficult to see how videotex services could be provided presently much more cheaply than this. On the other hand, it is likely that households may be willing to pay fees considerably less than this amount, i.e., cents rather than dollars per hour of connect time, or monthly fees of $0-$8 for some kinds of information services.

There is therefore no evidence to suggest that videotex can compete on an economical basis with other media in the home without some kind of subsidy. Videotex could, however, compete favorably with other media and even develop new markets for information services in the home where timeliness and access to large amounts of specialized information requiring computer processing is a necessity. Users of such a service must be willing to pay fees of $3-$5 or more per hour of connect time. This market is probably a very specialized one catering to the demands of sophisticated users rather than the general public.

Even though videotex may not appear to be an economically viable information service in the home on the basis of recovering all its cost from subscription, there may be other sources of revenue that could serve to cover this deficit and therefore subsidize the service in the home in some way or another. Advertising revenues could serve to subsidize the supply of videotex services in the home as they do in the case of broadcasting and publishing industries. Until penetra-

tion has reached a significant level, however, this source of revenue is unlikely to be sufficient. Governments could subsidize the supply of videotex services until penetration reaches a respectable level through the provision of grants to suppliers or in the provision of information to the public. A third possibility is to subsidize the household use of videotex services from the revenues of business users. Any one of these could serve as a strategy for developing the home service.

There is a wave of new products and services that has begun to appear on the horizon that could compete with or complement the development of videotex in the mass market. These include videodisks, home computers, pay television, security and alarm services, electronic mail devices, and so on. Competition could come from these new products and services as well as existing ones in the mass market in several major ways. The first is through effects on real disposable income or real discretionary income. Videotex may well have to compete for increases in real discretionary income at a time when its future growth is seriously threatened by growing energy costs, inflation and the decline in productivity growth. Videotex may also have to compete for advertising revenues as described above. Finally, videotex may compete for the disposable time of the household which although appearing to be on the increase, has increasing demands placed on it. Besides these factors, the risks associated with a proliferation of new services may threaten their development.

There are several other non-economic factors which may influence the development of videotex services in the home. The first is the problem of standards which plagues information technology, information and communications services. The second is the competition between the stand-alone and communicating devices and services, the former being less dependent upon communications standards and often much cheaper to use than the latter. The former technology may develop faster as a result. A third problem is the serviceware problem. Any new information service must have a well developed supply of content material. Videotex suffers in this respect relative to the online retrieval industry, for example, which has large amounts of serviceware available albeit for business and government users. Finally, virtually nothing is known about psychological factors which may influence the development of videotex services in the mass market. Particular factors such as attitudes toward artificial conversations with computers, time delays, frustration with undesirable or misunderstood responses, concern for confidentiality, and so on, highlight the possible need for educational and training programs, audio aids, etc.

Based on the above analysis, several comments can be made relating to factors which are likely to influence the timing and development of new services in the home. Developments on the business side could influence the home market in major ways. In particular, the development of electronic mail devices and services are likely to develop first in the business sector and then in the household sector. Electronic mail is more likely to develop in the home market before the information retrieval services because the former does not require large investments in the development of serviceware and usage fees should be smaller. The broadcast version of videotex appears to be the most inexpensive and quickest to develop for the home market but it does suffer by not having an extensive data base and not being fully interactive. Stand-alone systems

incorporating home computers, videodisks, and so on, may have a greater likelihood of finding mass markets because they do not suffer from the communications standards problem nor the regulatory problems characteristic of communications. As well, interactive videodisks incorporating information retrieval, processing and video content may prove superior to communicating services because of their superior performance, economics and facility of use. Electronic mail and information retrieval services could develop as add-ons to pay television, home security and alarm services, and so on. In order to develop the home information retrieval market, a tremendous effort may be required to subsidize the service from advertising revenues, from government funding or from the revenues of business services. Likely information suppliers in this market might be publishers, online data bank producers, governments, libraries, banks, advertisers or retail chains.

There are many major public policy problems facing the development of the home market. These include the problems of standardization, privacy and copyright, pricing issues, the issue of subsidization of the service, the role of government as an information supplier, the transborder information flow problem, media control and ownership, regulation of the information industry, advertising issues and so on. One of the major public policy issues currently facing the industry is the role of government in promoting the development of the videotex industry.

There is a conspicuous difference in the approach of government to the development of videotex services in Europe and the United States. In Europe, developments are essentially policy driven with the PTTs and the state providing much of the direction and funding for these developments. In France, for example, the government has devised a scheme for providing a computer terminal to every telephone subscriber by 1992. It has recently authorized production of the first batch of terminals. In the United States, market forces predominate and terminals and information services are already available commerically in the marketplace. However, no commercialy viable services exist in Europe to date and no spectacular successes have been experienced in the United States market. The continued push by policy on the one hand and by market forces on the other will continue for some time.

Both policy-regulatory and market forces could have an impact on the development of videotex services in Canada. In particular, the structure of the electronic mail and information supply industries will be of notable concern. There are three models that may serve to characterize the structure of these industries. These are: the regulated monopoly model, the regulated competitive model and the fully competitive model (i.e., free entry). The actual model adopted will depend upon economic factors such as scale economies and public policy. Choice of public policies will be determined by such requirements as the need to separate regulated from non-regulated suppliers, the achievement of social equity through cross-subsidization and value-of-service pricing and the desirability of using market forces as a means of achieving public benefits such as low prices, freedom of choice and the introduction of new services. The separation of carrier functions, electronic mail functions, information provider functions, bill collection functions and so on may require some attention at the the policy level. The federal government will also play a role in the establishment of standards, fostering the development of new services and stimulation of the manufacturing and information industries in Canada.

Introduction

A particularly dramatic development in the three decades or so since the second world war has been due to innovations in the fields of communications and information technology. Developments, in particular, in computers, telecommunications and microelectronics have resulted in a proliferation of new products, services, processing techniques and new industries. The power and speed of these developments has been primarily due to competitive market forces supplemented by greater awareness, knowledge and experience by the supply industry and users alike. The result has been dramatic increases in the performance-cost ratio of new generations of products and the increased breadth of applications which have spawned new markets and altered older ones.

