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FINAL REPORT

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Mass Market Computer-Communications
Services in Canada:
Prospects for market development

by

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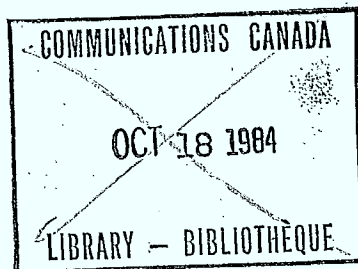
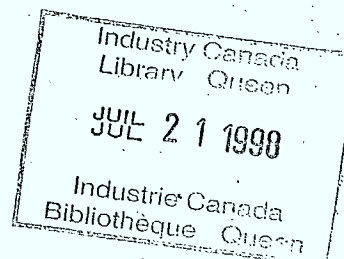
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EXECUTIVE SUMMARY

Computer-communications services are said to herald the new "information age", an age which will witness revolutionary changes in all aspects of our society and of human endeavour. Despite these predictions of revolutionary change and despite the present availability of the technology, there has, to date, been relatively little success in introducing computer-communications services for the general public. The very pragmatic question which remains to be answered is "what factors will determine the development of computer-communications services for the mass consumer market in Canada?"

For purposes of this study, "computer-communications services" are defined as services which involve the combined use of computers and electronic communications for the remote delivery of computerized data bases and/or the direct interaction of an end-user with a computer situated elsewhere. The "mass consumer market" for purposes of this study is defined in terms of four criteria: widespread usage; the use of computer based information/content and remote direct access via an electronic communications medium; availability to the general public, even if the immediate target audience is a sub-group of the general public; and all classes of users i.e., residential, business, government and actual or potential users.

Based on this definition of the mass consumer market for computer-communications services, a taxonomy of service offerings is developed. Three major classification schemes are superimposed on one another in the final taxonomy presented. These are:

- a functional classification where a five-fold breakdown consisting

of information retrieval, transactions, messaging, computing and monitoring, is used;

- a "level of interaction" classification which involves a two-way categorization between interactive services, i.e., services which directly provide some level of processing capability by the user other than selection of pre-packaged content, and consumptive services, i.e., services which provide no user processing capability other than, possibly, the selection of pre-packaged content;
- a "user, or human, capabilities" classification which uses a three-way categorization, amplification of cognition, regulation of affect and "communication/control" to describe the way in which computer/communications services will influence or impact on human capabilities.

A number of conclusions emerge from the taxonomy of service offerings developed from the combination of these three different, albeit related, classification schemes. In terms of services already existing or under active consideration for introduction, information retrieval/amplification of cognition shows the greatest number of entries. Second, consumptive systems are capable of delivering a great many information retrieval services, cannot be used directly for messaging or computing services, have very limited use for transactions and monitoring services, and are more limited, i.e., less "rich", for information retrieval purposes than the equivalent content provided by an interactive service. Finally, consumptive services relate overwhelmingly to cognitive abilities while interactive services, proportionately, influence regulation of affect and communication/control to a greater degree.

The taxonomy, by itself, is recognized to be of only limited value since it examines needs and user impact purely in a technical sense of capabilities, i.e., it takes no account of economic or social factors, both, ultimately, the factors which will dictate market acceptance and market development.

In this regard the study proceeds to examine/analyze factors on both the demand side and the supply side of the potential mass market likely to influence the emergence and the timing of the emergence of the actual mass market.

On the demand side, a Lancaster demand model is employed to analyze the characteristics of computer-communications services. This demand model emphasizes the characteristics which computer-communications services offer the consumer rather than the services per se which is the focus of the standard demand paradigm. Such a model, it is argued, is far "richer" for analyzing the probable demand for new goods and services, where most of the characteristics offered by the new services are available, albeit in different proportions or different bundles, from existing goods and services.

The cost of computer-communications services is shown to be important, particularly when all cost elements, i.e., hardware costs, the cost or price of the service, communication costs and time costs, are taken into account. On the hardware side, terminal equipment dedicated to a particular service will retard market growth by adding to costs. Use of a standardized, intelligent, programmable terminal device such as a personal computer will, on the other hand, lower the cost of computer-communications services at the margin and thereby enhance market growth. Regarding the price of services, flat rate, unlimited usage subscription fees seem to be the favoured residential-user pricing scheme at the present time. This may change, however, as the number of available service offerings increases. Low prices, per se, are seen to be important, all other things equal, but the price levels which the market will tolerate must always be looked at relative to the value of the service. Low prices are not a necessary condition for a mass market.

Several other conclusions emerge from the demand analysis: the personalized/customized service characteristic which can be offered by computer-communications services may be one of its major advantages; the introduction of local measured service (LMS) for telephone pricing could discourage development of mass market computer-communications services; the value of graphics and colour capability to the market acceptance of computer-communications services is open to question; transactions services offer some of the potentially highest value characteristics amongst alternative computer-communications service offerings; potential congestion of telephone-based delivery systems could reduce the reliability of the service, a characteristic which users

are likely to value; and user preferences, including levels of satisfaction with existing goods and services which offer many of the same characteristics as computer-communications services, will play a large role in the ultimate success of mass market computer-communications services.

The supply analysis focusses on a number of specific issues: hardware options/choices; service packaging/content; financing; pricing; competition/market structure; marketing; and carrier options. Several important conclusions are generated, including, inter alia, the following: overall market development will be best served by one all-purpose terminal with which users can access any service of their choice; the personal computer offers major advantages as the standard terminal device for the market; competition in the marketplace will benefit long run market development; the major problem for achieving a mass market lies in finding a "valid" product, something which competition on the supply side of the market is more likely to promote; the traditional content/carriage separation to which telephony carriers have been subject should be maintained in the computer-communications field, and applied to all carriers, not just the telephone companies, but should not be taken to preclude carrier-operated gateway systems, subject to certain qualifications; content/service provider separation may be desirable but cannot or should not be extended to service provider control of content—successful marketing requires service providers to have some level of control over content; general advertising is not likely to be as important a source of financing for computer-communications services as is commonly assumed, although specific advertising tied to transactions-related services may be important; government subsidization could help promote mass market systems but could also create economically unjustified systems and distort market development; a tiered-pricing system, combining elements of flat rate and usage sensitive pricing, is likely to serve producers' interests best; marketing efforts should concentrate on identifying appropriate audience group or target market segments and on delivering products which respond to perceived needs of these various target groups. Finally some of the relative merits of cable and telephony distribution systems are discussed.

Putting the demand and supply analysis together, various scenarios of market development in the medium term are examined. Combining different elements of these various scenarios, a "preferred" market development scenario is suggested. This scenario recommends: non-exclusivity of production technologies and distribution channels; convergence of the terminal market around the personal computer; a recognition of content rather than hardware as the primary basis of the market; an emphasis on transactions and messaging services as the primary functional applications of the market; gateway facilities to re-enforce the universality of networks; focussed applications directed at identifiable market segments and emphasizing high-value content; an initial focus on business applications; tiered-content and tiered price structures; and financing arrangements which draw on both information-provider revenues and user charges.

How quickly the market develops will depend on how quickly this shape emerges. No quantitative demand forecasts are offered. The likelihood and the timing of this preferred shape emerging are too uncertain for such an exercise.

The study concludes with an examination of the role of government and of government policy. Subsidy programs are seen as short-term measures only and subject, always, to a firm justification of the subsidy, and the amount, in cost-benefit terms. Regulation of the industry by government is discussed, noting that if regulation is to occur the "rules of the game" must be known and regulatory delay should not be allowed to retard market development. The direct financial benefits to government of participating in the computer-communications services market are also examined.

Finally, the social/economic policy goals of government as they relate to computer-communications service are discussed. Government to date has not officially stated or prioritized its goals for this sector. Various possible goals, gleaned from statements by senior public officials, are examined relative to the goal of maximizing market development. The analysis demonstrates clearly that the goals and objectives of government could have a major influence on the development of mass market computer-communications services. The preferred market development scenario sketched earlier can be

reconciled with the various potential policy goals of government if those goals are interpreted in particular ways. Interpreted differently, market development, per se, will be retarded and/or distorted. If this is to be avoided while still promoting the valid social objectives of government policy, those objectives must be clearly spelled out in a realistic way. Services, i.e., content and applications, not hardware, are what matter both in terms of market development and social objectives. Services are what must concern industry, consumers and government alike.

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Chapter One

INTRODUCTION

Computer-communications technology, we are told, will transform our society. The post-industrial society or the information age is heralded as representing part of a revolution which will profoundly influence all aspects of human endeavour:

Out of this widespread availability of information power, there will flow social changes and opportunities for human development that promise to make the next few decades among the most critical mankind has ever faced.¹

But the "widespread availability of information power," by itself, will not accomplish this. The availability of the power represents only the machines. It is the widespread usage of information power that must be achieved if the potential benefits of this technology are to be realized.

This study is about the widespread usage of computer-communications services. By computer-communications services we mean services involving the combined use of computers and electronic communications for the remote delivery of computerized data bases and/or the connection of an end-user with a computer situated elsewhere. More precisely, this study is an examination and analysis of the factors likely to influence the development of computer-communications services for the mass consumer market in Canada.

It is not particularly original to draw a distinction between the machines of the information age and their use and observe that the former, alone, are not sufficient for the impact that is forecast. But it is a point which seems sometimes to be lost sight of. It is not that anyone fails to realize that the machines must be used to be useful but

that they fail to realize that simply having the machines available does not guarantee their use:

...the question is not a technical one but an economic one.

It is not the technical feasibility of most of the applications we have described, but the economic capability to take advantage of them.²

This study is not concerned directly with the possible transformative or revolutionary impact of computer-communications technology. But this potential impact is part of what makes the questions we are concerned with of interest and importance. More specifically, the emergence of a mass market, i.e., widespread usage of computer-communications services, is a pre-condition to the technology exerting a real social and economic impact on society, even if it falls short of creating a new "industrial revolution." The emergence of a mass market and the timing of that emergence, in turn, is an economic not a technological question. The characteristics of both the demand and supply sides of the market, i.e., of both consumers and producers, will be involved and will determine whether, how, by whom and for what the technology is used on a wide scale. As Godfrey and Chang note,

If there is to be real social impact...it will first reveal itself in the marketplace; predictions and warnings made without careful attention to marketplace realities are likely to be invalid.³

This study, also, does not deal with the potential negative social consequences that could accompany widespread adoption of computer-communications technology: technology-induced unemployment, increased regional disparities; a widening of the information gap between rich and poor and between well-educated and less well-educated, social alienation/isolation, privacy concerns, and so on. Some of these are mentioned in the context of government policy but none are examined in detail. This does not mean, however, that these possible negative consequences are unimportant or do not deserve to be treated seriously. Their omission from this discussion simply reflects the particular focus of this study.

In Chapter Two, our analysis begins with an examination of what

the term "mass consumer market" means beyond the obvious interpretation of widespread usage. In Chapter Three, a taxonomy of service offerings which fits within our definition of mass market is developed. This is important to our analysis not only because it sets out the range of service potentials but because it also classifies these services in terms of functional areas of application, in terms of human capabilities, and in terms of their dynamic or interactive qualities. These are all very relevant categorizations for considering the reasons for people using the services and the implications of the services for users.

Chapter Four offers an analysis of the demand side of the market. It examines and analyzes the factors which will influence consumer use of the technology within the framework of an economic demand model which takes explicit account of a new product being added to an existing set of consumption activities.

Chapter Five offers an analysis of the supply side of the market. It examines a number of producer-related issues: hardware options and choices, service packaging and content, financing, pricing, competition and market structure, marketing and carrier or distribution options.

In Chapter Six, the analysis of Chapters Four and Five is brought together to examine some possible scenarios of market development in Canada over the next three to five years and to develop a scenario which is most likely to maximize the growth of the market within that time period.

Finally, Chapter Seven puts the discussion and analysis of Chapter Six into a public policy context, examining ways in which government may, if it chooses, promote the market development scenario developed in the preceeding analysis and casting the whole issue of market development in the larger context of government's goals and objectives.

We conclude Chapter Seven with a reiteration of the argument with which we opened this Introduction. "Services, i.e., content and applications, are what matter and what should be the concern for the industry, for consumers and for government alike."

Notes to Chapter One

1. "Terms of Reference for OECD Panel on Policy Issues of Computer/Telecommunications Interaction: May 1970," in "Computers and Telecommunication," Vol. 3, OECD Informatics Studies, Paris 1973. Quoted in D. Parkhill, "The Necessary Structure," in D. Godfrey and D. Parkhill (eds.), Gutenberg Two, (Victoria: Press Porcepic, 1980), p. 95.
2. R. Curnow and S. Curran, "The Technology 'Applied,'" in G. Friedrichs and A. Schaff (eds.), Microelectronics and Society, For Better or For Worse, A Report to the Club of Rome, (Oxford: Pergammon Press, 1982), p. 113.
3. D. Godfrey and E. Chang, "Telidon Is More Than Videotex," in D. Godfrey and E. Chang (eds.), The TELIDON Book, (Victoria: Press Porcepic, 1981), p. 2.

Chapter Two

DEFINING THE MASS MARKET

In order to discuss and analyze computer-communications services for the mass consumer market it is necessary to clearly spell out what all of these terms mean. "Computer-communications services" has been defined already in Chapter One. But "mass consumer market" has not yet been defined in a detailed way. This chapter will be concerned with providing this detailed definition.

What, then, is a "mass consumer market"?

One straightforward and obvious answer is to say that it means widespread usage or implementation. This does not, however, take one very far. It leaves unanswered such questions as whether a mass market is a home or residential market, a business market, or both; whether the market is defined in terms of the industry as a whole, individual service providers, individual services or individual data bases; whether the market is defined by the criteria for commercial viability or by some other criteria; and so on.

As a way of beginning to answer these questions and others, let us consider the ways in which the term mass market has been used by various observers/commentators of the computer-communications industry.

A Review of the Literature

Tydeman, et. al. define a mass market as "widespread implementation".¹ Within the generic class of computer-communications services labelled videotex,² the market is defined as all videotex users, i.e., it is not defined according to a particular service offering or

service provider. This definition does, however, distinguish videotex services from non-videotex computer-communications services; thus, implicitly, the market is being differentiated along technology lines. The other important characteristic of Tydeman's definition to note is the use of the word "implementation". In other words, Tydeman defines the mass market in terms of actual users rather than potential users. Further, he does not explicitly distinguish between users and buyers nor between users and usage. As will be discussed in more detail below, these distinctions may be important.

Baird³ offers a slightly different or modified concept of the mass market from that of Tydeman. His definition also rests on the number of users but he explicitly defines the requisite number of users in terms of a profitability criterion.

But, the ISP's (information/service providers) will only really be interested in providing their dollar input if they can see a fair return for their spending. In other words, if there are enough users of their information or service to benefit them in the way they desire.⁴

Very significantly, Baird's definition of mass market is put in the context of individual system operators. He discusses the "critical mass" of users, the number of users an individual operator requires for profitability. This critical mass is seen as a function of two factors: the spending power of users and the cost of operating the system. Baird's concern is with videotex service, which, amongst computer communications services, he categorizes as the most expensive because of its full colour and graphic capability and the large capacity of the system as a result of its being aimed at the general public. The latter, in turn, makes the average spending power of users less than, say, for a business-oriented service. The result of all of this is to end up with a relatively large critical mass for videotex system operators compared to non-videotex computer-communications services.

There is something of a tautology to this argument by Baird. Costs are higher and spending power lower because it is assumed that videotex is being offered to a large number of users. In turn, this means that for the service to succeed it needs to have a large number of users.

Two final points should be noted about Baird's discussion of the mass market:

- a) the profitability criterion he is using is, in effect, a break-even one, i.e., the critical mass is the minimum number of users required to earn a "fair return"⁵; and
- b) implicitly, his argument on the implication of the relatively high cost of videotex service assumes a high proportion of fixed costs, for a system engineered to a particular size and with certain colour and graphics capability. In other words, he is not basing his definition on an economies of scale argument but rather on the ability to lower average cost per user by spreading fixed costs over a larger number of users.

Considering these two points more carefully, two further notions or rationalizations of the meaning of "mass market" can be generated.

First, it is possible to think of a mass market in terms of maximizing the number of users per system operator so as to maximize profits, rather than in terms of the minimum number of users required to realize simply a fair return per system operator. In other words the profitability criterion could be defined in terms of improving profitability rather than simply achieving a break-even level of operation. In the short run, these will be the same only by coincidence. In the long run, they will coincide only if the market is a perfectly competitive one, an occurrence which is not very likely.

Secondly, if there are economies of scale to be realized by system operators then this becomes another basis for a focus on mass market development. Baird's analysis, as noted earlier, is not an economies of scale argument. Rather, Baird is arguing that, having engineered a given size system which has a large user capacity, a large number of users will be needed to make such a system pay. By contrast, an economies of scale argument would mean that the larger the scale of operation the lower per unit costs will be. For example, a system engineered for, say, 10,000 users will have a lower cost per user than a system engineered for, say, 1,000 users, if economies of scale are present. The likelihood of such economies of scale being present is an issue that is beyond the scope of this study to answer. Economies of scale are, however, a theoretical possibility which, if present, would

provide a basis for seeking mass market development, defined in terms of number of subscribers per system operator. Such development would, of necessity, imply a small number of large system operators.