At the present time, there is an almost hysteric perception of a myriad of possible applications and wonders that the future may bring and the opportunities that they will create. This optimism is partially reinforced by the fact that the economic trends, particularly increasing performance and declining costs of hardware, show no sign of diminishing in the next decade. These trends have spawned optimistic scenarios of the future known as "the information revolution", "office of the future" and so on. One of the most recent scenarios can be called "home of the future" where an attempt is being made to market information retrieval services in the home. This service has been called videotex.

The purpose of this report is to provide an overview and analysis of the issues raised by the development of new services with special emphasis placed on marketing and economic issues, institutional and regulatory issues and social and policy issues. A forecast for Videotex and Telidon has been developed in [2].

Videotex

Videotex has been defined by LINK, a company actively involved in its marketing, as "any two-way, low-cost, easy-to-use information service normally utilizing adapted television sets accessed by either the telephone network or cable television lines". The CCITT, an international standards organization has developed a definition similar to this and proposed the use of the word "videotex" to refer to the whole class of two-way public services being developed around the world. Teletext is the broadcast version of videotex. The British post office developed the first videotex system which it called Viewdata. France has developed its own version which differs from the British system in several major ways. Telidon is the Canadian version of videotex which differs from the former versions by its more sophisticated features, primarily its advanced graphics and its communications protocol which makes it capable of using the narrow-band telephone network more efficiently.

The British, French and Canadian governments are promoting their respective technologies as the international standard in the field and are extremely active in marketing the systems around the world through franchise arrangements, reciprocal development and trade agreements, etc. The focus of marketing activity has been in the home in all cases. Field trials have been

scheduled in almost all advanced countries of the world in an attempt to develop the domestic market. In recent months, some emphasis seems to have shifted to the business market.

Information retrieval systems using computer and telecommunications systems are not new. Most large corporations maintain in-house data bases for storage and retrieval of information pertaining to budgeting, sales, personnel, scheduling, inventory, and so on. Recent trends have been toward distributing the data bases geographically and toward extending the data bases to all major corporate activities. Similar trends have begun in many intermediate and small corporations. Advances in minicomputer and microcomputer hardware and software have made this more economically attractive. The intelligent terminal is playing a role too by providing the individual user with sophisticated computational power, storage and retrieval capabilities, processing power, communications and word processing. Important elements of this end-user technology in business applications are the keyboard, printer, display and some local storage and processing power. A particular thrust on the business side is in office automation which refers to the potential for integrating electronic messaging, filing and copying, with word processing, data processing and publishing.

A commercial online data bank industry has developed providing information retrieval services by telecommunications facilities to extremely large volumes of bibliographic, publishing and numeric information. Literature search services, financial and marketing services and econometric forecasts can be accessed via computer terminals and telephone facilities almost anywhere in

the world. The users of these data bases tend to be governments and business. Access is relatively expensive and the industry is growing rapidly.

Information retrieval technology and the services it permits are therefore not new. What makes videotex different from other information retrieval systems is its perceived appeal as a service to the general public, i.e., to households in particular but also business users. For example, the contents of the data base, such as weather, travel and entertainment information, are of interest to the general public. Another feature of videotex is its accessibility through public networks such as telephone, cable and broadcasting. A third feature is its simplicity of use. The user interacts with the television set using a small key pad consisting of a dozen or so keys. Using these keys the user can step through the data base much as he would the pages of a book. Most users require only a brief session on instructions to use videotex. Another feature of videotex is its method of displaying information of a graphical nature. This feature of color graphics brings a new dimension of information retrieval to the user and, it is hoped, may enhance its acceptability to the public as a universal medium for information retrieval.

Videotex is therefore a different application of an existing technology, an application to the household market. The online information retrieval industry developed in response to a need by businesses and governments for highly specialized information services and information processing. The question raised by the promoters of videotex is whether such a market exists for electronic information retrieval and data processing services in the home and if so, what is the character of these services, how big the market is, what time scale, what strategies and how much capital investment is required to develop

this market. It is premature at this time to answer all of these questions. We can, however, provide some rational and intelligent analysis of some of these issues in a qualitative sense, In order to do this, we will look into issues such as the state of art of information and communication technology, identify markets and look into the whole issue of new home services that appear to be developing, including pay television, videodisks, home computers and so on.

Identification of Potential Products and Services

The purpose of this section is to identify and characterize the nature of products and services that new information technology can provide and to relate these to videotex.

The two-way hybrid nature of computer and telecommunications technology have the following functional capabilities:

1. Access to data processing,
2. Information retrieval,
3. Two-way message communications,
4. Broadcast messaging,
5. Transaction services,
6. Polling,
7. Electronic funds transfer services, and
8. Telemetering, security and alarm services.

Another view of this technology is to specify its direct and indirect potential uses. For example, most observers will regard the above functions as those provided directly to a typical user of the system. In some cases however,

such as the telemetering, security and alarm services, no user is involved because the service is automatic. In other cases, it can be used to complement a given service. In the provision of pay television, for example, two-way technology can be used to monitor usage for charging purposes. In conjunction with conventional television, it can be used to monitor viewing patterns automatically. Some of these applications have been developed and products are already on the market. The indirect services that are possible with new two-way communications technology could be as important if not more so in the short run as the more direct services suggested above. They could be the forerunners of new more direct services.

It is possible to classify the potential direct services according to the following modes or content classes:

1. Alphanumeric,
2. Graphical,
3. Video,
4. Voice, and
5. Mixtures of the above.

There is a trend toward mixing or integrating the above modes. For example, voice is usually provided with video for film and attempts are being made to integrate graphical and alphanumeric information. Videotex and Telidon can be regarded as an attempt to achieve this integration. A great deal of speculation also exists to the possibilities of integrating voice with graphical and alphanumeric information. Rapid progress is occuring in the development of voice synthesis and recognition systems and many applications are scheduled for

marketing this year. The coming decade should see many surprising developments in this area in the home and business markets as well as in manufacturing.

There is a whole class of information products relevant to videotex-type services consisting of hardware, software and firmware which is incorporated in the term - terminal equipment. Several companies are working on multi-functional terminals which integrate various technologies into a single terminal or various modules. Among the possible features are the following:

Video display, (color, resolution, etc.)
Copier or print features,
Keyboard for data input,
Memory and storage,
Local processing power,
Communications functions,
Voice synthesis and recognition, and
Specialized software packages and chips.

Among the modes of information content that the terminal could have are the following:

Alphanumeric,
Graphical,
Photographic,
Motion pictures,
Microfilm, and
Voice.

There is a trend in the market toward the integration of these modes of content from the point of view of storage and communications. New products and service will exhibit this trend. The videodisk, for example, has the potential from a storage and communications point of view to combine all of these modes of content. This will mean potentially lucrative opportunities for business in research and development, manufacturing and service provision. Some governments will want to promote these developments as a means of achieving domestic economic objectives such as export promotion, employment creation and improvements in productivity.

The application and service industries could be at least as important as the hardware itself and probably more so in the future and should receive special attention. A comprehensive list of information services is contained in Appendix B of a report submitted to DOC in 1979 by R.W. Hough and Associates Limited and Communications Studies and Planning.[1] These services are categorized as analogue and digital, one and two way, low and high speed, real and virtual transmission applications, etc. The list encompasses the following services and applications:

1. Library services,
2. Educational applications,
3. Law enforcement,
4. Banking,
5. Investment and Security brokerage,
6. Manufacturing,
7. Printing and publishing,
8. Insurance,
9. Public utilities,
10. Wholesale and retail trade,
11. Rail and air transportation,

12. Personal services, and

13. Institutional and government services.

In this section, we have identified some of the potential products and service opportunities relevant to videotex in particular and information technology in general, in terms of functional capabilities, direct and indirect service usage, the mode of information content, particular industrial applications and so on. Implicit in these have been the telecommunications functions such as switching, transmission and network facilities and services. All are relevant to an assessment of the potential market for this technology.

Identification of Markets

One of the first questions posed when discussing new information and communications products and services is that of market identification. This is the purpose of this section.

The first classification that is usually suggested is that of the business and consumer markets and for many purposes this may be adequate. However, one can go beyond this using a scheme in which groups of individuals are identified who share a common pursuit requiring access to a common information base and communications medium for coordination purposes or who require access to information for any reason, be it for making decisions or for entertainment or education purposes. Five markets have been identified.

The private in-house market is by far the largest market for information products and services. It consists of all goods and services purchased by businesses for use entirely within their own organization.

Information and communications goods and services are required by business for coordination, control, reporting, monitoring, communications, and so on. This market consists of stand-alone and communicating equipment such as computers and terminal equipment, typewriters, copiers, private line facilities and so on. This market is very large. It was in this market that computers and data processing suppliers found their first big customers and where these suppliers are still concentrating their sales efforts. It is in this market too that many of the new entrants into the telecommunications industry such as IBM and Xerox have made enormous plans and investments. This is also the current thrust of the activity in office automation. Many new information and communications products and services often develop and mature in this market and diffuse outward into the public market. This market should be monitored very carefully for this reason.

This market can be further broken down into industrial and services sectors, the Fortune 500 corporations and intermediate and small businesses, government departments and agencies, public services such as health, education and welfare, and so on.

The Closed-user business market consists of information and communications equipment and services used for private inter-organizational purposes (rather than intra-organizational uses) which serve the purposes of coordination, information sharing, and so on. The banking industry, for example, could justify a closed-user network for facilitating the development of electronic payments. Certain trade related organizations will want a two-way informationand communications system for their own use. Some possibilities for such groups are the following:

1. Travel agencies,
2. Theatre agencies,
3. Flourists,
4. Real estate agencies,
5. Insurance agencies,
6. Brokerage agencies,
7. Wholesalers,
8. Banks,
9. Advertisers,
10. Transport carriers,
11. Retailers,
12. Publishers,
13. Pharmacies,
14. Auto dealers,
15. Architects, and so on.

This market is very active with travel, insurance and brokerage agencies developing online information retrieval services. Graphics could play an important role in this market since layouts, plans, designs, maps, and so on, are so important to advertisers, publishers, transportation companies, etc.

The commercial data bank market consists of organizations which supply information services to users in the market place for a fee. They bear some resemblance to computer service bureaus but supply information and data bank services instead of solely data processing services. The user community consists mainly of government, industry, academic institutions and libraries. Very specialized information services are provided in the areas of marketing, business and finance and bibliographical services to name a few. To many organizations, they offer an economical alternative to maintaining in-house information services. Fees, however can be quite high. It is conceivable that these suppliers may some day expand horizontally into the home or consumer market if such a market is economically viable.

The special-interest group consumer market consists of groups of individuals who share a need to communicate information to one another or who

share an interest in the provision of certain kinds of information and who are willing to jointly finance the provision of the service. They could operate for-profit or not-for-profit. An example of a communications service in this special-interest group consumer market is teleconferencing.

There are many special-interest groups who operate using conferences, telephone services, newsletters and so on. A list of potential groups is the following:

1. Hobbyists,
2. Inventors,
3. Scientific and technical groups,
4. Professional groups, and other
5. General and specific interest groups.

The mass market refers to the consumer market identified primarily by its universality. New information and communications products and services could some day be as common as the telephone, radio and television service. Among the new products coming along for potential mass consumption are videodisks, home computers, games and so on. The mass market is the focus of the videotex and other field trials. Since the home or mass market is the focus of so much field trial activity throughout the world, the remainder of this report will be directed to an analysis of this market.

Information Services in the Home

The household sector or the consumer market is a legitimate target for new electronic information products and services but it is unlike other markets, for example, the business market, in several major respects. In particular, the

willingness or ability to pay, the existence of externalities and the public good nature of information and communications make the home or public market operate in very special ways. A brief review of the economics of information services in the home may alert one to the possible strategies for developing new services in this market.

Print and electronic media are used to provide information and entertainment services to the home and there is probably some interdependence between them. We know very little about the cross-elasticity of demand and therefore the substitution possibilities between the two media and among the various forms of each. New forms of communications such as those of videotex could serve to subsititute for or complement either or both of these media.

Print media provide information to the home in the form of newspapers and magazines, books, brochures and sales catalogues and other forms of advertising. The telephone directory and the yellow pages also use print media. All forms of print not addressed to a specific household, with the exception of books are financed to a large degree by advertising revenues. About 80 per cent of the revenues of all newspapers and periodicals in Canada, for example, are derived from advertising. The other 20 per cent are derived from subscription fees and circulation. Most other printed information services identified above are financed entirely by advertising. This includes catalogues and sales information and the yellow pages. Furthermore, where households pay for information, fees are typically very small. Daily newspaper subscriptions are of the order of one to two dollars per week. Monthly magazines cost of the

order of one to three but typically less than two dollars. Paperback books cost from one to three dollars while hardback books cost from ten dollars upward.