Parkhill⁶ develops a notion of the mass market which is different again from either Tydeman or Baird. To quote Parkhill directly,

Basic to this picture is a view of the evolution of computing and communications systems that sees them coming together in the form of a universal, functionally-integrated but institutionally-separated information distribution system metaphorically called an "Electronic Highway Network".⁷

For Parkhill, the mass market is a kind of "market for the masses". In other words, it is not just an economic market but rather one that has major social overtones. Parkhill's aim is to "make the potentially revolutionary benefits of computer power available to everyone".⁸

Parkhill's sense of the mass market is echoed quite closely by the Science Council of Canada:

It is becoming apparent that we are going to need (and therefore have) or are going to have (and therefore need) a public use of computers. The public at large will be able to dial up a computing facility appropriate to their needs.⁹

In the case of both Parkhill and the Science Council the market is defined without respect to individual service operators. There is nothing in either definition, however, to suggest that the market is seen as monolithic, although Parkhill does talk of the "Electronic Highway Network" which would tie all of the parts together.

There are conceptions of the mass market which are monolithic, however. Indeed, the early Prestel system in the U.K. was based on this notion.

The effort Prestel was driven by the quest, current then, for a universal data base. It was felt that all the information that a nation needs to operate, economically, socially and culturally, could be stored on one computer, or collection of computers, and provide universal access by/to all citizens.¹⁰

Gordon Thompson dismisses both the desirability and the practicability of this approach:

The inappropriate use of the big is beautiful idea in applying information technology has produced some mongoloids. The "computer utility," an idea from the early development period of information technology, was clearly based on the structure of existing industrial public utilities, and exhibited the heavy, centralist, structural notions of the older technology. For many real and valid reasons, there will never be a collecting together of "raw computer power" into one giant, centralized machine serving a whole country or, for that matter, a whole city. The big-is-beautiful idea applies to information technology in a very small, weak fashion.¹¹

Thompson goes on to describe what he calls "the information market-place",¹² a market where information is the good which is exchanged. This is Thompson's vision of the mass market.

The key to releasing the full socio-economic potential of the new information technology, with its communications facilities, computers, and intelligent terminals, and the like, lies in designing a suitable infrastructure wherein the technology encourages the content suppliers and users to interact in a synergistic way. Such an infrastructure could produce a new mass medium.¹³

Thompson's mass market would not feature centralized production but, rather, would be "pluralistic" in nature. It would not deliver "material chosen for appeal to the widest audience",¹⁴ but "tailored material, specifically aimed at small-user populations".¹⁵ Thompson adds another important qualification to his definition. Not only is his mass market one which has a large number of users but also it is one where the time devoted to participating in the market is significant.

...users would have to spend significant quantities of time using this new medium if there were to be economically significant revenues flowing from these usages. For the electronic information market-place to mean anything economically, people will have to spend time in that market-place. Not just fleeting moments, but "chunks" of time.¹⁶

Daniel Bell has also commented on the question of market organization for computer-communications services. He discusses two alternatives: "a single computer utility that would centralize and provide a single source for information and transmission of data for consumer use... and a completely unregulated, competitive market system in which different "producers" would be free to set up diverse informational services and transmission would be through cable, microwave, or satellite communication operated by different combines, each competing for the business."¹⁷

Bell reviews the relative merits of each of these alternatives and, on balance, decides in favour of the market system. He believes this would best realize the goals of what he describes as "the information society," a conception which has social (versus purely economic) overtones similar to those of Parkhill's conception of the mass market discussed earlier.

The 1979 Hickling-Johnston report¹⁸ to the Department of Communications, viewed the mass market in economic terms but included some new considerations.

Inherent in the relentlessness of falling costs is a new set of product opportunities in consumer markets as opposed to the customary markets for digital devices which have been oriented to the producer markets in business and government. One is drawn to the view that 1980 will mark a discontinuity in the industries associated with digital technology, where consumer products tailored and priced to a mass market assume a prominence and character all of their own. Mass markets offer scale economies in the production of devices, but more importantly they offer scale economies in the software which converts those devices into usable services. The mass markets provide the volume potential which permits pricing to capture that volume. As well as affordable prices, the mass market must cater to an essentially computer-illiterate clientele, and will require a very high level of technical transparency in the devices and attendant services offered.¹⁹

Thus, the Hickling-Johnston view of the mass market is one which:

- a) does not include business and government users;
- b) offers economies of scale in the equipment, i.e., hardware, market;
- c) offers economies of scale in the software market; and
- d) is made up of "ordinary people," a "computer-illiterate clientele".

The two new considerations which Hickling-Johnston add to the discussion are economies of scale in hardware and in software as part of the basis for the mass market. The fact that business and government users are specifically excluded is also noteworthy. .

A 1980 report for the Department of Communications undertaken by R.W. Hough and Associates²⁰ examines the probable growth of the videotex market in Canada to 1990. Although the report never explicitly defines "mass market," it does, implicitly, think of the mass market strictly in terms of videotex, thereby distinguishing the market in technology terms as per the Tydeman definition noted earlier. It also presumes that a major emphasis of the mass market will be "home" users versus "business" users. While this is not as restrictive a condition as Hickling-Johnston, it is very close to being so. Finally, the report explicitly attempts to estimate demand and on the basis of these projections concludes, "if Telidon could reach the market penetrations suggested herein, that would be a very good market indeed."²¹ Thus, implicitly, the report seems to be thinking in terms of some minimum threshold necessary to establish the market. Unlike Baird, however,²² this minimum threshold, or what Baird calls the "critical mass," is defined in terms of the entire videotex market, not individual service operators.

Kurchak²³ defines the mass market in terms of "services to be made generally available to the public."²⁴ Kurchak goes on to note that

researchers specializing in videotex have pointed out that data base services may operate profitably selling a specialized service to a small audience of terminal owners at relatively high prices as has currently been done; or, theoretically, with a large audience of terminals one may offer services cheaply and still enjoy profits. However, in the interim phase when the market of terminals is neither of

a specialized-audience sort nor of a mass audience size, it will be very difficult for providers of services to get adequate returns.²⁵

Kurchak's definition, either implicitly or explicitly, delimits the mass market as follows:

- a) the market is defined in terms of number of terminals rather than number of buyers or number of users or other possible measures such as dollar volume or hours of usage; none of these are necessarily the same and some obviously differ;
- b) the market would offer lower prices to the terminal-audience, which implicitly assumes that low prices are a necessary characteristic for gaining a mass audience;
- c) the source of this lower price is not spelled out; conceptually it could derive from the ability to spread high fixed costs over a larger number of customers, economies of scale in software and/or data base provision or economies of scale in production of terminals; this latter point might be assumed to be quite important in Kurchak's case owing to her definition of the market in terms of terminals.

The importance of economies in hardware production are emphasized by Booth and Wills in a more recent study for DOC:²⁶

The importance of standards lies in the fact that until a universal standard is adopted, mass production of equipment for display is not likely to take place.²⁷

Wills and Booth go on to note, however, that "hardware...is not going to be the way to gain the greatest penetration of Telidon".²⁸ They argue that content development is just as important. They also note that "developing a mass encyclopedia-like information retrieval capability has...problems".²⁹

Interview Responses

In a number of the interviews carried out as part of this present study, the industry participants/observers being interviewed offered their own versions of the meaning of the mass market concept. Many of these parallel closely various of the definitions from the literature just reviewed. Others, however, differ in certain respects.

For a number of interviewees, the mass market was perceived in monolithic terms, such that a disaggregated market was seen as an alternative to the mass market rather than one possible manifestation of the mass market. For others, the monolithic concept was dismissed out of hand. In one interview case, the mass market was defined in terms of the installed base of the carrier for the service and the share of that base enjoyed by the individual service operator of a computer-communications service.³⁰ Implicitly this appears to assume that any given service will employ only one distribution or carrier system. Technologically there is no reason this should be the case³¹ but, in economic terms, it is possible that it could prove to be the preferred approach. This view also implies a possible confusion between the notion of a mass market and the notion of a target market.

Not surprisingly, most service providers interviewed see the market share of individual service providers and/or services as a crucial variable in any definition of the mass market, although they may view the market itself in more aggregate terms. All interviewees regard home or residential service as a necessary component of the mass market though some define it as strictly residential while others define it as both business and residential. For some, volume, not type of customer, is the crucial variable.

An interesting argument made by some interviewees was the notion of specific functions being mass market services in their own right. The two functions most often mentioned in this regard were electronic messaging or mail services and transactions services, in particular tele-shopping and tele-banking. Information retrieval was also mentioned by several interviewees in this regard but, in so doing, they noted that they did not regard information retrieval as the basis for "building" the market.

There is a certain tendency on the part of some service providers to try to carve out market niches for themselves. Thus they do not necessarily think in terms of a mass market but just in terms of their own market. The NABU Network, at least for now, appears to be an example of such an approach.³² Infomart also placed a great deal of emphasis on the need to target the service and the content of the service to particular audience groups.³³ One interviewee noted that

market niches might in fact be highly dispersed geographically, requiring the use of mass media as a marketing tool to reach this audience. The use of mass marketing techniques was thus seen as one way of defining a mass market, where individual product offerings were, however, highly individualized.³⁴

In terms of marketing theory, this latter notion of a mass market is an accepted one. One marketing definition of mass market, for example, is the following:

A mass market includes all persons in the country who can be reached by transportation facilities and the mass media.³⁵

If, for the case of computer-communications services, "communication facilities" are read in place of "transportation facilities", this statement is precisely the view expressed in the just mentioned interview. The marketing definition goes on to note that there are two alternative views of the mass market which can be considered consistent with the general definition. First, there is the case where market preferences are treated as homogeneous, i.e., the market is presumed to be made up of "people with want patterns remarkably similar from person to person."³⁶ This means that the product presented to the market is a compromise. It is the product which is "somewhat acceptable to everyone rather than being precisely what is preferred by any part of the total market."³⁷ This is what has been referred to here as the monolithic approach or definition of the mass market.

The second mass market case is the segmented market approach. This, in certain terms, "represents a partial abandonment of the mass market concept",³⁸ insofar as the conventional view of the mass market assumes some level of product homogeneity. In fact, however, the real difference between the homogeneous mass market approach and the segmented market approach is that the former concentrates on the traits of the majority or plurality of buyers while the latter emphasizes minority traits and divides the market into segments in order to accomplish this.³⁹

In this way of looking at things, product differentiation as defined in marketing terms is not to be confused with market segmentation. In

the latter case, the product is differentiated while the appeal to customers may be, and usually is, universal, making use of mass media and other mass marketing techniques. Product differentiation for marketing specialists, however, may involve a single product which is, however, distinguished by different sales appeals to different segments of the market. Thus product differentiation implies, in marketing terms, several different targets for promotion. Another term for product differentiation, defined in this way, is "market aggregation".⁴⁰

In terms of this marketing definition of mass market which defines a mass market in terms of mass media promotion, an interesting question which emerges is whether mass market computer-communications services are themselves mass communication services. Mass communications has been defined as:

Systems of messages and means of generation and transmission (human and technological) that have three properties: first, the messages and the media are intended for a large and spatially dispersed audience; second, the messages and the media are sufficiently standard to be readily comprehensible to and usable by a large fraction of the intended audience; third, the messages are available, because of media availability, to a large fraction of the relevant population.⁴¹

What is obvious from this definition is that for mass market computer-communications services to qualify as mass communication services they would have to be of the monolithic or homogeneous mass market variety. It is interesting to speculate whether preconceptions of mass communications systems held by many of the first participants in the mass computer-communications services market led to the monolithic view of the market being prevalent for some while.

A Summary of Views

Table 2.1 provides a summary of the various characteristics attributed to the mass market for computer-communications services by the literature/industry observers reviewed. An examination of Table 2.1 reveals that some of the attributes or characteristics of mass markets identified by different individuals are contradictory, while some can be seen as subsets of others.

Table 2.1
Summary of Mass Market Characteristics
—Alternative Views

1. Technology
 - videotex vs non-videotex
 - all computer-communications services
2. Audience
 - number of actual users per system operator
 - number of actual users per total industry
 - number of actual users per service
 - number of accessible terminals
 - number of customers
 - number of potential users
 - number of subscribers/installed base of carrier
 - high usage per user
3. Audience characteristics
 - general public
 - computer illiterate
 - residential
 - non-business and non-government
 - residential plus business plus government
 - low price threshold
 - average income constraint
4. Economic considerations
 - high fixed costs (absolute and relative)
 - economies of scale—system operator
 - economies of scale—hardware
 - economies of scale—software
 - use of mass media advertising
 - viability per system operator
 - viability per overall market

Table 2.1 (Cont'd.)
Summary of Mass Market Characteristics
—Alternative Views

5. Service Characteristics

- universal data base
 - "information market-place"
 - targeted audience applications
 - computer utility—single service provider
 - decentralized market—many service providers
 - equipment/hardware compatibility
 - software compatibility
-

In technological terms, there is, as has already been observed, a tendency to distinguish videotex from non-videotex services and in particular to define a mass market for videotex services alone. This distinction is somewhat confusing because the term videotex is used in different ways by different commentators. For some it is a generic term for any computer-communications service having a widespread or large audience.⁴² In this case it becomes allcomputer-communications services subject to other characteristics imposed on the definition of mass market. In purely technical terms, however, videotex means something else. "Pure" videotex is a system where the data base is constructed and retrieved in page format. In other words it is not a "full-text service," either in organization or presentation. For the present time, at least, there appears to be no good reason to impose this limitation on the definition of mass market. To avoid confusion, videotex will be defined here in strictly technical terms and the market therefore will be defined in terms of computer-communications services in general. In other words, the only technological constraint imposed on the definition will be that services be computer-communications services as defined in Chapter One.

In terms of audience, there are several alternatives shown in Table 2.1. Which of these is most relevant will depend on whose perspective is being taken into account. Service providers or system operators will be concerned with their own customer base, actual or potential. To the extent that number of customers and usage per

customer are substitutes for any given sales volume, both numbers and usage are likely to be important. The number of accessible terminals or the installed base of the carrier may both be good indicators of potential audience for a given system operator but only if supply and demand are in equilibrium in the terminal or carrier markets.

It is not clear, however, that the perspective of the system operator is the most useful one for our purposes. Insofar as services offered by different system operators are competing ones, the markets of different service providers will overlap. This would tend to move us towards an industry wide definition of audience whether we are using the system operator or individual services as the base unit for examination of the supply side of the market. Regarding this latter distinction, it does not appear to be necessary to limit our definition by dealing with either system operators or services exclusively. Both of these may be relevant ways of disaggregating the total market, depending on the situation. This point will be made more obvious in Chapter Three, where a taxonomy of computer-communications services is set out.

The distinction between customers and users may be a relevant one, depending again on the perspective from which the market is viewed. As a general proposition, customers can be assumed to be users but users will not necessarily be customers. From a service operator perspective, this distinction may not be relevant. If service providers are interested in dollar sales and if pricing of services is usage-sensitive in some respect, then having someone use someone else's code/account will not matter. From a public policy perspective, if an objective of public policy is to maximize persons using the system or having access to the system, then the committed customer list of the service operator will underestimate the size of the market. If there are public access terminals located in hotels, shopping malls, libraries, etc., then again the number of users will exceed the number of customers. For advertisers, if the systems involve sponsored services, users will be more relevant since advertisers will be most interested in total audience reached. If the pricing structure for services is not usage sensitive, then system operators may care if there are more users than customers. Overall, it would appear to be best to err in this case on the

side of enlarging the audience. Thus we will define the audience in terms of users rather than customers or terminals, while noting that for some purposes both customers and terminals may be relevant measures of audience.

Finally, with regard to audience, there is the question of actual versus potential users. Because the analysis of Chapter Four is concerned with identifying demand characteristics which will determine or influence the entry of users into the market, potential users will be adopted here for definitional purposes. When, and if, the market reaches maturity, actual users will become more meaningful.

Audience characteristics shown in Table 2.1 are relatively straightforward to deal with. A potential mass market clearly must encompass the general public. It is important to emphasize however that this doesn't mean that individual services or systems cannot be targeted to selected groups. By the same token, general public does not mean an exclusive emphasis on home or residential users. For one thing, in many cases the dividing line between business services and residential services is a blurred one in terms of the physical location of access. Personal banking or shopping might be done from the office while a business electronic messaging service might be accessed from the home. The same is true for government services and users. Product characteristics may well differ between services intended for a residential audience versus a business audience but, put in these terms, this becomes simply one level of product differentiation in a segmented market rather than separate markets. The price and income thresholds may need to be lower to attract a mass audience for a given service or system than if the service is for a small, highly specialized audience. This, however, is a relative characteristic not an absolute one. Even in relative terms it may not be true. The price or income threshold will depend, *ceteris paribus*, on the value of the service to the individual user. The higher is the value of the content and/or the medium, the higher the price which a given user will be prepared to pay or the higher the proportion of his/her income may be devoted to the service, all other things equal. Still there is no question that affordability will also influence the number of participants. What is important to remember is that the cost of the service itself is only one of the user's costs.

There is also the cost of the terminal equipment which may include a display unit, a modem and carrier service as well as the terminal itself and the communications cost of using the service if this is not included in the price of the service itself.⁴³ Account must also be taken of time, learning costs and other non-cash cost components. Thus it will be more relevant to talk about price and income constraints in terms of total user costs rather than just the cost of individual services.⁴⁴ Having said this, however, no price or income constraints will be imposed on the definition of mass market. Rather, in keeping with defining the audience in terms of potential users, income and price will be taken as conditions governing entry into the market in terms of actual users and the extent of usage once in the market. The economic considerations identified in Table 2.1 also fall out of our definition for this same reason.