Print technology and print media are very attractive economically and from a convenience point of view. Economies of scale exist. Costs are relatively low for individual households. Print provides a lasting storage capability and it can be carried with an individual for consumption repeatedly at any time and any place. Print media also facilitate browsing, an important feature to the general public. Unless electronic media can meet these performance features, it will not provide effective competition for print media.

Radio and television broadcasting are the major electronic media in the home providing entertainment and information services. The household, however, pays no fee for receiving this service. All he needs to do is to purchase a proper receiving set and be within receiving distance of the signal. Broadcasting service is a public good in this respect. The major source of revenue for the broadcasting industry has been advertising. The reasons for this are technological and economic. In the past, the technology has not been available for providing a broadcasting service where reception could be economically monitored and usage fees levied. Advertising has stepped in to finance this service. The technology is now available to provide this service selectively and at an economical price. In the case of television broadcasting, for example, the technology makes it economically feasible to implement a scheme of pay television where household usage can be monitored and fees levied on either a program or channel basis. Under such a scheme, entertainment, educational and information services can be provided on a metered basis. Pay

television programming should be more selective and discriminating than commerical television and advertising revenues won't be neccessary to finance the service. The industry in Canada has suggested charges of $8.00 per month for pay television above normal cable subscription fees.

Households also obtain information from public libraries, telephone service, postal service and subscribe to cable services for television reception. Telephone service is available at a cost of $8 -$10 per month in urban Ontario which includes the rental of a telephone set and unlimited local calling. Long distance charges are metered. Depending upon how costs are allocated, an argument can be made that local residential subscribers are being subsidized. The theoretical reason given for this is that fees have to be low enough to encourage access and ensure universality of telephone service since fees in excess of this will discourage usage. Low fees are therefore important for public telephone service and this pricing structure has been designed and encouraged by the industry and regulators for this reason.

Households also have access to large volumes of information through public libraries. There are virtually no impediments to public library usage. Fees are almost non-existent and libraries provide relatively good service by giving public access to newspapers and magazines, books, periodicals and often records and film. Costs are covered through taxation reflecting the public goods nature of these services. The content of library services can be classified as information, entertainment and education.

Postal service is provided freely to all households and virtually all businesses and households are users of the service. Fees are levied on the

agency sending the information in most cases rather than the other way around. Although there is some disagreement, usage fees are very small. The cost of postage for a first class mail anywhere in Canada is about 17 cents. Postal service has also been subsidized in Canada by the federal government.

Cable service is not a universal service in Canada but it is readily accessible by about 75 per cent of Canadians. Fees currently charged are of the order of $6.- 8. monthly. Presumably, these fees are indicative of the desire by Canadians for improved reception of Canadian broadcasting signals but primarily reception of the U.S. channels. The content of cable services is primarily entertainment although there is some information and educational content present.

Can we draw some conclusions from this brief examination of information services in the home which could be pertinent to new services such as videotex? Disregarding for the moment the specialized nature of videotex and regarding it as another communications medium or service as those described above, there are some implications we can draw from examination of the above media services that may be relevant to the demand for and supply of videotex services and development of the services.

An economic examination of public information services cannot be done without introducing the concept of "user pays" and "advertiser pays". Most information services and all the media derive a large part of their revenues not from the user but from advertising. In the case of broadcasting, the user pays nothing directly to receive the signal. This suggests that for some information

services, households may not be willing to pay anything for information because it is already free. In other cases, such as newspapers and magazines, where the user pays only about 20 percent of the costs, monthly subscription fees amount to typically $2-$6. Disregarding the issue of timeliness for the moment, this suggests that if videotex is to provide information of a nature that competes with newspapers and magazines, it must do so on a basis of a payment about equal to that of newspapers.

How much will households pay for videotex services? Our analysis appears to indicate that households may be willing to pay monthly fees of the order $0-$6.00 for information that is already available to the public through alternative means. There may, however, be a demand for an enhanced information service to the public. This service would be designed to provide more specialized, more accurate and detailed information in a more timely manner. Such an information service would be justified strictly on economic grounds, however, i.e., the economic benefits derived from the service by the household would have to be commensurated with the fees paid for the service.

Further examination of the concept of advertiser pays is warranted, however. In order for markets to operate efficiently and indeed for consumers to benefit, some information must be exchanged. In order for businesses to prosper, an investment must be made in advertising and this investment is recouped through greater market share or higher revenues and profits. A certain fraction of the price of all goods and services is therefore information or advertising costs. This suggests that videotex may be very effectively used as a medium for advertising and marketing. Secondly, it suggests that advertising revenues could play an important role in financing the supply of these services.

It is not clear, however, what level of penetration would be necessary before the advertising industry would seriously consider using this medium. Considering the probable investment requirements, penetration rates of up to 20-30 per cent may be necessary.

Another source of revenue for information services to the public is public funding by federal, provincial and local governments through taxation. Information services of some kinds belong to the category of public goods or merit goods. Since everyone is deemed to benefit from an informed public, certain kinds of information services can be subsidized or financed by tax revenues as a means of encouraging consumption by the general public. Public library service is an example of this. This suggests that the supply of certain kinds of electronic information services, videotex or otherwise, may be financed through taxation. It also suggests that the government itself could be a source of information to the public as it has been to business in the past.

A third source of funding for information services to the public is that of cross-subsidization by professional and business users. In the supply of many products and services, for example, it is often the case that a large part of the production costs are common to one or more products, services or customer classes. In such cases, pricing of the goods or services become the difficult problem of quite arbitrarily assigning these common costs. Certain customer classes or services can bear the burden of these investment costs through higher prices while other classes need bear only the marginal operating costs which are often much smaller. Time-of-day pricing for electrical utilities is an application of this principle. It is also used in the pricing of telephone and telecommunications services. For videotex-type services, it means that business users or certain classes of public users could bear the

common investment costs of service provision while the general public could pay the much smaller marginal or incremented costs.

Revenue sources of the kinds discussed above could play a major role in the development of new electronic information retrieval services. A brief examination of the costs of online services currently available reveals the surprising fact that access costs are very high, sometimes reaching $50 - 90 per hour. Estimates have been made that usage fees as high as $30. per month are necessary to pay for videotex. There is not enough information available to estimate the costs of supply of videotex services in any great detail but if the cost structure of online services is any indication, it is highly unlikely that revenues from households alone will cover these costs. In such a case, the other revenue sources identified above could provide some leverage for the development of videotex services.

Unless new electronic media of the videotex type has certain features, it will be difficult to compete with print media. Videotex has to be very inexpensive and it probably must have some kind of print or copy mechanism for mass consumer acceptance. Unless supply costs drop quickly to compete with print, it is unlikely that videotex will compete with print media for some time to come. Costs of print media could rise quickly, however, due to such factors such as rising energy and labor costs. If print media lost its advertising revenue, for example, due to a switch to another medium such as videotex for some reason or other, relative prices to the household would change dramatically and videotex would compete on price directly with print such as newspapers, provided it offered a printed service. This is unlikely, however.

Cross-impacts between media and among media services have always been the subject of speculation. We are not aware of any studies in which the cross-impacts of radio broadcasting and the audio disk industry or of television broadcasting and theatre have been explored. We do know that none of these industries were wiped out by the other and that all continue to flourish. There is also no evidence that the advent of pay-television in the U.S. has had any adverse effects on theatre attendance or on commercial television although it may be to early to confirm this. There has been a trend, however, toward greater specialized programming with the advent of pay-television and deregulation in the United States. New channels cater to sports and religious interests in addition to programming catering to certain ethnic groups. There now appears to be an excess demand for specialized programming material of these kinds. There has been some speculation that the videodisk technology would impact the theatre industry as well as television broadcasting and both industries have voiced concern about the trends. Should first run movies, for example, be distributed on videodisk and the videodisk industry take the same form as the audio disk industry, there could be some cross-impacts but this in only speculative. There has also been a trend toward greater demand for specialty magazines catering to special interests of the consumer, i.e., sports, living styles, hobbies, etc. It is not clear what cross-impacts have been incurred by other publishing industries or within the magazine industry itself.

What does seem clear, however, is that new media and new products and services within a particular medium expand the market by meeting the specialized and diverse demands of consumers. Cross-impacts undoubtedly occur due to shifts in demand as well as advertising revenues but the markets appear to be expanding as diversity increases. Based on this evidence, it is highly unlikely that new

media and new media services will have adverse effects on existing media services.

It is more likely that information retrieval services in the home will complement print media rather than compete with it for some time to come. We surmise that videotex will prove to be an expensive alternative to print media for some time to come. For those households therefore who desire immediate specialized information of some kind and are willing to pay a premium for it above alternative sources, videotex would appear to provide a solution and satisfy a need. In some cases, no alternative information sources in print will exist and the service will find a natural place in the speciality information supply market. This is one of the reasons why the online database market developed. Therefore, it is possible to conclude that factors such as the need for very rapid access to information and access to very specialized information and the willingness to pay premium rates will play a dominant role in the development of videotex service in the home until such time as costs drop to make it an economical alternative to advertisers and subscribers of print media. Since these factors are more characteristic of the business market than the household market, it could be a better business strategy to market videotex as a service to the business community and to governments. This would also be more likely to alleviate cash flow problems the videotex supplier will probably encounter. Nevertheless, further study of the home market and the economics of videotex seems warranted to confirm those conclusions.

Alternative Market Development Scenarios

Many factors will play a role in the development of the home market for electronic information goods and services. The purpose of this section is to analyze some of these factors and speculate on how the market may develop.

An interesting feature or characteristic of the current state-of-art of information technology is that a great variety of new products and services are coming onto the market at the same time, driven by declining costs, an endless number of possible applications and a maturing of the supply industry. Videotex is only one of these products or services. In fact, this proliferation of possibilities and products is creating increased risks for individual suppliers by increasing the probability that any one will not be able to recoup his investment before his product becomes obsolete. There is also the possibility that no market exists for the majority of the products and that creating a new market will be a time consuming and expensive undertaking.

There are several major developments on the horizon which may stimulate the home market. Some of these will compete with videotex and may provide the foundation of a videotex service of its own. These are described briefly below.

The so-called home computer or a variant of it may find a growing market in the household sector. It may be used locally for entertainment and educational applications and/or it may develop for use in message communications and access to commercial data banks. Personal computer networks in the United States such as the SOURCE have developed in this way. Computer hobbyists are

active all over the world. The Ottawa club is experimenting with the development of radio technology for two-way services. It is entirely possible that technically oriented and professional individuals are on the leading edge of the household user community of new information services.

The videodisk shows great potential for the storage and distribution of large amounts of information for entertainment, education, training and information retrieval purposes. Add-on devices such as a microcomputer, keyboard (i.e., a home computer) and communications module could also provide the nucleus of the "home of the future". Videodisk appears to have a particularly great market potential because of its costs and versatility. Deliveries of the Philips/MCA and RCA videodisks are expected within the year at prices of about $500-$750 (compared to over $1,500 for videocassettes). Prices of disks are expected to be below $20. Interestingly enough, videodisks can serve as storage media for video and data and could serve the information retrieval, education and entertainment markets in the home and in business.

The development of an inexpensive electronic mail and message terminal could provide the first key to the future home market. Such a device could develop for person-to-person use in the business or home market and could further develop for access to computers and data banks. Siemans is known to have developed a hand-held electronic mail device with a small keyboard and display. The terminal can be attached to the telephone network and can communicate with other similar terminals for two-way message communications and with computers for information retrieval. Costs are expected to be initially about $500. U.S.

An inexpensive telecopier or teleprinter could also provide the foundation for a new market in the business or home market since printed output is so important in both markets.

Pay television could provide the ingredient for development of the home information market by permitting the common usage of carrier facilities, billing and some of the terminal equipment which are necessary for the provision of such service. It may be possible to address terminal devices in the home for the delivery of information and messages using the same technology.