Economies of scale, be it in hardware, software or per system operator⁴⁵ will influence the mass market insofar as they contribute to lower prices. Similarly the impact of high (relative and absolute) fixed costs will work in the same manner. Thus the definition of a mass market will not incorporate these characteristics but these characteristics may be important in shaping the mass market. By the same token, viability considerations, either for individual system operators or the overall market, will be seen as consequences of the market as defined, rather than being treated as part of the definition. To argue, as Baird does,⁴⁶ that profitability is the criterion defining the market and that a mass market is one large enough to justify the investment in a service intended for a large market is simply a tautology.

The use of mass media advertising or other mass marketing techniques will also be excluded from the general definition of mass market. While mass marketing techniques may be very important to market success and may be a necessary or essential component in creating a mass market, marketing techniques, per se, do not define the market.

The same is true of service characteristics. There seems to be no necessary reason why a mass market need be defined a priori either in monolithic terms or segmented terms or monopoly versus competitive

market terms. Conceptually any of these may be compatible with a mass market. It is important to realize, however, that the choices made in this regard are likely to influence the shape and success of the market. As Larratt has noted,

...in North America today there is no single simple mass market. The mass market has disaggregated...⁴⁷

Equipment and software compatibility will also be important determinants of the shape, existence and/or timing of a mass market for computer-communications services. These are not, however, necessary conditions for a mass market and hence are not included in the definition of mass market.

Definition

The definition of mass consumer market adopted here is, thus, as follows.

The mass consumer market for computer-communications services is one which:

- a) involves widespread usage
- b) of services involving both computer based information/content and remote connection of users via an electronic communications medium
- c) available to the general public, though not necessarily aimed, in the case of each individual offering, at a majority of the general public and
- d) encompasses all classes of users, residential, business and government, actual or potential.

As is obvious, this is a very broad definition. It could be argued that it is, in fact, an underspecified definition. As subsequent analysis will show, greater specification is in fact necessary to make this definition of mass market operational. It has been stated as is for now, however, in order to demonstrate the lowest common denominator that can be gleaned from most of the existing work on this subject and, in the process, to provide a base, albeit broad, general, definition as an initial framework for subsequent analysis.

Notes to Chapter Two

1. J. Tydeman, et. al., Teletext and Videotex in the United States (New York: McGraw-Hill, 1982), p. 3.
2. Videotex is defined by Tydeman as "the generic name to describe the provision of two-way information services... In addition, we also use the term videotex to refer broadly to the class of systems that provide electronic information to the home." (p. 2) This differs from a purely technical definition of videotex which would emphasize the input and output of videotex data in pages.
3. N. Baird, "Mass Market Videotex—There is a Better Way", Videotex Canada, 1, 4, 1983, p. 29.
4. Ibid., p. 29.
5. Ibid., p. 29.
6. D. Parkhill, "The Necessary Structure", in D. Godfrey, et. al., op. cit.
7. Ibid., p. 93.
8. Ibid., p. 72.
9. Science Council of Canada, Communications and Computers, Information and Canadian Society (Ottawa: 1978), p. 18.
10. R. Larratt, "Market Factors", in D. Godfrey and E. Chang (eds.), op. cit., p. 20.
11. G. Thompson, "Memo from Mercury: Information Technology is Different", Occasional Paper No. 10, The Institute for Research on Public Policy (Montreal: 1979), p. 7.

12. Ibid., pp. 29-33.
13. Ibid., p. 41.
14. Ibid., p. 42.
15. Ibid., p. 42.
16. Ibid., pp. 55-56.
17. D. Bell, "The Social Framework of the Information Society", in T. Forester (ed.), The Microelectronics Revolution (Oxford: Basil Blackwell, 1980), pp. 533-534.
18. Hickling-Johnston Limited, Field Marketing Trial Strategy for Telidon (Toronto: Hickling-Johnston Limited, 1979).
19. Ibid., p. 1.
20. Roger W. Hough and Associates Ltd., A Study to Forecast the Demand for Telidon Services Over the Next Ten Years (Ottawa: Roger W. Hough and Associates, 1980).
21. Ibid., p. 146.
22. Baird, op. cit.
23. M. Kurchak, Telidon: the information providers, (Ottawa: Department of Communications, 1981).
24. Ibid., p. 2.
25. Ibid., p. 7.
26. P. Booth and R. Wills, Telidon Evaluation, Executive Summary Report, Wescom Communications and Research Studies Ltd., 1983.

27. Ibid., p. 6.
28. Ibid., p. 33.
29. Ibid., p. 33.
30. Personal interview with Time, Inc.
31. Technologically, interactive services could be carried by telephone carriers, cable carriers, or by direct satellite transmission. One-way broadcast-type services, such as teletext, can be done through TV, cable, satellite or FM radio.
32. NABU considers their typical user to be family units with above average income and children between the ages of six and seventeen, who regard games as too limited and stand-alone computers as too complicated and for whom purchased software and accessories would be too expensive. (Personal interview with NABU.)
33. Infomart asserted, during the course of a personal interview session, that to be relevant, the mass market must be defined in terms of the number of subscribers to a service rather than the number of customers of a service provider.
34. Interview with GTE Telenet.
35. R. Gist, Marketing and Society, (New York: Holt, Rinehart and Winston, 1971), p. 226.
36. Ibid.
37. Ibid.
38. Ibid., p. 228.

39. Ibid., pp. 228-229.
40. Ibid., pp. 230-231.
41. D. Bobrow "Mass Communication and the Political System" in W. Davison and F. Yu (eds.), Mass Communication Research, (New York: Praeger, 1974), pp. 93-94.
42. This is, for example, the way in which Tydeman, op. cit., uses the term.
43. The Source, for example, charges on the basis of connect time which is inclusive of communications cost when the packet switched network is used and there are no marginal costs of accessing the packet network.
44. It is important to note that there is a major difference in this regard between the decision to join the first system/service and the decision to join subsequent systems/services. For the latter, terminal or equipment costs will no longer be relevant so long as the terminal equipment is compatible with the additional services.
45. Economies of scale per system operator, which are distinguished here from hardware or software economies of scale represent either economies on the administration side or economies which come from offering a multiplicity of services by the same operator. The latter is, in fact, more economies of scope than economies of scale.
46. See earlier discussion of Baird, op. cit.
47. Larratt, op. cit., p. 19.

Chapter Three

A TAXONOMY OF SERVICE OFFERINGS

Having defined, in general, the "mass consumer market" for computer-communications services, the question arises as to exactly which services fall within this market as defined. Related to this question of which services are to be considered is the question of categorizing or classifying the various services so as to facilitate the analysis of the market which is to follow.

As already noted in Chapter One, "computer-communications services" for purposes of this study includes all services involving the combined use of computers and electronic communications for the remote delivery of computerized data bases and/or the connection of an end-user with a computer situated elsewhere. This definition thus precludes normal broadcasting services, including radio, television, and cable television services, including pay-TV. It also precludes normal telephony services. The fact that computerization of telephone switching and transmission facilities is now common does not qualify standard telephony services as a computer-communications service as the term is used here. The use of computers in the working of the network does not constitute either the remote delivery of a computerized data base or direct interaction between an end-user and a computer situated elsewhere.

The definition of "mass consumer market" arrived at in Chapter Two puts a further major limitation on the range of services under consideration. Because the definition of mass market includes the availability of the service to the general public, all internal or local networks are excluded from consideration. Also, because "widespread

usage" is another element of the definition of mass market, closed-user group¹ applications are excluded even when the closed group involves parties from more than one organization. Specialized service offerings are not excluded in principle. In practice, characteristics of particular services such as price or required level of computer literacy, may disqualify certain specialized service offerings from inclusion in the mass market. This, however, is not a definitional concern. Nor does the definition of mass market, which is defined in aggregate market terms rather than in terms of individual services or service providers, preclude the inclusion of services which, by themselves, have a relatively small audience. As long as such services are available to the general public they represent part of the market as defined.

These various qualifications still leave us with a very broad range of service offerings to consider. It is not practical nor, for that matter, particularly useful to attempt to list all such services. Rather, assuming that, by use of an appropriate classification system, it becomes possible to identify certain general classes of services, the relevant characteristics of these services which will influence their emergence or the timing of their emergence as part(s) of the mass market can be analyzed.

Some Alternative Classifications

Several authors/observers who have examined the field of computer-communications services have adopted a classification scheme based on the general purpose of the service. Tydeman, for example, makes use of the following five-fold classification:

1. information retrieval services
2. transactions services
3. messaging services
4. computing services and
5. monitoring services²

The industry itself tends to categorize services in terms of content orientation. Thus, for example, The Source uses the following general classification:

1. communications
2. business and finance

3. travel
4. news and sports
5. entertainment/games
6. consumer services³

This classification, based on content orientation, overlaps Tydeman's functional classification shown just before. "News and sports," for example, would largely fall within "information retrieval," as would parts of "entertainment/games" (e.g. daily horoscopes, movie reviews), "travel" and "consumer services". On the other hand, "computing services" are, to the extent they exist on The Source, classified partly under "communications" and partly under "consumer services." "Communications obviously includes "messaging services" and "consumer services" includes "transactions services".

The NABU Network in Canada offers four categories of programming: news, family entertainment, educational programming and general entertainment. Like The Source, these categories describe content focus in a way which is not consistent with a functional classification such as Tydeman's, in the sense that neither classification is a subset of the other, i.e., they are alternative not complementary classifications.

A slightly different classification from that of the NABU Network or The Source arises from a grouping of services based on the characteristics/orientation of information providers. One example of such a classification is the following: banking, shopping, news, education, games, messaging, classified, programmes, entertainment guides and consumer information.⁴ This is very similar to a content classification such as NABU or The Source uses, but differs primarily in the level of aggregation at which categories are defined. There is also a similarity between this IP-based classification and a functional classification such as Tydeman's. Again the difference is in the level of aggregation. What both of these comparisons indicate is that the more disaggregated the classification, moving in the extreme to a description of individual data bases, the more compatible will be the various general ways of classifying the market. But insofar as the purpose of classifying services is to avoid a detailed listing, this does not help very much.

It is quite common to classify computer-communications services, particularly videotex services, into two-way services and one-way services.⁵ In the specific case of videotex, one-way services are known as teletext. This distinction between one-way and two-way services has both technological and functional implications. The technological implications arise from the fact that one-way and two-way services normally involve different distribution technologies. One-way systems involve a broadcast-type distribution while two-way systems involve an individualized on-line connection. With one significant exception, which is discussed below, broadcast distribution means that

1. everybody receives the same data base(s); user selectivity is exercised only in terms of which elements of the data base put out in a broadcast cycle the user chooses to hold.
2. no other level of interaction is possible within the broadcast distribution system itself; it is possible to construct hybrid systems which use, say, a telephone line for return responses from the user but there is not a direct on-line interactivity.

Two-way systems, which, theoretically at least, could be carried out using cable, telephone or satellite,⁶ create the possibility of

1. direct response by users within the distribution system delivering the service(s) to the user.
2. the possibility of limiting access to a data base or some element of a data base to designated users.

The significant exception to these normal distinguishing characteristics between one-way and two-way services is a system which uses a broadcast mode combined with a terminal with programmable processing capability, e.g. a personal computer, and operates through downloading of data bases into the terminal from where the user is able to manipulate them, i.e., interact, locally. Such a system does, in fact, exist; this is how the NABU Network operates.

This system still differs from a two-way on-line system in functional terms because, by itself, it is still not capable of handling either messaging services or transactions services. Normal one-way broadcast systems would also not be able to offer computing services or games if they did not make use of a computer as the user's terminal device. Monitoring services also cannot be provided in a strict sense on

a broadcast system. However, if cable is the physical distribution system being used for delivery of the broadcast service and if the cable plant is equipped with addressable technology, then monitoring can be provided through a polling strategy whereby the head-end computer, or a third party computer, polls a set of monitoring devices at each address on a recurrent cycle. This is technically different than monitoring on a two-way system where the message would originate at the user's end; in practical terms, however, this difference may be indistinguishable to users.⁷

It is possible to think in terms of classifying services more strictly in technological terms than is involved in the simple one-way, two-way classification. Such a categorization, as one superimposed on other classification schemes, is implicit in the literature which distinguishes videotex and teletext from other computer-communications services.⁸ One could also talk about ASCII-based services, real-time services, text services, graphics services, colour services and so on.

These technological distinctions, unless they have functional implications, are not a particularly useful way of attempting to categorize the market. As a general proposition, users will not care how they receive the service, or how the data base is mounted or configured, etc. as long as the service does for them what they want at a cost that is acceptable. Thus it is more meaningful in seeking to categorize the market to concentrate on a functional classification, i.e., on user applications, and to introduce technological concerns only insofar as these have implications for function. It should be remembered, however, that there are non-computer-communications technologies that are capable of performing many of the same functions as computer-communications services. While a technological breakdown of the computer-communications field itself is not one which we will pursue as a way of classifying the market, competing technologies from outside the field will be of interest to us in assessing the market potential of computer-communications services.

Martin⁹ has listed various telecommunications services in the home. This list is reproduced in Table 3.1, even though it does not correspond to our needs in three important respects. First, it is looking at telecommunications services rather than computer-communications

Table 3.1
Possible Telecommunications Services in the Home

Passive entertainment

- Radio
- Many television channels
- Pay TV (e.g. Home Box Office—movies, sports, etc.)
- Dial-up music/sound library
- Dial-up movies
- Subscriber-originated programming

People-to-people communications

- Telephone
- Videophones
- Still-picture phones
- Videoconferencing
- Telephone answering service
- Voicegram service
- Message sending service
- Telemedical services
- Psychiatric consultation
- Local ombudsman
- Access to elected officials

Interactive television

- Interactive educational programs
- Interactive television games
- Quiz shows
- Advertizing and sales
- Politics
- Television ratings
- Public opinion polls
- Debates on local issues
- Telemedical applications
- Interactive pornography
- Betting on horse races

Table 3.1 (Cont'd.)
Possible Telecommunications Services in the Home

Gambling on other sports

Still-picture interaction

- Computer-assisted instruction
- Shopping
- Catalogue displays
- Advertizing and ordering
- Consumer reports
- Entertainment guide
- City information
- Obtaining travel advice and directions
- Tour information
- Boating/fishing information
- Sports reports
- Weather forecasts
- Hobby information
- Book/literature reviews
- Book library service
- Encyclopedia
- Politics
- Computer dating
- Real estate
- Games for children's entertainment
- Gambling games (bingo)

Monitoring

- Fire alarms on-line to fire service
- Burglar alarms on-line to police
- Remote control of heating and air conditioning (a user sending commands to this equipment from a distant telephone)
- Remote control of cooker
- Water, gas, and electricity meter reading
- Television audience counting

Table 3.1 (Cont'd.)
Possible Telecommunications Services in the Home

Telephone voice-answerback

- Stock market information
- Weather reports
- Sports information
- Banking
- Medical diagnosis
- Electronic voting

Home printer

- Electronic delivery of newspaper/magazines
- Customized news service
- Stock market ticker
- Electronic mail
- Message delivery
- Text editing; report preparation
- Secretarial assistance
- Customized advertizing
- Consumer guidance
- Information retrieval
- Obtaining transportation schedules
- Obtaining travel advice/maps

Computer terminals

- Income tax preparation
- Recording of tax information
- Banking
- Domestic accounting
- Entertainment/sports reservations
- Restaurant reservations
- Travel planning and reservations
- Computer-assisted instruction
- Computation
- Investment comparison and analysis

Table 3.1 (Cont'd.)

Possible Telecommunications Services in the Home

- Investment monitoring
- Work at home
- Access to company files
- Information retrieval
- Library/literature/document searches
- Searching for goods to buy
- Shopping information; price lists and comparisons
- Real estate searching
- Job searching
- Vocational counseling
- Obtaining insurance
- Obtaining licenses
- Medicare claims
- Medical diagnosis
- Emergency medical information
- Yellow pages
- Communications directory assistance
- Dictionary/glossary/thesaurus
- Address records
- Diary, appointments, reminders
- Message sending
- Christmas card/invitation lists
- Housing, health, welfare, and social information
- Games (e.g. chess)
- Computer dating
- Obtaining sports partners

Source: J. Martin, Future Developments in Telecommunications, 2nd edition, (Englewood Cliffs: Prentice-Hall, 1977) pp. 314-316.

services. Thus, it includes a number of telephony or broadcasting services which lie outside of our definition of the market, although they do represent possible substitutes for services which are part of the market. Second, Martin is looking only at the home market. As noted in Chapter Two, our definition of the mass market is not restricted to the home or residential market, although the home market is clearly an important component of the mass market. Business or government oriented services are, however, included in our definition except for the case of closed user group applications. Third, Martin's general classification scheme is, to a large extent, a technology-based classification, based both on the medium being used for transmission or viewing and/or the hardware elements involved in the service.

In spite of these reservations, Martin's list is useful in providing an initial view of the kinds of services available. Many of the elements in this list will be used in the taxonomy developed here.