The online information retrieval industry is well established to take advantage of economic opportunities in the home information retrieval market and may make incursions in this direction in the future. This industry has enormous amounts of serviceware which is readily accessible by standard computer terminals almost anywhere in the world. Although it is not clear why this industry has not reacted to the home market in a more positive manner, an inhibiting factor is probably the high cost of training, support services and general marketing overhead associated with many very small customers in the home market as compared to that of much larger business customers.

Any of the above developments could provide a serious challenge to the marketing strategy of those videotex suppliers in Canada. Several major factors may move developments in a particular direction. Some of these factors are discussed below.

Competition will take place among the above new products and services in unusual ways. All will compete for the incremental disposable dollar of the

consumer. Real disposable income has increased annually since the war but inflation and rising energy costs threaten this trend and prospects for the near future are not bright. Households will undoubtedly be very selective in their purchase of new products and services of this nature. New services and products will also compete for the daily disposable time of the household. Although leisure time is increasing, there is an increasing demand on it. Households will probably be more selective in their use of time in the future. For example, households may prefer videodisks to pay television and pay television to commercial television if the selectivity of entertainment, scheduling and the elimination of commercials proves to be more productive of households' leisure time. Some households might prefer videotex to other information services solely on the basis of time savings. The above new media could also compete for advertising revenues. One scenario would have a switch of advertising to videotex as a result of the introduction of commercial free television.

In the home market, entertainment has a higher premium than information services per se. Therefore, the first product to open this market may be entertainment-based such as the videodisk and pay television.

There is an important distinction between stand-alone and communicating devices when providing information services. Stand-alone devices may open the market and provide much of the revenue for the home market or communications devices may provide the initial thrust. With stand-alone devices too, telecommunications standards pose no problems.

Standards are a ubiquitous problem with marketing information products and services. Standards are required for interfacing terminals with

telecommunications facilities and between the storage of information with their retrieval mechanisms. Standards are a serious problem with the videodisk industry, the television industry, the computer and the telecommunications industry. They will also be with videotex. The development of a standard will play an important role in how this market develops and who the winners are. That is why standards are a primary goal of the videotex and Telidon strategies.

Serviceware or content will also play an important factor in the development of new services. A good strategy for many suppliers of equipment is to design a product where a great deal of content is readily available. Videodisk suppliers, for example, have entire libraries of film for promoting their products. Data banks exist for public access by home and business users using standard terminals and various software package exist for access by intelligent and non-intelligent terminals. Videotex, however, does not have access to extensive sources of readily available information and this is a handicap which could retard its development and even destroy it as an information retrieval service.

Developments in the business market may stimulate the home market. For example, it is not uncommon for a particular product or service to find a market in the business sector first and then diffuse into the home market. This is particularly true in the infancy stages of a new product or service when costs are high and the market is just beginning to grow. As the product matures, more suppliers enter the market and costs drop. When these costs drop low enough the product often finds a market in the household sector. Almost all of the new information technology and information retrieval services have developed in the

business sector first. IBM is known to have identified the business market for the sale of its videodisk. Calculators found their way into the consumer market after the business market. Therefore, the home market for videotex may take off only after it is successful in the business sector. This is particularly true of the non-entertainment services.

We saw earlier that price would probably be a decisive factor in the development of videotex services to the home. This price can be broken down into one-time charges and usage charges. The former consist of such items as terminal costs, registration costs, perhaps training costs, and so on. Usage charges consist of such items as connect charges, storage and CPU charges, retrieval charges and so on. Videotex terminals currently cost more than $1,200 each and there are further costs of adapting the television set. We estimate that terminal costs should be in the range of $50-$200 for videotex to be acceptable to the average household. Usage costs for online services and computer services vary a great deal but charges of $5.00-$60.00 per hour are more likely for those services whereas charges of the order of several cents per hour may be neccessary to give videotex a mass appeal. It is highly unlikely that charges of this kind could support a videotex service for some time to come. Nevertheless, the service could be subsidized as a means of promoting its use.

The market for videotex could develop rapidly with a firm commitment by industry or government to invest the neccessary capital to develop the hardware, software and services. Particular business interests could include the advertising, banking and, of course, the telecommunications industry. The advertising industry, for example, could conceivably provide a videotex service

for a small fee to the household given the appropriate market strategy. The banks, the telephone companies, broadcasters and cable industries are other candidates for taking this initiative.

All of the above factors will interact in a myriad of ways and it is difficult to predict how the market will develop. However, it is possible to make some qualitative judgements based on the above analysis.

In the home market, stand-alone products will probably develop very rapidly expecially in the videodisk area since no communications protocols, no regulations and no communications standards are required and a considerable amount of content is available. In addition, the videodisk strategy would be designed to provide entertainment content for which a relatively high demand is known to exist. Pay television is, of course, a second major lucrative market in the stages of take-off. Information services could be provided over pay television or using videodisks at some time in the future. Thirdly, an inexpensive electronic mail and message device could develop quite rapidly using the telephone network or using new radio technology. Protocols would be required but developments would not be restricted by lack of content. Fourthly, the information retrieval market in the home will take a longer time to develop because of the lack of content services for the home and the relatively high costs that will probably accompany the service in the initial stages. Of the different versions of videotex, the broadcast version would appear to be the most easily and inexpensively implemented even though it is inferior in many ways to the two-way kind.

Industry Structure and Regulation

The advent of potentially new forms of electronic information and communications services in the home raises many questions and issues relating to industry structure and regulation. The purpose of this section is to explore the problems and possibilities associated with the development of these new services.

Many industries may be directly or indirectly involved in the development and supply of new services. These include the following:

1. The telecommunications carrier industry,
2. The cable industry,
3. The broadcasting industry,
4. The publishing industry,
5. The advertising industry,
6. The computer service industry,
7. The equipment and facilities supply industry,
8. The postal service,
9. The banking industry,
10. Libraries, and generally
11. Any supplier of data banks and information.

The possible involvement of so many industries raises many problems having to do with the need to cooperate on the one hand and the need to compete on the other.

Cooperation will be necessary in the development of standards and the provision of jointly produced goods and services. Competition will be necessary

to ensure efficient allocation of resources, lower costs and service diversity. Conflicts arise in the achievement of both goals and regulations of some kind may be deemed necessary for ensuring that a desirable mix of the two is achieved where feasible.

Some of the above industries operate in regulated markets while others operate in competitive and quasi-regulated markets. Some of the regulated industries are monopolistic while others are oligopolistic and competitive. Some companies are vertically integrated while others are parts of horizontally integrated conglomerates. Combinations of all of these also exist. The new services may accentuate these problems.

Regulations may be used to curb the abuse of excess market or monopoly power or to ensure that the public benefits in some other socially or economically justifyable manner. Regulations can take various forms. Extreme forms of regulation include public ownership but it could take the form of entry and price regulations and obligation to serve all customers at reasonable standards of service quality and guarantee of access as in telecommunications. Finally, regulation can take legal forms mainly through anti-trust legislation prohibiting any form of cross-ownership, vertical or horizontal integration, etc. Any one of these regulations or a combination of them many be envisioned for the provision of new services.

One possible method or scheme for attempting to ensure orderly market operation is to separate suppliers by activity or function. This has been tried in broadcasting, cable and telecommunications although it has created problems of its own. Possible separation of functions include the following:

1. Carriage suppliers,
2. Content suppliers,
3. Information suppliers,
4. Equipment and facilities supplier,
5. Data processing supplier.
6. Suppliers of financial services,
7. Suppliers of security, alarm and billing services and so on.

The size distribution and concentration of new information and communications services supply industries will depend upon the degree of economies of scale in the supply of network facilities and services, data processing operations and in the production of information itself. In some cases, economies of scope may appear when particular costs can be eliminated or reduced by integrating two or more of these functions. The existence of economies of scale and scope could also determine the kinds of regulation that may be envisioned.

There are at least six elements of cost that could determine the degree of economies of scale and scope in the provision of services. There are:

1. Information production costs,
2. Data base administration costs,
3. Hardware and software costs,
4. Telecommunications costs,
5. Marketing, service and training costs, and
6. Billing costs.

A full costing analysis will be necessary to address the problem of economies of scale. To an increasing degree, however, the hardware and systems costs are an increasingly insignificant factor in determining economies of scale.

The electronic mail and message market and the information supply market can develop either in an interdependent fashion or entirely independently. Timing, market and institutional forces will all play roles in this development. There are however, possible structures that these industries may take and it is useful to speculate on these.

The structure of the electronic mail and message industry may develop in one of several forms. One form is the public telephone model where the service would be supplied by the telephone carrier under a regulated monopoly structure similar to that of public telephone service. Terminals could be supplied competitively. The second model is the regulated competitive model when service would be supplied by interconnect carriers such as CNCP over the telephone network. A third model is the postal model where the Post Office department would provide the service over leased facilities from the carriers. Under the value-added model any supplier could provide the service over facilities leased from the carriers but the carriers would be restricted from directly competing with them. A fifth model called the fully competitive model would see suppliers competing for the provision of service using the facilities of the carriers, the cable industry or through a radio network.

The structure of the information service supply industry could take one of several forms. The information broker model views the emergence of an information industry dominated by a new form of institution whose function would be that or a broker or packager of information content purchased on the market.

A variant of this model would have the broker providing one-stop shopping through access to many specialized data bases in addition to its own more general-interest data bases. The second model of this industry (the source retailer model) would see many suppliers providing information services to their customers without intermediaries. In this model, the original suppliers would not have to share their royalties with intermediaries unlike the first model. The broker model would have a status much like that of publishers or broadcasters whereas the second model would be equivalent to having everyone supplying his own publishing or advertising to the public. Both possibilities could co-exist. As in the case of the electronic mail and message market, economies of scale and scope could be a major factor in determining the industry structure.

Policy Issues

The development of new forms of public information and communications services raises many policy issues. The development of new services of this kind could have major impacts of an economic and social nature over the next decade or so and certainly in the longer run, they could radically alter industrial structure and household behavior. The purpose of this section is to suggest and briefly investigate some of these issues.

A major issue currently is the degree of government involvement in the development of the home market. The central government of most OECD countries is actively involved in promoting new services through the provision of huge subsidies to their PTTs (Post, Telephone and Telegraph) and to domestic manufacturers of electronic equipment. There are several reasons given for this direct involvement. First, the major participant in the supply of new services,

namely the PTT's, are publicly-owned and therefore government involvement of some kind is deemed necessary to ensure that new services are introduced in an orderly manner free of adverse consequences. Standards are also given as a reason for involvement. But the major reason appears to relate to an industrial strategy designed to stimulate the domestic market and to capture any export opportunities that may exist. These opportunities could increase employment and improve the balance of payments of these economies, so it is argued.

The strategy of France is a case in point. The government of France has embarked on an ambitious program aimed at supplying each telephone subscriber in France with a device attached to the telephone system consisting of a keyboard, screen and coupler. This device would be used to access directory information and the printed versions of the directory would cease to be produced after this has been accomplished. The government claims these terminals can be mass produced for $100 each and that the savings from discontinuing the existing printed directory would pay for the terminal. The program is to be completed in 1992. Production of the first batch of terminals has commenced by three domestic suppliers funded by the government. Other complementary and stimulative measures of this kind have been developed by the French government.

In the United States, market forces predominate to a higher degree although the program of deregulation has not been carried far enough to eliminate all risks and disincentives on the part of large companies in formerly regulated industries to enter the market. Many carriers, broadcasters and cable companies, however, are entering this market. In the United States too, several new and quite innovative services are being tested in the home. The SOURCE and

Micro-Net are two of these. The strategy of the former company is particularly interesting. This strategy took advantage of the existing base of home and small business computers and terminals and supplemented this with existing inexpensive telecommunications service and access to data banks throughout the U.S. A relatively inexpensive two-way information retrieval and messaging service was developed in a matter of months. Testing of the market for new services in the home in the United States has shown greater diversity of service offerings and participation by more diverse suppliers than in any other country.

The decision by governments to become actively involved in the manufacturing and marketing of new information products is a significant trend but one which is still risky. The market is dominated by a few very large multi national corporations. Competition is fierce. There are many ways new home information services could develop and some have been explored above. There are many competitors to videotex and some have been identified. Should governments feel compelled to take stimulative action, it should not be without a strategy focusing on market factors and forces identified above. Such a strategy should take advantage of market forces rather than attempting to thwart them. Failure to do so could seriously weaken the same industry that government is trying to support and stimulate.