One-way vs. Two-way Systems

Tydeman¹⁰ expands on his five general categories of service by listing, under each general category, various application areas and/or specific types of applications. Table 3.2 sets out this taxonomy provided by Tydeman. Like Martin, Tydeman is primarily concerned with home-based systems. But he includes certain business applications which individuals want to access from the home and also a few that would be only accessed from the office, such as "inventory/stock control". Tydeman focuses just on teletext/videotex applications. It should be remembered, however, from the discussion of Chapter Two, that Tydeman uses these terms in a generic sense rather than a strict technological sense, so that his definition of teletext/videotex comes very close to our own definition of computer-communications services. Tydeman groups teletext and videotex applications together in this taxonomy. This means that the individual application areas are not identified as being one-way or two-way services. While many of them are, or could be, both, and while any one-way service necessarily can be provided as part of a two-way system, certain two-way services cannot be provided as one-way services. It is also relevant to note that the properties of a service, relative to its general classification, may differ

Table 3.2
Future Teletext/Videotex Applications

I. Information Retrieval

<u>Application Area</u>	<u>Individual Applications</u>
Electronic Publishing	<ul style="list-style-type: none"> - electronic newspapers - specialized newsletters - electronic encyclopedia
Library and Reference Service	<ul style="list-style-type: none"> - data base access - catalogue review
Community Services	<ul style="list-style-type: none"> - community bulletin board - transit/travel information - emergency information - government information - housing availability - comparison shopping - electronic hotlines - foreign language service - captioning - electronic directories
Education	<ul style="list-style-type: none"> - course listing - CAI/CMI - special services for home-bound students - supplemental materials for education TV programs - do-it-yourself training - literacy - retraining
Health	<ul style="list-style-type: none"> - storefront medicine - first-aid

Table 3.2 (Cont'd.)
Future Teletext/Videotex Applications

Entertainment

- electronic jukebox
- on-demand TV

Advertising

- electronic yellow pages
- supplement to TV advertising
- classified advertising
- display advertising

II. Transactions

- electronic checkbook
- electronic funds transfer
- electronic credit cards
- electronic catalogues
- gambling
- entertainment options

III. Messaging

- electronic mail
- "videotexgram"
- conferencing
- serendipity machine
- electronic welcome wagon
- referenda or quasi-referenda
- consumer action
- electronic gossip
- internal business communication
- market research

Table 3.2 (Cont'd.)
Future Teletext/Videotex Applications

IV. Computing

- video games
- home computing service
- personal information storage
- financial management
- telework
- extensions of corporate management systems
- inventory/stock control

V. Telemonitoring

- home security
- health and safety monitoring
- energy management

Source: J. Tydeman, et. al., Teletext and Videotex in the United States, (New York: McGraw-Hill, 1982), pp. 65-69.

depending on whether it is one-way or two-way. As Tydeman notes

...many one-way information retrieval services could be enhanced by interactive transactions and/or messaging capabilities. An electronic version of the official Airline Guide would be classified as an information-retrieval service; addition of a trip-planning service would involve computing, while inclusion of the capacity to make reservations would require a transaction capability.¹¹

At a more general level, this last example illustrates the further point that, for two-way services, the "primary functional classification"¹² categories may not be mutually exclusive. Services may fall under more than one classification (function) depending on the way it is used. Others may not even provide a unique classification according to individual users/usage. As Tydeman notes, "A few applications (e.g. computer-assisted instruction, which utilizes both information retrieval and computing) are true hybrids requiring two or more functions."¹³

One of the very important implications of this point regarding the categorization of two-way services is that the technological distinction between one-way and two-way service does not really capture the essence of the functional distinction which these two alternatives represent. A two-way service which does nothing more than deliver information will be technologically distinct from a one-way service doing the same thing. Functionally, however, the two will be indistinguishable. What is, in fact, the crucial functional attribute which the one-way/two-way distinction is addressing is the level of interactivity which is allowed or which is utilized.

A one-way service, in terms of the level of interaction between the end-user and the remote computer, which downloads content to a local computer will be indistinguishable from a two-way on-line interactive system for all but transactions and messaging services. A two-way system which is used simply to receive information, with no on-line interaction beyond the selection of content, will be indistinguishable from one-way systems, such as teletext, which provide no processing capability beyond the selection of content.

If we categorize services which directly provide some level of processing capability, be it manipulation or transformation of the data base, whether on-line or locally, other than the selection of pre-packaged content, as interactive and services which provide no processing capability other than the selection of pre-packaged content, or which do not even provide content selection, as consumptive, we can capture the functional distinction between the two types of service better than if we categorize them as one-way and two-way, i.e., better than if we categorize them in technological terms. Thus, in our own taxonomy developed here, we will use these categories as the most general level of classification.

User Capabilities

While we have argued earlier in this chapter in favour of a functional classification of service offerings or applications, it is also possible to view the potential range of service offerings from the perspective of user capabilities, i.e., the human capabilities which the service offering relates to or influences in some way.

Kochen¹⁴ has described this view as follows:

there are at least three powerful capabilities we may expect of this technology: amplification of an individual's cognitive abilities, regulation and control of an individual's affect, and new forms of communication and control in society.¹⁵

Kochen goes on to describe what is meant by each of these three capabilities.¹⁶ He points out that, in terms of "amplification of cognition," "...the likely future of technologies will enormously extend the analytical reasoning ability of planners, policy analysts, scientists and other individuals in tasks limited by capacities for vertical thinking, data analysis, and scientific inference."¹⁷

"Regulation of affect" involves an improved capacity for individuals to deal with emotion-laden trade-offs, as "the broader bandwidths of communication channels and input/output devices, more sophisticated simulation languages, greater storage capacities make it possible to create more effective simulations...we should anticipate a variety of major applications of simulation technology to help not only

designers and professionals, but ordinary individuals with difficult conflicting choices."¹⁸ He goes on to say, "A closely related task in the regulation of affect arises in coping with complexity, with or without a conflicting choice... The issues are generally complex, involving many interacting variables, with little clarity about the possible solutions, their properties, or what information is helpful in finding an adequate solution. Mass media cannot filter from their broadcasts the purely cognitive aspects from those arousing emotions. Techniques that extend computer-aided instruction or that provide individualized point-to-point communication could affect such a separation."¹⁹ Finally, Kochen notes, "The variety of options in both form and content in the presentation of information by computer offers certain programmers new means of regulating the emotions likely to be evoked in various users."²⁰

Regarding "communication and control" Kochen offers two observations which are relevant to our purposes. First, he notes that "the organization of societies into communities and neighbourhoods can exhibit coordinated integration or dissonant fragmentation. The emerging communications technologies can greatly affect social stability in this sense, particularly at the level of ethical values."²¹ Secondly, he notes that, "control over how needed information is requested passes from the information designer to the user, at least to some extent... Unlike the present use of mass media, with one message broadcast to reach all levels in a single, one-directional, point-to-mass transmission, the new technologies will permit different users to obtain custom-tailored messages, in a conversational rather than a lecture mode, while being initiated and controlled by him rather than by the sender."²²

Kochen's description of these three capabilities moves somewhat outside our present framework in that he is not, in all cases, bound by either presently or imminently available services or technology. He is also dealing, to a large extent, with highly professional or process oriented applications rather than more mundane tasks such as games, restaurant guides, banking and shopping. Nonetheless, at the risk of taking some licence with his terminology, it is possible for us to adapt his three capabilities to our purpose here by defining the terms in the following way:

Amplification of cognition

- the enhancement, improvement or strengthening of mental capacities such as memory, calculation and thought, through improved data storage, more rapid display of facts, improved capacity for presenting relationships, provision of translation capability and provision of algorithms, the workings of which may not be exactly known to the user.

Regulation of Affect

- the enhancement or improvement of the capacity of individuals to deal with value judgements, to cope with complexity and to separate the cognitive aspects of an issue from the emotional aspects through improved capacity for presenting relationships, provision of simulation capability, improved qualities of instruction and individualized communication.

Communication/Control

- the enhancement or improvement of social interaction, social stability, and, for individuals, control over content/presentation of data/messages through custom-tailoring of messages/content, networking, and other processes which influence the ability of users to achieve some desired outcome.

A Preliminary Taxonomy

If these three capabilities are superimposed on Tydeman's five-way functional classification so that they are treated as complementary classifications rather than as alternatives, we can produce a matrix as shown in Table 3.3. Table 3.3 includes only the applications outlined by Tydeman, as shown in Table 3.2.

The virtue of this double classification is its simultaneous emphasis on two different dimensions of the user experience with any particular type of service. On the one hand it shows the immediate functional purpose of the service area in terms of the user need being served and, on the other hand, it shows how the user's human capabilities relate to, or are influenced by, the service. Thus a given box in the matrix shows the relationship, as expressed in a particular type of service offering, between the user's human capabilities and the functional purpose of the service or the user's needs.

Table 3.3
Classification of Computer-Communications Service Offerings

Function Capability	Information Retrieval	Transactions	Messaging	Computing	Monitoring
Amplification of Cognition	<ul style="list-style-type: none"> - electronic newspapers - electronic encyclopedia - library data bases - library catalogue review - transit information - emergency information - housing availability - comparison shopping - captioning - electronic directories - education course listings - government information - community information - storefront medicine - first-aid - classified advertising - display advertising - supplement to TV advertising - electronic yellow pages 	<ul style="list-style-type: none"> - on-demand TV - electronic jukebox 	<ul style="list-style-type: none"> - electronic hot lines 	<ul style="list-style-type: none"> - personal information storage - inventory/stock control 	
Regulation of Affect	<ul style="list-style-type: none"> - CAI/CMI - special services for home-bound students - supplemental materials for TV programs - retraining - literacy - travel information 			<ul style="list-style-type: none"> - home computing service - video games - financial management - telework - extensions of corporate management systems 	
Communication/ Control	<ul style="list-style-type: none"> - do-it-yourself training - specialized newsletters 	<ul style="list-style-type: none"> - electronic check-book - electronic funds transfer - electronic credit cards - electronic catalogues - gambling - entertainment options 	<ul style="list-style-type: none"> - community bulletin board - electronic mail - videotexgram - conferencing - serendipity machine - electronic welcome wagon - referenda or quasi-referenda - consumer action - electronic gossip - internal business communication - market research 		<ul style="list-style-type: none"> - home security - health and safety monitoring - energy management

This double classification scheme may not, in fact, add a great deal to our understanding of the short run market characteristics of computer-communications services, especially given the relative newness of all of the services and hence the general lack of familiarity with the full range of properties of these services on the part of users. In the longer term, however, the way in which the services relate to and impact on human capabilities will primarily determine the transformative effects of this technology on society. Thus it is extremely useful to begin to appreciate/better understand this dimension of the technology even if, at this point, we are dealing with it only in developing a taxonomy of service offerings.

One of the points to be emphasized regarding Table 3.3, is that the classification of certain individual services by either method is, to some extent, arbitrary. Insofar as possible, services have been classified under the function and capability which seems to best represent the primary orientation of the service in each respective context.²³ But several entries could easily have been classified elsewhere. Travel information, for example, has been shown under regulation of affect/information retrieval. It might well have been listed under amplification of cognition/information retrieval. Which is most appropriate will, to a large extent, depend on the service offering itself. To the extent that the service allows the user to actually "experience" something of the travel site, the regulation of affect category is most appropriate. If it is, however, relatively bland, objective information, such as the price of hotel rooms and the availability of hotel rooms, it would probably be more appropriate to use the amplification of cognition category. Apart from this question of primary purpose, many of the services listed have, by their nature, elements of more than one category. Electronic banking services, for example, have elements of both information retrieval (checking your chequeing account balance or current interest rates) and transactions (transferring funds or paying bills). There could also be a message component (being advised by your bank that your account is overdrawn or a cheque you deposited was returned NSF). To avoid duplication in the listings, cross-listings to take account of the multi-faceted nature of certain services have not been shown. This is, however, an important point for the reader to bear in mind in examining Table 3.3.

Table 3.3, as noted earlier, lists only those services put forward by Tydeman. Thus, it does not include a number of services actually or potentially available in the market place. It is also possible to specify in more detail some of the services which Tydeman includes. It should be further noted that Table 3.3, like Table 3.2, follows Tydeman in not drawing a distinction between interactive and consumptive services as these terms were earlier defined.

A Final Taxonomy

Table 3.4 represents an extension of Table 3.3 which separates interactive and consumptive services and adds some additional services and/or provides a finer breakdown of some of Tydeman's applications. Although this new listing is reasonably exhaustive in terms of services now available or imaginable, it is important to remember that there may be many services which will ultimately develop which are still missing because we cannot yet imagine them. We tend to think of new developments first in terms of our present experience. Thus it may be far from coincidental that the greatest number of listings in Tables 3.3 and 3.4 occur under the information retrieval category and the amplification of cognition category.

An examination of Table 3.4 reveals a number of interesting conclusions apart from the point just noted regarding the proportionately greater number of entries for both information retrieval and amplification of cognition. First, consumptive systems are quite capable of delivering a great many services. Second, consumptive systems cannot deliver as many services as interactive systems. Third, in functional terms, consumptive systems cannot be used for virtually any transactions services or monitoring services or for any messaging or computing services. In other words, the primary, if not exclusive, function served by consumptive systems is information retrieval. Fourth, the nature of many consumptive services within the information retrieval category is more limited than the same type of service offered on an interactive system, in that consumptive services lack the dynamic properties which interactive services are capable of having; consumptive services are static by definition. Fifth, following from the second, third and fourth points just noted, interactive systems

Table 3.4
Classification of Computer-Communications Service Offerings

Interactive	Consumptive
I. Amplification of Cognition	
<u>A. Information Retrieval</u>	
<p> electronic newspapers electronic encyclopedia library data bases library catalogue review transit information (dynamic) housing availability (dynamic) comparison shopping (dynamic) captioning, electronic directories education course listings community information first-aid medical information classified advertising display advertising supplement to TV advertising electronic yellow pages emergency information government information book/literature reviews event evaluation consumer information (dynamic) political, economic, social, market, and technology forecasts hobby information political profiles </p>	<p> electronic newspapers electronic encyclopedia library data bases library catalogue review transit information (static) housing availability (static) comparison shopping (static) captioning electronic directories education course listings community information first-aid medical information classified advertising display advertising supplement to TV advertising electronic yellow pages emergency information government information book/literature reviews event evaluation consumer information (static) political, economic, social, market, and technology forecasts hobby information political profiles </p>

Table 3.4 (Cont'd.)
Classification of Computer-Communications Service Offerings

Interactive	Consumptive
<hr/>	
I. Amplification of Cognition	
<hr/>	
<u>A. Information Retrieval</u>	
industrial profiles	industrial profiles
traffic analysis (dynamic)	traffic analysis (static)
pharmaceutical information	pharmaceutical information
tax information/guides	tax information/guides
mortgage information/services	mortgage information/services
dictionary/thesaurus	dictionary/thesaurus
weather information	weather information
journals/magazines/books	journals/magazines/books
<hr/>	
<u>B. Transactions</u>	
on-demand TV	on-demand TV (only on subscrip- tion, unlimited usage basis)
electronic jukebox	electronic jukebox (only on sub- scription, unlimited usage basis)
information provider sales	--
<hr/>	
<u>C. Messaging</u>	
electronic hot lines	--
<hr/>	
<u>D. Computing</u>	
personal information storage	--
inventory/stock control	--

Table 3.4 (Cont'd.)

Classification of Computer-Communications Service Offerings

Interactive	Consumptive
II. Regulation of Affect	
<u>A. Information Retrieval</u>	
CAI/CMI	
special services for home-bound students (dynamic)	special services for home-bound students (static)
supplemental materials for TV programs (dynamic)	supplemental materials for TV programs (static)
retraining (dynamic)	retraining (static)
travel information (dynamic)	travel information (static)
research assistance	
vocational counselling	vocational training information
training simulations	--
political scenarios	--
employment information/job searching	employment information
artistic workshops	--
<u>B. Transactions</u>	
complex issue testing	--
text/graphics report generation	--
medical claims	--
computer dating	--
document delivery	--
<u>C. Messaging</u>	
town meeting	--
"debate" on political issues	--

Table 3.4 (Cont'd.)
Classification of Computer-Communications Service Offerings

Interactive	Consumptive
II. Regulation of Affect	
<u>D. Computing</u>	
economic modelling	--
home computing service	--
video games	--
financial management	--
telework	--
extensions of corporate management systems	--
III. Communication/Control	
<u>A. Information Retrieval</u>	
do-it-yourself training (dynamic)	do-it-yourself training (static)
specialized newsletters	specialized newsletters
specialized journals/magazines	specialized journals/magazines
<u>B. Transactions</u>	
electronic checkbook	--
electronic funds transfer	--
electronic credit cards	--
electronic gambling	--
entertainment options	--
- travel, restaurant, hotel reservations	
- theatre/sports tickets	

Table 3.4 (Cont'd.)

Classification of Computer-Communications Service Offerings

Interactive	Consumptive
III. Communication/Control	

B. Transactions (Cont'd.)

electronic shopping	--
book lending	--
book buying	--
inter-library loans	--
used goods trading	--
teletypesetting	--
brokerage services	--
- shopping	
- banking	
- insurance	

C. Messaging

community bulletin board (dynamic)	community bulletin board (static)
electronic mail	--
videotexgram	--
conferencing	--
serendipity machine	--
electronic welcome wagon	--
referenda or quasi-referenda	--
consumer action	--
electronic gossip	--
internal business communication	
involving external access	--
market research	--
complaints	--

Table 3.4 (Cont'd.)
Classification of Computer-Communications Service Offerings

Interactive	Consumptive
III. Communication/Control	
<u>E. Monitoring</u>	
home security	home security (by polling system)
health and safety monitoring	--
energy management	--
remote control of household functions	--
meter reading	meter reading (by polling system)

Note to Table 4

The terms static and dynamic refer to the nature of the content that can be delivered by a particular service. An interactive service, such as traffic analysis, for example, can be made to provide users with customized routings on request. This would be a dynamic service. The same service as consumptive could only provide routings pre-programmed into the system. This would be a static service. In general, dynamic refers to the ability of the user to vary the content and/or the presentation of content while static refers to a fixed content/format which the user cannot influence.

are much "richer" than consumptive systems. This is a conclusion which takes no account of user preferences or of the economics of consumptive versus interactive systems, however. Sixth, on a human capability basis, consumptive services, proportionately, affect cognition relative to the capabilities of regulation of affect and communication/control more than interactive services. Put in different words, consumptive services relate overwhelmingly to amplification of cognition; services which influence regulation of affect and communication/control are overwhelmingly a function of interactive systems.