The role of government in the development of information technology and new services typically follows one of three scenarios. The first is that of almost complete reliance on market forces. This strategy is pursued by nations with strong domestic suppliers such as the United States or those with almost no supply industry whatsoever. The recent trends towards deregulation in the U.S. are typical of this reliance on market forces as a means of acommodating change, fostering lower costs and the development of new and more diverse products and

services. A second scenario is that of almost complete reliance on government for the development of new products and services. This is accomplished through direct intervention in the market place through such means as public ownership, tariff and non-tariff trade barriers and the provision of large subsidies to domestic suppliers. The European and Japanese governments typically pursue this strategy. The Canadian strategy is a mixture of the above two, typically relying on free market forces more than the European governments but less than in the United States and using less direct stimulative policies and less non-tariff trade barriers that the European governments. These national strategies should prove interesting to monitor for public policy.

There is very little doubt that the potential opportunities and economic benefits from information technology are very appealing. Often cited are the benefits of increased employment and growth accompanying domestic opportunities and the creation of export markets for information goods and services. Increased efficiency and productivity are other recognized benefits from information technology. Both industry and government should recognize, however, that capturing these economic opportunities and benefits involves a very complex strategy with almost unlimited scope. Not only is hardware involved but so is software. Benefits arise not only from the supply of components but of systems, not only from systems but of services, and so on. The benfits offered to user suppliers are perhaps as important as those offered to hardware and software suppliers. In short, if an explicit strategy is to be pursued, it should take all of these into consideration. This would explicity involve make-or-buy and develop-or-buy policies in both the short-run and long-run. It would also involve economic analysis of market size, economies of scale, costs of research and development, analysis of manufacturing and

distribution systems and so on. In this way, government policies could be devised in such a way as to maximize overall benefits to the domestic economy while being fully cognizant of the sacrificies made rather than the case at present where governments deal with the issue in a case by case fashion. The current sole preoccupation with hardware and the terminal is an example of this.

Another important issue relates to the sources of financing of new information retrieval services in the home. We have suggested that revenues from advertising, business services and from governments could serve as leverage for the development of new services in the home. This is an important issue because the source of financing will determine the quality, type and content of these services. If advertising revenues predominate, the media could be dominated by high pressure marketing and sales content. This raises several issues relating to false advertising, adverse effects on particular groups such as children and so on. It also relates to political and economic power in society, to who controls the new media, who benefits by having access to it and to freedom of expression.

The direct marketing role of the new media will be particularly intreguing for many companies. Besides providing an economical alternative to current marketing practices, it could provide companies with better feedback and information on customer tastes, wants and so on. Access to the new medium and the information it provides could also represent a valuable asset to particular industries and a liability for others. Some industries such as the newspaper industry could be seriously hurt by the development of new media.

The advent of new services such as videotex but also pay television and videodisks raises some serious issues concerning their impacts on broadcasting,

publishing and advertising. Broadcasters have been wary of pay television because of the possible impact on audience fragmentation. Audience fragmentation, the argument goes, would result in a decline in advertising revenues to broadcasters. This could necessitate a rise in advertising rates and a further decline in advertising revenues exacerbating the plight of the broadcasters. The same effect could result from the introduction of videodisks. To avoid this, broadcasters may want to control or participate in pay television, videodisk and videotex. If these new services threaten publishers in any way, they too will want to become actively involved.

It is clear, though, that the older industries could survive just as radio did with the introduction of television and the audio disk industry. What does the new media mean for advertising? Pay television and videodisk could carry advertising content. So could videotex. Advertisers will probably closely monitor the development of these new media services and take advantage of any potentials that arise. This includes the use of videotex as well as videodisk as advertising media.

Inter-industry boundary problems could proliferate with the introduction of two-way services in the home. We are aware of the problems facing broadcasting and cable, cable and telecommunications, telecommunications and the data processing industry, and so on. Additional problems of this nature will arise with new services. One of these problems, for example, could be in the provision of financial and banking services, banking and accounting services, banking and data processing, charge card services and audit ratings and so on.

The provision of information services to the public and the subsidization of various kinds of information for public consumption raises many public

policy issues. Consumers will demand information in some cases and government will be pressured to supply or finance the supply of information as a public good. Consumer groups will be actively involved in this issue. This raises questions relating to the economic value of information services to the public, pricing issues, open government and access to government information.

The technological and economic trends point toward a proliferation of electronic distribution systems integrated nationally and internationally. Access to these systems will be increasingly difficult to deny for technical and political reasons. This raises issues respecting domestic content and the importation of foreign produced content. The issues of national sovereignty, employment and balance of payments could be as important with videotex as it has come to be with publishing and broadcasting. Issues relating to the protection, regulation and stimulation of the Canadian production industry could also arise.

Pricing will play an important role in the provision of new information services. Free access by the public to information can cause economic problems of excess demand and a misallocation of resources. Free access by suppliers of information or subsidization of them could also encourage overuse and a drop in the quality of information. This could result in degradation of performance, the proliferation of junk information or "information pollution". Pricing principles such as value-of-service pricing, cost-of-service pricing, usage-sensitive pricing, and so on, in a regulatory environment could be resorted to as a means of achieving particular social and economic objectives but major conflicts will be encountered especially with the efficiency and equity goals.

Privacy will be a critical issue with the new media. When large amounts of information on individuals or on individual behavior can be easily and inexpensively accessed in centralized computer readable media, privacy problems will arise. This issue is already a seriously debated topic of concern to the public. With new home information services, everything that individuals do while using the service can be monitored and recorded. This information has economic, social and political value. It can be used to the detriment of individuals and can be bought and sold for a fee. It can be used for marketing purposes in valuable ways. Privacy regulations can be envisioned when new services in the home are developed but the invisible nature of information will make privacy difficult and expensive to achieve. Without it, however, individuals may be deterred from using the new media.

The last issue raised here is that of copyright which would be a very important factor influencing the development of new services. The nature of the new technology makes unauthorized use and theft and resale of valuable information expensive and difficult if not impossible to police. Unless some means is found to reward those supplying information for these efforts through royalties, there will be no incentives to provide information having particularly significant economic value to their customers.

ESTABROOKS, MAURICE
--Videotex: an economic and policy assessment.