None of these conclusions are particularly surprising. Nor, by themselves, do they advance us very far. Before any conclusions can be drawn on the superiority of interactive services versus consumptive services, a great deal of further information is required. Specifically, more must be known about consumer preferences; if users do not want the additional services or service capability of interactive systems, then these features of interactive systems will be no more than technological niceties. More must be known about the economics of the different types of system; if consumptive systems are much cheaper than interactive systems, then even if consumers like the extra features offered by interactive systems they may not be willing to buy them. More must be known about the content and form of service offerings, the number of producers, the structure of markets, etc. If interactive services in practice are no different than consumptive services, i.e., if their interactive capability is not used, then there will be no superiority. If different producers are offering consumptive services and interactive services, the two will be competitive; if the same producers offer both, they might well be complementary. And so on.

All of these questions are ones to go on to explore. The listings which have been included in Table 3.3 and Table 3.4 are all services which computer-communications technology makes possible, are all services which in some form are presently available or under consideration in North America and are all services which could, at least collectively, form the basis of a mass market. At present, however, they have not developed to the mass market stage, either individually or collectively. The factors which will determine the

emergence of the mass market and the timing of that emergence are what must still be addressed.

Notes to Chapter Three

1. A closed-user group is a case where some restriction, other than open-market constraints such as price, is placed on access to the service. In other words, conditions of membership in the group are defined to include criteria not within the discretionary control of potential members. Thus, for example, if a legal data base is available only to members of the Canadian Bar Association or its affiliates, such a service would fall within the closed-user group classification.
2. Tydeman, et. al., op. cit., p. 3.
3. The Source Command Guide, Fall/Winter 1983, Source Telecomputing Corp., 1983.
4. This classification was obtained from David Carlyle during a personal interview.
5. See, for example, Tydeman, op. cit.
6. While all of these are theoretically possible, in practice cable systems as presently available in North America do not have two-way capability and satellites, to be used for two-way services, would require an earth station for the user which has both a downlink and an uplink capability.
7. The major implication of this difference is that the response time may be affected. On a polling system, a particular monitor only gets checked once in a cycle and only in a predetermined order within the cycle. Depending on the size of the cycle, i.e., how long the time interval between passes by any particular monitor, a problem may not be identified as quickly as if a message was

immediately sent by the monitor (or a local control unit) as soon as the problem begins. In practice any difference is probably one of seconds and is not likely to be of practical significance.

8. See discussion of this point in Chapter 2.
9. J. Martin, Future Developments in Telecommunications, 2nd edition, (Englewood Cliffs: Prentice-Hall, 1977), pp. 314-316.
10. J. Tydeman, op. cit., pp. 65-69.
11. Ibid., p. 64.
12. Ibid., p. 64.
13. Ibid., p. 64.
14. M. Kochen, "Technology and Communication in the Future", JASIS, 32, 2, March 1981.
15. Ibid., p. 148-149.
16. Ibid., pp. 149-151.
17. Ibid., p. 150.
18. Ibid., p. 150.
19. Ibid., p. 150.
20. Ibid., p. 150.
21. Ibid., p. 151.
22. Ibid., p. 151.

23. For the functional classification, with the exception of "community bulletin boards," Tydeman's listing has been adhered to.

Chapter Four

DEMAND ANALYSIS

The taxonomy of service offerings laid out in Chapter Three represents the potential of the mass market. All of these services and the functions and/or capabilities to which they relate are present or under consideration in North America. But they have not yet developed, in terms of availability, number of users or levels of usage, to the mass market stage.

Ultimately the emergence of the mass market for computer-communications services will depend on both supply side and demand side market influences/characteristics. In this chapter we will examine the demand side of the market.

A Review of Existing Forecasts

Since the late 1970s there have been a number of forecasts of the expected growth of the computer-communications services market or, in the Canadian case, of the videotex market.

In a 1979 study,¹ Hickling-Johnston forecast that by 1985 there would be 350,000 Telidon subscribers in Canada.² By 1991, they estimated this figure would be 1.9 million.³

In a 1980 study,⁴ Michael Tyler forecast that by 1985 there would be between 410,000 and 830,000 subscribers to videotex and videotex-like electronic publishing services in the United States.⁵ Hickling-Johnston forecast a U.S. market size 10 times that of Canada or 3.5 million subscribers by 1985.⁶

Hough and Associates, in a 1980 report,⁷ offers two alternative forecasts of Telidon growth based on two different methodologies.

First, using what is called a historical analogy method, Hough estimates between 85,000 and 140,000 Telidon terminals in Canada by 1986.⁸ Second, using an income-expenditure approach, it is estimated that "the number of potential videotex households that might reasonably be expected in 1985...is only 26,000."⁹ This figure is, however, relatively sensitive to the user cost of Telidon. The figure just quoted assumes a monthly user cost of \$25. If the cost were to be \$13, however, the potential market size increases to 650,000 households according to Hough's estimates.¹⁰ By making assumptions regarding adoption rates within the potential subscriber body, Hough concludes, according to his income-expenditure method, that by 1985, actual Telidon subscribers in Canada will number between 13,000 and 150,000, depending on the monthly cost of the service.¹¹

A 1979 report by Tamec Inc.¹² forecasts that by 1985 there will be between 1,489,000 videotex households in Canada (pessimistic scenario) and 2,190,000 videotex households in Canada (optimistic scenario). These figures are predicted to be 4,524,000 and 6,536,000 respectively by 1990.¹³

All of these estimates of Telidon or videotex market growth are concerned only with videotex rather than the full range of computer-communications services and they are all concerned strictly with households rather than the full range of potential users which would also include government and business.

In spite of this, one of the immediately most striking conclusions to be reached is that they all overestimate the market in reality, including Hough's lower limit estimate using the income-expenditure approach. While 1985 (or 1986 for Hough's historical analogy estimates) is not yet here, the size of the market attained by videotex to date makes it virtually impossible that any of the 1985 projections will be met.

A detailed review of the basis on which these various forecasts were made will not be offered here. Some of these studies will be referred to in subsequent discussions when it is relevant to do so. For the moment, however, only one general observation regarding all of these forecasts will be made. That observation is that none of them uses a method which takes any account of the attributes or

characteristics of videotex service. Tyler comes closest, perhaps, insofar as his estimates derive from an initial estimation of the size of the personal computer market and the assumption that it is the personal computer market which will drive the videotex market. Tyler also includes videotex-like services, which, at least partially, extends his definition of the market towards the full range of household computer-communications services. But it still stops short of the total market as defined here.

Because these forecasts do not take account of the characteristics of the service, they can be criticized or questioned on several grounds:

1. Insofar as they are videotex specific, the lack of consideration of the distinguishing characteristics of videotex versus other computer-communications services means that the estimates make no allowance for the possible substitution of other computer-communications services for videotex. Tyler's estimates are the least objectionable on these grounds.
2. Insofar as they are household-specific, the lack of consideration of distinguishing characteristics of household services versus business or government services means that the estimates make no allowance for the potential complementarity amongst these three audience groups.
3. Insofar as they take no account of the distinguishing characteristics of videotex (or videotex-like) services as computer-communications services, they fail to take account of either potential substitution effects or potential complementarity effects between computer-communications services and non-computer-communications alternatives for delivering the same or similar end results to consumers.

It is extremely important to realize that the listing of service offerings developed in the taxonomy presented in Chapter Three presents little that is new in the sense that there is almost nothing in the list which cannot be provided in some fashion without using either computers and/or electronic communications. Computer-communications applications may be superior to their alternatives for various reasons but the services themselves, in a generic sense, are not unique.

What distinguishes computer-communications services from other technologies, both non-electronic products such as print publications or other electronic technologies such as commercial television or videodisc, are the particular characteristics or attributes of the one technology versus the others. Equally important will be users' reactions to these characteristics. The taste, preferences and attitudes of potential users will determine the extent to which the attributes of computer-communications services give rise to actual usage.

Recognition of the fact that the characteristics of computer-communications services coupled with consumer reaction to those characteristics will define the market for computer-communications services leads to three conclusions:

1. to evaluate the potential demand for computer-communications services requires an understanding of the characteristics of both computer-communications services and non-computer communications services;
2. to evaluate the potential demand for computer-communications services requires an understanding of consumer reaction to the characteristics of computer-communications services in contrast to non-computer-communications services, including the level of satisfaction (or dissatisfaction) with present services; and
3. the relationship between computer-communications services and non-computer-communications services may be substitutive (what is more commonly referred to as competitive) or complementary.

These represent the issues on the demand side of the market to go on to explore in the balance of this chapter. Supply side considerations will be discussed in Chapter Five.

Demand Models

The standard economic paradigm of demand posits a relationship between the demand for a product and a) the price of the product b) the price of competing or substitute products (or, alternatively, of complementary products) c) income levels and d) tastes.

While this paradigm has great utility for the analysis of demand for established goods, when one is dealing with a new good, it is less satisfactory. As noted by Lancaster,

Traditional demand theory has never been able to handle satisfactorily the problem of introducing new goods. The consumer's preference map is given in terms of the original set of goods, and the new good requires that this be thrown away and replaced by a preference map based on the new set of goods. All the information concerning preferences on the original set of goods is discarded in the process.¹⁴

The problem then is that, for purposes of assessing the demand for the new product, a great deal of relevant information is excluded from the analysis.

If the new good is of "a kind that possesses the same characteristics as the old, but in different proportions,"¹⁵ then a demand model that is different from the standard demand paradigm can be used and, at least theoretically, overcomes this problem. This is a demand model based on a characteristics analysis.¹⁶

The preceeding discussion in this chapter of the relevance of the characteristics of computer-communications services versus the output or end results of the service in a generic sense suggests that such a model is likely to be very useful for an analysis of the demand for computer-communications services. As Lancaster notes, "Almost all new goods have characteristics or perform functions similar to those of existing goods, but differently combined."¹⁷ Computer-communications services appear to fit this description very nicely.

The model which Lancaster develops assumes that "the consumer's demand for goods arises from the fact that goods are required to obtain characteristics and is a derived demand."¹⁸ Characteristics typically will be joint for any particular good, i.e., there will typically be a bundle of characteristics associated with a particular good. This means that "a single good may have more than one characteristic, and a single characteristic may be obtainable from more than one good."¹⁹ It also means that "goods which share a common characteristic may have their other characteristics qualitatively different, or they may give the same characteristics but in a quantitatively different combination."²⁰ Finally, it will also be the case that "goods in combination may possess characteristics different from those pertaining to the goods separately."²¹

From this notion of the characteristics of goods defining the demand for goods, it is possible to derive the notion of a "consumption technology"²² (consumption activities which produce various combinations of characteristics) and from this to think in terms of consumption efficiency, a notion which conventional demand theory does not include.

Introducing the notion of consumption efficiency into demand theory changes the nature of consumer choice into a two-part decision: first, consumers will make an efficiency choice, meaning that combinations of goods which do not achieve maximum attainable combinations of characteristics within some defined budget constraint, will be rejected; second, consumers will make a private choice, based on preferences, of the exact combination of goods to be consumed from amongst the efficient possibilities, i.e., from amongst those combinations consistent with maximization of characteristics.

Consumers may act inefficiently in using any given consumption technology, due to ignorance or mismanagement.²³ Therefore, the actual choice of goods made by consumers does not necessarily reveal their preferences for characteristics (as implicitly assumed by conventional demand theory); it may represent an inefficient choice.

When a new good is introduced, assuming that it possesses characteristics already available but in different combinations or proportions than existing goods, this means, in effect, a change in the consumption technology. As is well known to be the case for a change in production technology, a change in consumption technology will be adopted, i.e., the good will be used, only if, assuming no ignorance or mismanagement, its price makes it efficient to use. In other words, too high a relative price for a new good may prevent a market for the good from developing. If other goods or combinations of other goods can provide the same characteristics as the new good and do so at a lower price, rational consumers will not buy the new good. Purely on efficiency grounds, assuming consumers act efficiently, a new good may fail to penetrate the market, beyond some period of experimentation with the good, because its price is too high; this is before the question of consumer preferences is even considered. If the price of the good is low enough to put the good within the set of efficient combinations of

characteristics, then preferences will determine how much of the good is bought within a given budget constraint. Thus a low price, in relative terms, does not guarantee a market. Consumers' attitudes, level of satisfaction with existing goods, and the specific characteristics offered by the new good compared to the old will all influence consumers' preferences.

Applying the Lancaster Model

To fully apply the Lancaster demand model to the case of computer-communications services would require

1. identifying the relevant characteristics of computer-communications services;
2. identifying the relevant characteristics of alternatives to computer-communications services, both individual products and combinations of products; and
3. assessing consumer preferences in relation to 1 and 2.

The task would, in fact, be even more complicated than this suggests, given

1. the large heterogeneity within the computer-communications services category, where different characteristics (or different proportions of characteristics) will be offered by different technologies and/or by different functional applications of the technologies;
2. the large range of products which would need to be considered as alternatives for delivering combinations of various characteristics, a task which is compounded by having to consider combinations of products, rather than just individual products, capable of delivering characteristics combinations;
3. the possibility, some examples of which are already well established in the market, that combinations of computer-communications services and non-computer-communications services may represent alternative combinations of products for achieving certain characteristics, thus further enlarging the range of alternatives to be considered. In other words, we cannot simply treat non-computer-communications services as substitute technologies to computer-communications services. In terms of

characteristics, combinations of the two may be an efficient way of delivering a set of desired characteristics, i.e., the technologies may be complementary in the context of certain specific applications/uses;

4. the possibility of complementarities within the computer-communications services market, i.e., different computer-communications technologies/services may not only be competitive with one another but, also, may be complementary; and
5. the difficulty of assessing consumer preferences.

Taking all of these considerations together, it is beyond the scope of this present exercise to attempt a detailed application of the Lancaster demand model. Even if the task were considered to be within the scope of this paper, the necessary information on the entire range of products and consumer preferences are, in many cases, non-existent. This is, in fact, an area of further research which could be extremely valuable.

While a detailed application of the Lancaster model is not possible, the model nonetheless provides a general framework for our analysis from which a number of valuable insights can be gained. More significantly, as a framework, it provides a basis for organizing the information that is available regarding the demand for computer-communications services.

Relevant Characteristics

The functional classification of services set out in the taxonomy developed in Chapter Three represents a first-level differentiation of the computer-communications market that allows an initial identification of some common characteristics. Further levels of differentiation are possible down to the level of the individual listings included in Table 3.4. For the moment, however, this first-level differentiation will be used in order to keep the analysis within manageable proportions. For the moment also, the "capabilities" classification used in Table 3.4 will be ignored. The classification of "interactive" versus "consumptive" services shown in Table 3.4 will be used.

There is, in the literature, a number of discussions of "important"

characteristics of computer-communications services. Tydeman, for example, makes mention of content, convenience, ease of use, reliability and cost.²⁴ Tydeman also notes the importance of certain technical characteristics of the system such as transmission speed, error rate, graphic capabilities, terminal characteristics, distribution mode, and capacity.²⁵

The Hickling-Johnston report notes, with respect to Telidon, that "the network base, the interactive capability and the colour graphics define the character of the Telidon medium."²⁶ Hickling-Johnston stress the networking characteristic of Telidon and the importance of content, where the content or information that is considered to be most important is that "where value can be placed on current information."²⁷ Hickling-Johnston also notes, that "the information retrieval capability of Telidon-like products has, in our view, been over-emphasized.... In most of these cases, the information is reasonably readily attainable through other sources.... It is less than clear that serviceware which simply mechanizes what is now done offers high potential for the consumers."²⁸

OCLC, reporting on its Channel 2000 project,²⁹ notes several characteristics of viewdata, i.e., videotex systems. These include: improved access to information; time savings in accessing information; convenience; locational independence; better use of discretionary time; more informed decision making; personalized service; ease of use; and "a reasonable price against competing systems."³⁰ The OCLC report also notes the importance of viewdata equipment being "nonintrusive and compatible with existing life-styles."³¹ Overall, the evaluation of the test results emphasized two primary considerations: ease of use and low cost.³² Reliability was identified by users as an important feature, in view of technical problems experienced by users.³³ The OCLC report also notes that an important characteristic of computer systems is that "with their capabilities for rapid update and communication of information, they are ideal for serving topical, timely information needs."³⁴

In various of the interviews conducted as part of this present study, the importance of computer-communications systems for the delivery of timely information was stressed.³⁵ Representatives of the

Financial Post cited several important characteristics of computer-communications services including timeliness. The others were time, content, convenience, cost and immediacy.³⁶ Rogers Cablesystems noted that, based on the experience of trials conducted in Portland Oregon, consumers "want something that is real in value terms, simple in operation and straightforward as to packaging, price, etc."³⁷ David Carlyle, speaking of videotex systems, stressed the advantage of the simplicity of the system. Time Inc. placed a great deal of stress on response time,³⁸ noting that available evidence indicates that a ten second response time is totally unacceptable to end users. A five second response has been found to be still somewhat questionable. A two and a half second response time is finally the one which it can be said confidently users will accept.³⁹ Time Inc. also stressed the importance of the ability to customize/personalize content with two-way videotex or what, in the taxonomy of Chapter Three, was labelled more generally as interactive services. This, it was noted by Time, represents a significant difference between two-way videotex and teletext. The latter can personalize only in the most general terms of letting the user select what he/she will receive or, in the case of multiple channel service, by particularizing the services offered on each channel. Thus, for example, there could be a news/weather channel, a sports channel, a consumer product channel, etc. But the ability to call information up on demand and for the user to exercise the most complete control over content is most fully realized with an interactive system.⁴⁰

The notion that the value of content will be the key to market acceptance was stressed in many of the interviews conducted.⁴¹ Both in industry circles and in the literature, the lack of development of appropriate applications is generally perceived to be the greatest weakness of Telidon development in Canada to date. This is also a fundamental conclusion which emerges from the Lancaster demand framework with its emphasis on the characteristics offered by products versus products as ends in themselves.

This discussion could go on, continuing to identify characteristics of computer-communications systems in general or of videotex systems in particular, which are perceived, or have been demonstrated, to be

important to consumer adoption or use of services. The major ones have, however, been identified in the preceeding discussion. These are (not in any order of priority):

1. speed of access
2. timeliness of information
3. convenience
4. ease of use
5. cost
6. content
7. value of content
8. reliability
9. error rate
10. graphic capability
11. colour capability
12. capacity
13. networking
14. interactivity (for other than consumptive systems)
15. personalized/customized service
16. more informed decision making
17. immediacy
18. simplicity

When one reviews this listing, it becomes apparent that there are two distinguishable types of characteristics being mixed together: output characteristics which are attributes which are desired in their own right and are characteristics derived from the services, and technical characteristics which are attributes which improve the quality of the product or the product characteristics but which are not output characteristics in their own right. Table 4.1 duplicates the list provided above but divides the items shown there into these two categories of output characteristics and technical characteristics. Cost is included under technical characteristics because cost, or, in conventional terms, price, is a characteristic which will determine the available combinations of output characteristics attainable (for a given budget constraint) and will influence the user's preference or choice between different available characteristics sets but is not, itself, an output characteristic.

Table 4.1
 Characteristics of Computer-Communications Services
 Identified from Literature/Interviews

<u>Output Characteristics</u>	<u>Technical Characteristics</u>
content	ease of use
value of content; timeliness;	cost
immediacy	speed of access
networking	convenience
interactivity (except for	reliability
consumptive systems)	error rate
personalized/customized service	graphics
more informed decision making	colour
non-intrusive	capability
	simplicity of system

The technical characteristics it is important to realize, while distinguishable from the output characteristics, may heavily influence the presence of output characteristics, either in absolute or relative terms. In other words, while the two are distinguishable, they are not independent. Convenience and speed of access, for example, as technical characteristics, may heavily influence leisure-time consumption where leisure time is an output characteristic.

This latter example illustrates another important point about Table 4.1. Table 4.1 is a list we have compiled based on the literature and a series of interviews conducted as part of this study. Both of these sources are dominated by persons involved in or with the computer-communications market. It is not unexpected that these sources would have a bias towards technical characteristics, and output characteristics which are somewhat ubiquitous in the sense that they are not specific to any functional application, nor are they specific to any particular service application or to the commonplace needs of consumers/users.⁴²

If we think about output characteristics more carefully, there are several characteristics in addition to those in Table 4.1 which can be identified as relevant, either in general or with respect to specific

functions. Table 4.2 presents an illustrative list of these output characteristics together with those in Table 4.1, broken down between general and function-specific cases. It is important to realize not only that Table 4.2 is still not a definitive listing and also that the output characteristics are, even in the function-specific cases, still at a relatively high level of generality. This is because the five-way functional classification is, itself, at a relatively high level of generality. To overcome this would require a more disaggregated classification, ultimately ending up at the level of individual service offerings.

Table 4.3 draws on Larratt⁴³ to present an illustrative list of alternatives for computer-communications services, broken down according to the five-way functional classification scheme introduced in Chapter 3. Most of the listings in Table 4.3 are taken directly from Larratt. Because Larratt is considering Telidon versus all computer-communications systems, his original listings include some computer-communications alternatives to Telidon. Because we are considering, for now at least, all computer-communications services, these intra-computer-communications alternatives have been dropped in Table 4.3. Larratt also considers only shopping alternatives under transactions, hence some additional items have been added, and he does not consider non-computer-communications alternatives to monitoring or computing, so some possibilities have been added for these two functional categories. As in the case of Table 4.2, it is emphasized that Table 4.3 is not a definitive or exhaustive listing of alternatives. It does, however, provide some useful illustrations of what some of the alternatives may be.

With regard to the types of alternatives shown in Table 4.3 it is important to realize that these alternatives are all existing goods or services. The characteristics of these existing goods relative to new computer-communications services will determine the level of market acceptance of the computer-communications services. In this regard, it is relevant to emphasize that this relative comparison may not be based only on the objective characteristics of goods. Consumers' attitudes and perceived "needs" will greatly influence their preference function. If a technology offers superior characteristics which are, however,

Table 4.2
Illustrative List of Output Characteristics

<u>General</u>	<u>Information Retrieval</u>	<u>Transactions</u>	<u>Messaging</u>	<u>Computing</u>	<u>Monitoring</u>
- value of content	- information for a	- acquisition of	- inter-personal	- management	- safety
- networking	variety of specific	goods	communication	of personal	- time
- interactivity	needs	- discharge of	- political	affairs	saving
- customized service	- health maintenance	financial obli-	participation	- discharge of	- comfort
- more informed	- personal well-being	gations	- community	job obli-	- peace of
decision making	- learning	- management of	participation	gations	mind
- non-intrusive	- vocational needs	personal finan-	- business		
- leisure (time savings)	- well informed	cial affairs	correspondence		
- recreation	- management of per-	- specialized			
- entertainment	sonal affairs	buying needs			
	- political participation				

undesired, the good will not be purchased. If consumers are perfectly satisfied or even relatively satisfied with existing goods, they may see no reason to change. Levels of satisfaction or dissatisfaction with existing goods will in fact be a major determinant of the success of new products in the market. In this sense, present satisfaction may act as a kind of barrier to entry for new goods. So too may attitudes to "high tech" goods or uncertainty about performance or the characteristics of new computer-communications services.

A careful examination of Table 4.3 also reveals that while all of the alternatives listed could be substitutes for computer-communications services some of them might also be complementary. Stand-alone personal computers provide a good example of this.

Hickling-Johnston, writing in 1979, viewed the personal computer as directly competitive with Telidon. They attached particular importance to the then just announced entry of Texas Instruments into the personal computer market:

Telidon's ability to compete with this new generation of the personal computer will hinge on its ability to compete head on with Texas Instruments.⁴⁴

This example (i.e., the Texas Instruments personal computer) is somewhat ironic given Texas Instrument's withdrawal from the personal computer market in 1983. This fact aside, however, the general proposition of a computer-communications system (Telidon) in head-on competition with personal computers is the relevant point in quoting this example.

The Tyler forecast of demand for videotex and videotex-like systems, referred to at the beginning of this chapter, provides a good illustration of the alternative view of the personal computer/computer-communications services relationship. Tyler, it will be recalled from the earlier discussion, bases his projection of the growth of the videotex market on the projected growth of the personal computer market. In other words, he sees the two, at least with respect to household penetration and use, as complementary. Basically, his argument is that personal computers, by themselves, have a limited set of uses, for the average household user at least. Thus, the household which acquires a personal computer will quickly find that it is not being fully utilized

Table 4.3
Alternatives to Computer-Communications Services
by Functional Classification

<u>Information Retrieval</u>	<u>Transactions</u>	<u>Messaging</u>	<u>Computing</u>	<u>Monitoring</u>
Newspapers	Store purchases	Telephone	Stand-alone computer	Remote control devices
Magazines	Direct mail	Mail	Pocket calculator	In-house smoke alarms
Books	Telephone shopping	Telex	Word processor	Bell-type burglar
Television: cable/broadcast	In-person banking	Mailgram	Typewriter	alarms
Mail	Manual bill paying	Telegram	Manual calculation	"Programmable" thermo-
VCR's		Travel	Software manuals	stats
Videodisc		Couriers	Video game machines	
Reference libraries			Tape or floppy disc	
Friends			mounted software/	
Associates			data	
Professionals				
Personal Programmable				
Computer				
Yellow Pages				
Business Directories				

Source: For information retrieval, messaging and part of transactions, R. Larratt, op. cit., pp. 67-69.

and/or that the range of services it can provide can be significantly broadened/enhanced by equipping it with a communication capability and tying in to various computer-communications services. In addition, the cost of entering the computer-communications services field will have been significantly reduced because the terminal equipment (with perhaps the exception of a modem) will already be owned. Thus, as Larratt notes, "connection to data bases and electronic catalogues will have minimal add-on cost."⁴⁵

One can see the personal computer and various computer-communications services complementing one another in various ways: by augmenting the range of services for which the personal computer can be used; by providing a downloading capability for a computer-communications service to permit local processing, thereby reducing connect time charges or increasing the ease of use or convenience of the computer-communications service; by creating an electronic delivery system option for the marketing/purchase of computer software; and so on. We will come back to the issue of personal computers later in this chapter to consider more fully the relative merits of the personal computer as a standard terminal device for computer-communications services. For now, the above discussion should suffice to illustrate the general point of potential complementarity.

Table 4.4 describes a number of potential complementarities between computer-communications services and non-computer-communications services. Again, this is an illustrative listing, not an exhaustive or definitive listing. Again, however, it serves to indicate the range of complementary options which might exist.

With respect to Table 4.4, it should be noted that, as a general proposition, any information acquired through a computer-communications service may be complementary to some other communication activity. Table 4.4 concentrates primarily on complementarities with other information transfer modes and hence, does not include examples of complementarities with other more general consumption activities. Possible examples of such complementarities would include such things as the use of an on-line cookbook in preparing a meal; the use of weather information by a farmer to schedule planting activity; the use

Table 4.4
Complementarity Options for Alternative Technologies

- data base connection to personal computer
 - mail delivery of library books borrowed on-line
 - delivery (mail or transport) of merchandise borrowed on-line
 - downloading of software to personal computer
 - computer to computer "conversations"
 - in-person pick-up of items ordered on-line
 - telephone or mail ordering of products described on-line
 - purchase of goods after comparison shopping on-line
 - telephone response to polling questions delivered on-line
 - off-line processing of information delivered on-line
 - mail forwarding of messages to parties not accessible on-line
 - stock transactions off-line based on on-line stock/financial information
-

of political profile information as an aid in voting; and so on. In all of these cases, the computer-communications service is serving as a substitute for some other information transfer technology but is complementing some other consumption activity to which the information is an input.

Table 4.4 also illustrates the point emphasized in the Lancaster demand model that the characteristics possessed by a combination of products will differ, in kind or degree, from any of the products taken individually. This point is immediately obvious with even a cursory consideration of the characteristics of the listings included in Table 4.4 versus the constituent parts of the combinations shown. It must be emphasized, however, that this does not mean that the characteristics of the combined package necessarily represent a superior combination in efficiency terms.

Table 4.5 completes the discussion of characteristics and competing/complementary technologies by considering complementarities within the class of computer-communications services. Table 4.5 is expressed in relatively general terms in terms of functional categories with a specific example provided to illustrate the

Table 4.5
Complementarities Amongst Computer-Communications Services

1. Information retrieval and transactions
 - e.g. the use of comparison shopping results to make an on-line purchase
 2. Information retrieval and messaging
 - e.g. passing on, via electronic messaging, information received on-line
 3. Transactions and messaging
 - e.g. making an inquiry to your bank regarding the balance shown for your account
 4. Information retrieval and computing
 - e.g. on-line processing of information obtained on-line
 5. Information retrieval and monitoring
 - e.g. access to an emergency health procedures data base triggered by a health monitoring system
 6. Transactions and monitoring
 - e.g. automatic ordering of heating fuel based on readings from an energy monitoring system.
-

complementarity. It should be emphasized that in cases where different system operators provide individual services, some of these complementary packages might be harder to realize, which in itself would become of the characteristics of the combined package. Even without different system operators, to realize some of these packages might require the further addition of a local computer and a downloading capability on the service itself.

The taxonomy developed in Chapter Three contained a capabilities classification in addition to a functional classification. Specifically, services were classified according to three capabilities: amplification of cognition, regulation of affect and communication/control. Each of these capabilities may be viewed, in the content of the demand model of this chapter, as representing a combination of characteristics similar to those shown in Table 4.2. For simplicity, no separate listing of characteristics related to these

capabilities will be offered.

While the preceeding discussion of characteristics and substitute and complementary technologies has been illustrative rather than definitive, it is sufficient for us to proceed to analyze the implications of the discussion in terms of the Lancaster demand model.

Cost Considerations

The cost of a product, i.e., the price, enters the model in terms of defining maximum attainable combinations of characteristics, having specified the characteristics possessed by each product under consideration. When a new product is offered to the market, its consideration for purchase will be based both on the characteristics possessed by the goods, the proportions in which the characteristics are present and how much of the characteristics can be secured, which will be a function of the price of the product for a given income or budget constraint. The higher the price of a product, all other things equal, the smaller the level of characteristics that can be obtained and the weaker the new product will be as a substitute for existing products in efficiency terms.

For computer-communications services there are several elements of cost which must be considered and there is an important distinction to be made between first-time entry to the market versus the addition of an extra service by a consumer who is already in the market. There is also an important distinction to be made between "cash-costs", i.e. payments made to other parties, and implicit costs, such things as the time required to use the service, the time and effort of learning to use the equipment and the service, and so on. These implicit costs may be very important. The following discussion will focus on cash-costs but the potential importance of implicit costs should not be lost sight of. If high enough, the implicit costs could represent an effective barrier to entry.

The cash-cost elements involved in computer-communications services are:

1. the cost of hardware
 2. the cost of the service
- and

3. the communications cost.

The hardware cost will involve the cost of a display unit, a decoder, a communication box and a keyboard or keypad. The display unit cost may be negligible if an existing TV set is used for this purpose. In this case, the cost will be only an opportunity cost of lost television viewing time. This may not be insignificant, however, given different preference functions of family members. Hence it is not unreasonable to expect that some users, at least, may want a dedicated display unit, either a second television set or some other form of monitor. It is noteworthy that, to the extent that many households may already have more than one TV, this may largely eliminate this problem.⁴⁶ It is also important to realize, however, that the display capabilities of most colour television sets may not be suitable for many computer-communications services. The display unit cost will be a start-up cost only. The decoder, communication box and keyboard/keypad may or may not be a one time start up cost, depending on whether the system operator packages the service so as to require a dedicated terminal device. If this is the case, then the cost will be attached to any service add-on (except those purchased from the same vendor), not just to the first time entry. This creates a strong argument, from an overall market development perspective versus the perspective of an individual service provider, in favour of standardization of terminal equipment. This has been true for some time for ASCII based services but not for videotex/teletext services. The adoption of the NAPLPS standard for videotex, which has now been accepted as the industry standard, should partially overcome this problem. System operators can still require dedicated terminals through other means, however, and, in itself, NAPLPS does not make standard ASCII terminals compatible with videotex terminals.

It is a very important point to note that, if and when terminal devices for the computer-communications mass market converge on the personal computer, then the terminal cost and, perhaps, the display unit cost,⁴⁷ will disappear or at least will be reduced in importance, in terms of the start-up (or add-on) costs of computer-communications services. They will disappear if the decision to buy the personal computer is justified independent of the value of adopting computer-

communications services. In this case the computer-communications services will be add-ons which, at most and for the first time only, will involve the cost of a communications modem and either a hardware peripheral for certain production technologies like videotex or software which serves the same purpose. Personal computers could, however, ultimately have both of these features built in. Already there is a trend to equip personal computers with a communication capability. For the case where the purchase of the computer is independent of the adoption of computer-communications services, then the latter is a complementary technology which becomes an add-on to the characteristics set under consideration. Where the purchase decision for the computer and for the services are interdependent, then one begins with a complementary product bundle, the full cost of which must be taken into consideration when considering efficient consumption combinations. The bundle will, however, be an enhanced one in this case, offering characteristics for the combination greater than for either of the parts taken individually. Thus the hardware cost will in some sense be spread out, making the impact on computer-communications services less than if they were considered alone. All of this assumes that the personal computer is compatible or can be made compatible with the service in question.

It is possible to speculate that one of the reasons why the forecasts of Telidon adoption referenced at the beginning of this chapter have been so far beyond actual adoption is, in part, explained by the hardware costs, seen in the context of our model. First, Telidon terminals have been dedicated units up to this point, in that users require the terminal/decoder of a particular service to receive that service. Second, they have been "dumb" terminals in the sense that, while they have a processing capability or a CPU (central processing unit), it is of limited capability and, most importantly, it is "hidden" from the user, i.e., it cannot be programmed by the user. Third, they have been relatively expensive. A Telidon terminal, which lacks the additional capability of a personal computer, still sells for a price which is at or above the price of many personal computers. Prices are expected to fall but, at the same time, personal computer prices are expected to also fall.

The important point to recognize is that a dedicated terminal unit offers far more limited characteristics than a universal unit and a dumb terminal more limited characteristics than an intelligent, programmable terminal. The combination of a dedicated dumb terminal in comparison with a standardized, intelligent, programmable terminal simply cannot win unless its price is significantly lower. But the price for a Telidon terminal has not been significantly lower. It is not likely sheer coincidence that the two largest "general public" computer-communications services, The Source and CompuServe, with over 50,000 and 100,000 subscribers respectively, are services which are compatible with any ASCII terminal device and have been able to take immediate advantage of the recent growth in personal computer sales in North America.⁴⁸

The price of computer-communications services is the second component of cash-costs identified. There are a variety of pricing schemes theoretically possible for computer-communications services. First, price may be of a flat rate subscription variety, with unlimited usage. Second, it may be of a time sensitive variety (generally referred to as connect-time charges) with or without a minimum charge attached. Third, it may be both a subscription fee plus connect charge system. Fourth, it may have a subscription fee with unlimited usage for some "core" of services and add-on charges for either individual items or for further layers or tiers of service. Fifth, it may be wholly usage-sensitive based either on time, volume, content or combinations of these.

Examples of all of these options are to be found in the market at present. There are a number of specialized on-line data base services which use usage-sensitive pricing. A new service offering by the Financial Post introduced in 1984 is an example of this, incorporating a combination of time and content charges.⁴⁹ The NABU Network is an example of a tiered subscription-based service.⁵⁰ There is a core service to which users must subscribe for a fixed monthly fee and for which usage is unlimited. A number of horizontal tiers⁵¹ can then be added, each on the same basis, i.e., fixed fee and unlimited usage. Viewtron, the Knight Ridder videotex service in Florida, is a flat rate subscription service with unlimited usage. Compu Serve and The Source

are both connect-time charge systems. The Source has a few items with add-on charges. Compu Serve offers an Executive Information Service (versus their more general Consumer Information Service) where both connect-time charges and content charges apply.⁵² Both The Source and Compu Serve have a minimum monthly billing i.e., a minimum charge levied against subscribers whose connect time charges are less than the minimum.

The particular pricing scheme attached to a service will be one of the characteristics of the service which will differentiate the product and influence consumers' purchases. There seems to be a general consensus amongst industry representatives in Canada that, for households, a flat rate, subscription based system offering at least some core of services with unlimited usage, is, or will be, the preferred pricing system. This opinion was expressed by Rogers Cablesystems, Infomart, David Carlyle, NABU and others.⁵³ How attractive this characteristic is will depend in part on actual usage patterns. For major users or for users of particular items which involve time-intensive use (e.g. games), such a pricing scheme is very likely to save them money over a usage-sensitive scheme. For light users or for users of "quick consumption" items, i.e., items which take little time such as, for example, checking the weather, this may not be true. The major determinant of the advantages of this type of approach to users will, however, be the level of the fixed subscription fee. The higher it is the more likely that "average" and "below average" users will prefer some usage-sensitive scheme, although the particular form of sensitivity charging and the level of usage charges will clearly influence this trade-off. Nonetheless it would appear to be implicit in the argument that flat rate fees are preferred by subscribers that the level of fees is also relatively low. Two other characteristics of a non-usage-sensitive pricing scheme, i.e., a flat rate subscription fee scheme, are first, that it eliminates uncertainty over cost for the user, a characteristic consumers might well value even if they do not always use the equivalent of the fee and second, that it allows/encourages browsing, another characteristic which some users at least might value positively.

The notion that mass market services must be cheap, i.e., that the level of prices must be low, is a conclusion held by many industry

observers/participants. Indeed, as noted in Chapter Two, some observers include low prices as part of their definition of the mass market. The demand model employed here questions this assertion, however, as a necessary condition for the mass market.

It is undoubtedly true that the lower the price of a product, the more affordable it will be to more people and/or the more of the product the same people will be able to consume, for any given budget constraint. Affordability is, however, a slightly different issue which will be examined just below. For a given level of income, as long as prices are consistent with that level of income, the prices which consumers will accept will depend on the characteristics of the product and how much those characteristics would cost if obtained from alternative products. A corollary of this conclusion is that the broader the range and depth of characteristics offered by a product, the greater will be the substitution possibilities and, for a given set of prices for substitute products, the greater will be the proportion of a user's income which may be devoted to computer-communications services and the higher the price which users may be prepared to pay. This is not an argument for an upward sloping demand curve. What must be remembered is that a computer-communications system encompasses both a bundle of products (services) and a bundle of characteristics. The substitution possibilities may, depending on the specific service offerings of the system, extend across a number of budget categories for individuals or households,⁵⁴ not to mention businesses, which, it is important to remember, are included in our definition of the mass market.

None of this denies the proposition that a mass market will be more likely to emerge the lower the price of computer-communications services. What it does do, however, is underline the conclusion that the value of the services, expressed in our model in terms of desirable characteristics, will be the ultimate determinant of acceptable price levels, for a given level of income. When we recognize the full range of substitution possibilities, the enhanced characteristics bundles arising out of complementarities where these are found, and the need to consider the cost of alternative products capable of delivering the same range/proportions of characteristics, it is not as clear that low prices

are a necessary condition for a mass market to be realized.

The third cost component identified earlier was communications cost. Major discussion of this will be left to Chapter Five, where carrier or distribution alternatives will be examined. For now only a few general observations will be made:

1. communications costs may be a significant operating cost element where communications are by telephone and, from the users perspective, are not strictly local;
2. packet-switched data networks make the long distance communications costs implications for telephone based systems relatively minor for users with local access to a packet-switched network;
3. communications costs may bias user access to a telephone based computer-communications market towards residents of major urban centres (which are most likely to provide local access to the packet-switched network) and, on the producer side, towards local service providers versus national;
4. the flat rate, unlimited usage, local calling price structure now in place for telephone service in Canada encourages development of the computer-communications services market, all other things equal; by the same token, the introduction of local measured service (LMS) could discourage development, all other things equal;
5. present cable system technology makes telephone based systems the only present viable alternative to consider for fully interactive services. Thus points 1-4 represent legitimate concerns over the near- to medium-term for Canada.

Other Characteristics

Within the framework of our model, if we turn to examine some of the other characteristics of computer-communications services identified in Tables 4.1 and 4.2, some further interesting conclusions emerge.

1. The "personalized/customized service" characteristic is one which stands out as being potentially very important. The ability to tailor or target content to specific audience groups is emerging as the dominant marketing focus of computer-communications.

systems. Sometimes referred to as narrowcasting,⁵⁵ this approach has long been the basis of business-oriented services and is now regarded as the most promising approach for "general public" oriented services as well.⁵⁶ The ability to focus content is greatest with interactive services but is also possible, albeit to a lesser degree, with consumptive services, whether delivered via a two-way or a one-way distribution system. Some interactive services have even been designed to deliver personalized service at an individual level, rather than merely a group level.⁵⁷ The desire for customized service is regarded by some observers as a general societal phenomenon which technological change is increasingly making possible. Toffler, for example, maintains that "...the essence of Third Wave manufacture is the short run of partially or completely customized products... Autos, T-shirts, and many other products represent a halfway stage between mass and de-massified manufacture. The step beyond this, of course, is complete customization—the actual manufacture of one-of-a kind products. And that is clearly the direction in which we are heading: products custom-cut for individual users."⁵⁸ Toffler is looking at manufacturing, but the same observation can be made about a variety of products. Television, for example, with the multi-channel capability created by cable television technology, is becoming increasingly specialized with separate channels devoted to news, sports, movies, etc. Movie theatres are following a similar trend; individual viewing rooms are becoming smaller and the number of viewing rooms i.e., movie selections per theatre, is quite commonly more than one and may be as high as twenty or more. Computer-communications services have a tremendous technological ability for customization and the evidence from various sources suggests this to be an extremely important characteristic to exploit re consumer adoption. As noted in Chapter Two, a mass market is not necessarily defined by mass production; indeed, for computer-communications services, just the reverse may be true.

2. Graphics and colour capability are distinguishing characteristics between various computer-communications services but their

value is open to question. Both of these characteristics have been particularly stressed for videotex systems and, in particular, for Telidon. But for straight textual material which represents most of what is contained in information data bases, it is not clear that these characteristics are important.⁵⁹ It is noteworthy that CompuServe and The Source have, up to now, gotten by without either characteristic.⁶⁰ As David Carlyle has noted, "Many people argue that users do not need graphics and colour. This may in fact be true. The point is, from a marketing stance, it is the IP who needs it because the graphics and colour will permit more effective selling."⁶¹ This introduces a whole new line of thought into our analysis: advertising. For certain transactions services, graphics and colour may be very desirable attributes from the user's perspective and for direct selling activities, i.e., transactions services, advertising is expected and, in a generic sense at least, necessary. Beyond this, however, it is questionable whether the colour and graphics capability of computer-communications services at present, including Telidon, which is regarded as the most superior system in this regard, is capable of effectively competing with conventional advertising media such as TV and magazines. More importantly, the essence of computer-communications services is to allow the end user to see what they want, when they want it. By definition this does not permit hard selling or pressure to be exerted on the end user. Even given some trade-off with price, the user is not likely to be willing to accept very much in the way of sponsored content.⁶² One of the other characteristics of computer communications services identified in Tables 4.1 and 4.2 was its "non-intrusive" qualities. Advertising is potentially at odds with this⁶³ and, given Carlyle's argument, so are colour and graphics, if they are justified on the basis of advertising. Part of the consumer appeal of pay-TV is the elimination of the intrusive element of TV advertising. Beyond transactions services and product information services, the place of advertising in computer-communications services is not clear. More will be said on this in Chapter Five.

3. Transactions services offer some of the potentially highest value characteristics, in terms of convenience, time savings, energy savings (from travel substitution) and so on. Present lifestyle issues in terms of two-worker families,⁶⁴ energy prices, individualism and material expectations re-enforce the value of these characteristics. From a marketing point of view, these characteristics become a focus for selling effort and transactions services become a potentially important wedge for inducing first time entry to the market. The point has already been made of the value of focused applications. Transactions services become a particular way of implementing this strategy which has a particularly high expected return. A number of industry observers/participants believe that transactions services are the highest potential source of value for users while information retrieval is perhaps the lowest, at least in the perception of first time entrants to the market.⁶⁵ While this is not a universally held view,⁶⁶ it is the prevalent view. If true, it means that early development of mass market services, in particular residential-based services, is more likely to succeed if it includes a well developed transactions capability, both in terms of breadth and depth. A transactions emphasis would mean introducing a bias in favour of interactive systems versus consumptive systems and more involvement of retail service firms such as banks, department stores, etc.
4. Reliability as a characteristic potentially introduces a bias towards consumptive systems delivered by cable or broadcast mode. An interactive system, which means a telephone-based carrier system given present delivery technology, is subject to a capacity constraint, which broadcast systems are not. The latter works on a cycle which provides the same feed to everyone and is insensitive to the number of users. This is not the case with the former. The problem is present at two different levels. First, too many users may "overload" the local telephone switched network, preventing connections from being made and/or breaking connections which have been established. Second, the number of communication ports provisioned on the system itself may be

insufficient to handle demand at any given time. To overcome this capacity must be sufficient to meet peak-load demand, thereby adding to costs and creating a bias, all other things equal, towards broadcast systems. Not to do this creates a greater probability of connection problems and delays in response time, thereby affecting the reliability and hence usage of the system. Again the result will be a bias towards broadcast systems. On the other side, of course, the more limited functional capability of broadcast systems, which, in general, are largely consumptive systems, means there is a bias in the opposite direction. This will be particularly true given the preceeding argument regarding a transactions focus. The choice between characteristics present in different proportions will ultimately be decided on the basis of preferences not efficiency.

Market Characteristics

There is one final area of relevance to demand which has not yet been touched upon in any detail—market characteristics.

It has been implicit, if not explicit, in the analysis of this chapter that 1) consumer/user preferences will play a large role in the ultimate success of computer-communications services 2) the form as well as the content of services will matter 3) targeting or customized applications means catering to identified needs of identified groups and 4) a basis for classifying user needs and of disaggregating the market into identifiable user groups must be established.

The latter task is both easy and hard. For business oriented services, it is relatively easy to identify user groups along industry lines (e.g. agriculture, real estate, travel agencies) or professional lines (e.g. lawyers, doctors, investors). Identifying specific service needs for these groups may not be as easy and will require, in some cases, vision and persistence.⁶⁷ Nonetheless, focused business applications are regarded now as being the base on which a mass market will ultimately be built.⁶⁸ Such applications will establish a user base, they are more likely to be profitable quickly, and they will have a complementary influence on the use of services in the home.⁶⁹

Regarding the home market, the situation becomes far more

difficult. In part, because of high entry costs, there has been a tendency, in looking at the residential market, to focus on middle to high income users.⁷⁰ This has been re-enforced, to some extent, by the higher prices required to support services (in some cases, in terms of minimizing losses) while market size, hence sales, are still small. An important policy question implicit in this is whether the "public good" is best served by a focus on the more affluent segments of society and whether such an emphasis will widen the so-called information gap between rich and poor.⁷¹

Early "general public" services such as CompuServe and The Source catered to a large extent to so-called computer hobbyists. The personal computer market is broadening, however, and the characteristics of personal computer owners are changing as a result. Whereas computer hobbyists are generally computer-literate, many of the newest generation of personal computer owners are only what might be described as semi-literate. The personal computer market still represents a very obvious target population to focus on in the residence market but the needs of this group are far more heterogeneous than, say, even five years ago and the applications/services needed to serve this group require far more careful consideration.

One of the implications of more users who are no more than semi-computer-literate, both for personal computer based systems and non-personal computer based systems, is that it has intensified the search for "user-friendliness", systems that require a minimum of technical knowledge and understanding to operate. This may be important because it may have the side-effect, in many cases, of limiting the breadth or depth of the system and/or of limiting the range of operations that can be performed. Even though people may not know how to use sophisticated systems or may be intimidated by them, they may still want the operational characteristics and the results that only sophisticated systems can provide. "User-friendly" innovations which make services easier to use without limiting the end-characteristics of the service will continue to be desirable. Even for the highly computer-literate user, such innovations may offer considerable savings in time and convenience. But when "user-friendliness" means simplifying the operation in such a way as to reduce the capability/results of the

service, it is a different question. In Canada, much emphasis has been placed on videotex as a user-friendly system and in designing videotex systems to play this role. This has meant, however, offering only a keypad versus a full keyboard and using a tree-index structure for the organization/retrieval of the data base. Such features can be frustrating, cumbersome and overly restrictive. The gains in simplicity and ease of use is more than offset by losses in other desirable characteristics. What may be most ironic about this, however, is that a whole new generation of computer-literates is in the process of being produced by the educational system, re-enforced by video games and other electronic gadgetry. Just when user-friendly systems for the computer-illiterate get perfected, they may no longer be required or wanted.

As an aside it is worthwhile commenting on education itself as a target audience for service development. Computers are making major inroads in the educational system. But, for the most part, they are operated on a stand-alone basis. Networking is perceived as desirable and even takes place on a limited scale; in the future, distance-education using computer-communications technology may become an important delivery mechanism for university and adult education offerings. But for the public school system, networking, other than, perhaps, local area networking, is not likely to grow to any significant extent, for budget reasons, because of communications costs.⁷² Computer-communications systems using a broadcast distribution and downloading for local processing may develop.⁷³ In general, however, educational applications of computer-communications systems (versus computers) are likely to be most important as part of residential based services rather than being used directly in the school system.

Conclusion

In terms of the overall demand analysis of this chapter, a number of important implications for market development have been generated. To fully assess the significance of these, however, requires an examination of the supply side of the market and a joint consideration of both supply and demand. In Chapter Five, supply determinants are examined, while Chapter Six goes on to look at scenarios of market

development, based on the analysis of Chapters Four and Five. For the moment, perhaps the most important conclusion to emphasize from the demand analysis of this chapter is the need to look at computer-communications services in terms of their characteristics—in terms of what they will do for and the value they will deliver to users relative to competing or alternative technologies.

Notes to Chapter Four

1. Hickling-Johnston Limited, op. cit.
2. Ibid., Exhibit 4.
3. Ibid., Exhibit 4.
4. M. Tyler, "Market Projections for Personal Computers and Electronic Publishing," Context, Report Six, December 1980. Referenced in R. Larratt, "Market Factors" in D. Godfrey and E. Chang, op. cit., pp. 70-74.
5. R. Larratt, op. cit., p. 73.
6. Hickling-Johnston, p. 6.
7. R.W. Hough and Associates, op. cit.
8. Ibid., p. 59.
9. Ibid., p. 78.
10. Ibid., p. 80.
11. Ibid., Table 17, p. 81. The upper bound of 150,000 actual subscribers assumes a monthly cost of service of \$6.

12. Tamec Inc., Videotex Services: The Market Potential for Cable, Montreal, 1979.
13. Ibid., p. 110.
14. K. Lancaster, Introduction to Modern Micro Economics, (Chicago: Rand McNally, 1969), pp. 218-219.
15. Ibid., p. 219. (Underlining added for emphasis.)
16. This model has been developed by Lancaster. See Lancaster, op. cit. and also K. Lancaster, "Change and Innovation in the Technology of Consumption," American Economic Review/Supplement, May 1966 and K. Lancaster, "A New Approach to Consumer Theory," Journal of Political Economy, 74, 1966.
17. Ibid., p. 219.
18. Lancaster, AER, op. cit., p. 14.
19. Ibid., p. 15.
20. Ibid., p. 15.
21. Lancaster, JPE, op. cit., p. 134. As an example, a combination of a dishwashing detergent and a hand lotion offers characteristics which neither good separately offers. This is important to recognize because it means that, from a characteristics point of view, the two goods considered together represent a perfect substitute for a good which is both a dishwashing detergent and a hand lotion while individually they do not.
22. For a formal proof of this derivation see Lancaster, JPE, op. cit.
23. Lancaster notes on this point, "The consumer may not be aware

that a certain good possesses certain characteristics or that certain goods may be used in a particular combination to give a specified bundle of characteristics. Producers or sellers may use advertising to ensure that no characteristics of their product regarded as particularly desirable should go unnoticed by consumers. They will go to less pains to ensure that consumers are aware of some other characteristics of their product." (AER, op. cit., p. 18).

24. Tydeman, op. cit., p. 62.
25. Ibid., pp. 49, 63-64.
26. Hickling-Johnston, op. cit., p. 3.
27. Ibid., p. 12.
28. Ibid., p. 12.
29. OCLC, Channel 2000 Project Report, (Columbus: OCLC, 1981).
30. Ibid., pp. 2-3.
31. Ibid., p. 10. One of the non-intrusive features noted in a negative way was the feeling that 50 percent of users did not like having their phone tied up. Only 11 percent objected to the television being tied up (p. 16).
32. Ibid., p. 15.
33. Ibid., p. 16.
34. Ibid., p. 20.
35. This point was made, for example, in personal interviews with the Financial Post and with Time Inc.

36. Personal interview, Financial Post.
37. Personal interview, Rogers Cablesystems.
38. Response time refers to the time which elapses between a user's request for a particular piece of information and the appearance of that piece of information on the user's monitor.
39. Personal interview, Time Inc.
40. Ibid. This point was also stressed in several other interviews.
41. This point was made by McGraw-Hill, GTE Telenet, Infomart, Time Inc., Financial Post and others.
42. Larratt, op. cit. notes, with respect to this point, "In simple language: consumer information needs are related to everyday life situations, and people turn to various information sources, personal, institutional, and media, to find answers. The consumer relates the information need to the situation, not to the source of the information" (pp. 48-49).
43. Ibid., pp. 67-69.
44. Hickling-Johnston, op. cit., p. 18.
45. Larratt, op. cit., p. 74.
46. This was the reason in the Channel 2000 case which was advanced to explain why participants did not like having their phone tied up by the service but didn't object to having a television tied up. See footnote 31 for this chapter.
47. This will depend on whether the personal computer has its own display unit or uses the TV set for this purpose.

48. Personal interviews, The Source and CompuServe. Both of these services experienced major growth in 1983, in both cases virtually doubling their subscriber base. Very noteworthy is the fact that the majority of new customers are personal computer owners.
49. Personal interview, Financial Post. The interview took place in the late fall of 1983, at which time the service was planned for 1984.
50. Personal interview, NABU.
51. Horizontal tiers, as used here, means that there is no hierarchy to the tiers after you pass by the first one.
52. Promotional material supplied by CompuServe and The Source.
53. Personal interviews, Rogers, Infomart, David Carlyle, and NABU.
54. Demand forecasts such as Hough, op. cit. assume, mistakenly, that Telidon systems must be paid for entirely from the income devoted to "recreation, reading and entertainment," in the case of information retrieval services and games and "communications" in the case of messaging services. (Table 10, p. 67)
55. See Larratt, op. cit.
56. This point was stressed in a number of interviews conducted as part of this study with industry representatives/observers.
57. A new pharmaceutical information service offering by GTE Telenet, for example, contains a profile of each doctor with access to the system. When the computer identifies the user, it "tailors" the drug information to the doctor's particular medical specialization.

58. Alvin Toffler, The Third Wave, (New York: William Morrow, 1980), pp. 197, 199.
59. This point was made in several interviews conducted for this study.
60. Both of these companies do, however, have colour and graphics under consideration.
61. Personal interview, D. Carlyle.
62. Many of these points were raised in a personal interview with Time Inc.
63. The Source asserted in a personal interview that it would be improper to impose advertising on users who are paying for their use of the system and hence have the right to see only what they want.
64. This point was made in a personal interview with NCLIS. The proliferation of catalogues, mail-order shopping, TV-specials etc. was attributed in part to the fact that as more women enter the labour force they have less time to spend on traditional activities such as shopping or banking.
65. This point regarding transactions services was made in several of the personal interviews conducted.
66. Rogers Cablesystems, for example, in a personal interview, discounted the potential role of transactions services and argued instead that monitoring services were a more likely "entry wedge" to opening up the market. Given the one-way limitation of present cable technology and hence the lack of a fully developed transactions capability, which requires an interactive system, this is, perhaps, neither a surprising nor an unbiased position.

67. When Mead Data introduced LEXIS, a legal information system, it was derided and the service, in general, was written off by most industry observers as having no chance to succeed. LEXIS went on to become one of the most successful and profitable information systems in the world. Mead saw the opportunity and persisted when others might have given up.
68. See, for example, Larratt, op. cit., p. 22.
69. These points were made in various personal interview sessions.
70. This is true, for example, of the NABU Network where the target audience has, among other attributes, above average income. (See footnote 32, Chapter Two.)
71. OCLC, op. cit., p. 2.
72. Personal interview, TV Ontario.
73. Such a system is being developed by TV Ontario.



Chapter Five

SUPPLY DETERMINANTS

The supply side of the computer-communications market encompasses all aspects of the production of computer-communications services. As such it includes the provision of information, the creation of data bases, data base storage, service offerings and marketing activity and distribution. It also includes the hardware used to produce and use the services.

From the vantage point of market development, the important supply side issues include, inter alia: hardware options/choices, service packaging/content, financing, pricing, competition/structure, marketing and carrier options. These are the issues to be examined in this chapter.

Hardware

Aspects of the hardware issue have already been discussed in previous chapters. In particular, three major dimensions of the issue have been identified. These are:

- the use of dedicated terminal equipment
- standardization/compatibility of terminal equipment and the potential convergence of the terminal market towards the personal computer
- the price of terminal equipment and the impact of this on the initial entry decision of consumers to the market.

As noted in the previous discussion, if system operators continue, as videotex system operators have to this point,¹ the tendency to require a dedicated box or terminal for their service, overall market

development is likely to be impeded, even though, in the short run, the system operator may gain. The advantage of a dedicated box for a system operator is that it "locks in" users.² But precisely for this reason, overall market development will be slowed down. Hardware costs will be part of the cost of any add-on service, unless the service comes from the same system operator. The ability to expand the overall market more quickly once an initial user base has been established will be lost. Users will very quickly, perhaps even after just the first one, begin to find the proliferation of terminals intrusive. What will serve their needs best is one all-purpose terminal with which they can access any service of their choice. Until the market provides this, market growth will suffer.

Part of the success of on-line specialized data base services has been the ability of systems to interface with almost any terminal using ASCII code. But terminal machines still cannot necessarily "talk" to one another. A common standard for graphics has only just emerged with the wide-scale acceptance in North America of AT&T'S NAPLPS graphics protocol, a slightly enhanced version of the Canadian Telidon protocol. The problem of standardization is not just one of protocols, however. It is also a function of compatibility of components, so that users can "build" a system over time;³ it is a function of system software, something that system operators, not equipment manufacturers, must solve; and it is a problem of functionality, what the machine will permit the user to do, something which the emergence of personal computers as the standard terminal device and the notion of add-ons will help to overcome.

As long as hardware manufacturers continue to try to make unique terminals, an equipment problem will remain. Ultimately it may be expected that the market will force standardization/convergence of terminals, if one terminal device or type of terminal device becomes dominant in terms of market share. If this happens others will be forced to conform in order to maintain their own market share. Apple and the IBM PC look to be starting this process for the personal computer market.⁴ Add-ons either in the form of software or hardware peripherals are also emerging to give the personal computer videotex capability,⁵ radio-delivered teletext capability,⁶ and so on. The price

of telephone modems is falling, making it cheaper to give a personal computer a communications capability. These trends, coupled with the emerging standardization of the personal computer field itself, may suggest that a trend towards focusing the computer-communications market in general around the personal computer as the primary terminal device is already underway.

The price of terminal equipment has been, and still is, regarded as an impediment to market development of videotex and other computer-communications services.⁷ This has been a problem particularly for videotex in Canada where decoder boxes currently sell for between \$1200 and \$1700, and specially built TV monitors, which have built-in decoders, cost around \$2000.⁸ If and when market growth allows economies of scale in production to be achieved, these prices are expected to drop significantly. In the meantime, however, it means that videotex decoders are going up against personal computers at prices which are the same or higher, at the same time as they offer far more limited capability than personal computers. For approximately \$300, software to give a personal computer videotex capability and hence access to videotex services can be obtained.⁹ Before economies of scale in production are achieved, the dedicated videotex terminal may be forced out of the market. Even if production volumes grow and unit costs fall as a result, personal computer prices are also likely to continue to fall and there will still be the issue of the different capabilities of the two alternatives. As was noted in Chapter 4, the greater capability of the personal computer means that no single function necessarily has to justify the purchase of the machine by itself. This could be one of the most significant advantages in having the computer-communications market converge on the personal computer as the standard terminal device.

Competition

The issue of competition has a number of dimensions, two of which are particularly relevant here:

1. the number of service providers or system operators that will exist; and
2. the level of market integration which should be permitted.

The number of service providers or system operators there are in the market, i.e., how many producers there are, could influence market development in several different ways. First, the greater the number of service providers the greater the variety of service offerings there are likely to be and the more individualized those services may be. Choice and customized services are both characteristics likely to be valued by users. Second, competition in the market place is, in general, a healthy condition, especially from the consumer's point of view. It can be expected to keep prices down, which in itself will aid market development, and to make system operators more sensitive to users' needs and to factors such as quality and reliability. Third, competition could spur further technological advances in the field.

On the other hand, "too much" competition could fragment the market, preventing any one system operator from achieving efficient size, in terms of realizing economies of scale, economies of scope, or being better able to spread the relatively high fixed costs of these systems over a greater number of users.¹⁰ These economies would all tend to support lower prices; the failure to realize them would thus exert an upward pressure on prices. Second, it may be necessary, for getting the mass market started, to bring the resources available for these systems together, i.e., to create a single producer with sufficient resources both to develop and produce appropriate services and to weather the initial period of market development.

Hickling-Johnston, in their 1979 report, made a proposal along these lines in suggesting that the government should seek the establishment of "The Telidon Consortium, Inc.", a shared undertaking between government and the private sector, the purpose of which would be "the successful commercial exploitation of the Telidon product, first in Canadian markets, and ultimately in international mass markets... The Telidon Consortium Inc. would have exclusive rights to the Telidon product... it would seek to coordinate the efforts of manufacturers, networks, software developers and serviceware developers so that a fully integrated Telidon product emerges."¹¹

Larratt has also suggested something similar:

What if the Canadian government "Petro-Canned" Infomart... Imagine such a company, called, perhaps, the

General Telidon Systems Corporation. As an unshackled company, it would likely be able to raise \$50,000,000 in a public equity offer. Add to that Norpak with the \$30,000,000 it has recently obtained via Noranda, cable-oriented Nabu Manufacturing with maybe another \$20,000,000 and surprises are possible.¹²

While these two proposals are not identical, they are very similar and would push the market in the same direction. Would such a strategy work?

It is important to realize that both proposals are Telidon/videotex specific. Once the market definition is broadened to encompass all computer-communications services available to the general public, the idea becomes less operational/feasible, whatever its theoretical merits might be. Even theoretically, however, it is not clear that the idea has merit. A single large corporation dominating the market would stifle the emergence of competition for a long time which, in the longer run, could inhibit market development, even if it did assist it positively in the short run. More importantly, one corporation or twenty will still face the problem the market has had for some time, particularly videotex services, which is well summed up by Richard Hooper, commenting on Prestel in the U.K.:

The technology of viewdata remains obstinately ahead of good examples of its cost-effective application. Even after three years of trials in the UK with Prestel, the Post Office viewdata service, there is still a general feeling that viewdata is a technological solution looking for a problem to solve. Prestel itself is a classic example of technology-push rather than market-pull.¹³

The problem for achieving a mass market lies in finding a "valid product."¹⁴ It is not obvious that one big firm can do this better than twenty smaller firms; indeed, the reverse may be far more likely because the incentives and proportional effort may be greater for the case of twenty versus the case of one. As Schumacher has argued, big is not always better.¹⁵ The on-line data base market has been characterized by a large number of relatively small firms. There are some big firms too, of course. But on the whole one of the distinctive

features of the market is the relative ease of entry for small producers. Anyone with a good idea, i.e., a good application, is capable of entering the market. This can be, and has been, a powerful instrument for product innovation in this segment of the market.

Market Integration

Closely tied to the issue of competition in terms of the number of producers is the question of market integration. In other words, should participants (producers) in one segment of the production process also be permitted to participate in other segments? In concrete terms, should system operators also be information providers or carriers; should carriers be system operators or information providers, and so on?

Telephony carriers in Canada have traditionally been subjected to a content/carriage separation principle, together with the attendant principles of universal access and just and non-discriminatory prices.¹⁶ Parkhill has argued strongly that this principle (and its two attendant principles) should also apply to computer-communications services.¹⁷ Many system operators, or potential system operators, feel the same way with regard to telephone carrier participation in the market. They are wary, and justifiably so, of being dependent on one of their competitors for their means of delivery.¹⁸

Cable companies have not traditionally been subject to content/carriage separation and are not, in general, assumed to be precluded from being direct participants, as service providers, in the computer-communications industry. Indeed, the normal model for cable companies is to be directly involved or, at least, to be a partner directly participating in the venture. In a 1979 report for the Cable Television Association,¹⁹ an assessment of the market potential for cable companies in videotex services makes this point quite explicit.

Whether or not the traditional exemption of cable services from the separation principle, on the grounds that cable-TV is a broadcast/programming activity versus a purely distribution (carriage) activity, is accepted, this argument does not hold for computer-communications services. Further there is no reason why cable and telephone carriers should be treated differently if they are direct competitors, as is likely in the computer-communications field.

"Consistency alone demands that they be treated the same."²⁰

On balance the arguments for keeping carriers out of the content area, either as information providers or as service providers, appear to be valid. There are, however, two qualifications to this which must be noted.

First, carriers may be best positioned to provide users with a master index or directory of services which can be accessed through that carrier. Such a directory service could be very important in making access to services by users universal in practice. This, in turn, could be important to market development in that it would maximize the opportunities afforded to consumers considering whether to enter the market. An index or directory provided by the carrier would, however, be a service which, while perhaps not a significant exception, would technically violate the strict principle of content/carriage separation.

The second and perhaps more significant qualification arises from the changing technology of telephony carrier networks, which have now acquired an intelligence capability. This makes it relatively easy to turn the telephone network into a gateway system for providing links between users and third-party computers. Telecom Canada in 1981 announced its intention to provide such a network, "an intelligent network to provide a gateway for computerized information of all kinds".²¹ iNet has since gone through a technical field trial and is beginning a market trial. iNet is very close to being a reality.

Essentially iNet has the ability to put the full range of information and services available from any connected computer at the disposal of any iNet user. Such a system could be of major importance in promoting market development. It will provide a means of automatic access, i.e., users do not need to learn a whole series of individual log-on procedures or access codes; it will provide a "translation" capacity to overcome, at least to some extent, problems of incompatible hardware and non-standardization of equipment; it will provide a billing capability to information/service providers listed on the system and a single all-inclusive bill for users; in effect, it represents a kind of "one-stop shopping" option, which has a number of characteristics which should be very attractive to users.²²

While all of these characteristics relate to any gateway system, not just iNet, and while one does not need to be the telephone company to offer a gateway service, the question is whether telephony carriers should be precluded from offering gateway services such as iNet.²³ Technology has made carriage far more than providing a physical link between two points. The relatively easy distinction between content and carriage for the case of voice telephony or circuit-switched private data transmission becomes blurred in the face of digital-switching centres, packet-switched networks, automatic number identification and other features of the present generation of technology of the telecommunications network. Ultimately, the resolution of this issue is perhaps best decided based on consideration of the features of a particular carrier-operated gateway. In particular, three features will be important: control of content available on the system; the design of the billing function; and the degree of transparency in the system.

Insofar as the carrier controls access by information providers or service providers to the gateway network, even if the carrier directly provides no content to the system, the carrier will be controlling the content. Such control could be used to keep out other service providers or to enforce exclusivity agreements on information providers preventing them from also offering their data base through other service providers. Control of content could be used as an instrument for gaining unwarranted control of the market.

In terms of billing, if the carrier simply acts as the billing agent for information providers or service providers listed on the system, the bills appearing in the name of the data base vendor, there should be no problem, as long as the billing function is optional and not a condition of participation in the network.²⁴ If, however, the billing function operates such that the carrier buys the accounts receivable of the information/service providers, i.e., the carrier acts as a factor, then the carrier ceases to be a billing agent and becomes the bill owner. Technical niceties aside, the party who owns the bills will be perceived by users as the party who owns the service. The carrier will be perceived as the service provider whether or not this is technically or legally the case.

Finally if the third party computer links provided by the gateway

are completely transparent, the user will be unaware from anything happening on his monitor that he is dealing with another computer. Again the perception that the carrier is the service provider will be created/re-enforced.

Perceptions are, of course, not necessarily true and it could be argued with respect to both the billing argument and the transparency argument just presented that no matter what users believe, the carrier, in reality, is not actually the service provider and cannot take advantage of the market as if it were. But perceptions do influence people's behaviour. Users who perceive the carrier as the service provider will buy through the carrier rather than direct, or perceive the "carrier's service" as superior because it offers more choice and so on. Significant distortions could be introduced into the market and either the rate or the direction of market development could be affected. The carrier will become the service provider de facto if not de jure; the practical consequences could be identical.

The proposed iNet system, at least for the market trial stage, involves control of content in terms of who can be listed on the system but this is intended to be a feature only of the trial. Ultimately for a full commercial service, Telecom Canada claims no control will be exercised. iNet will involve factoring of accounts receivable in terms of providing a billing function, if the system goes ahead as proposed. The level of transparency will vary for different parts of the system.²⁵

Two final points can be made regarding market integration:

1. Carriers have already introduced electronic messaging services. Both Telecom Canada and CNCP Telecommunications have systems in place.²⁶ Potentially this will make the carriers direct competitors of other systems which wish to offer a messaging service. Fragmentation of the message market, whether or not the carriers belong, could be particularly serious because part of the value of a message service is a function of who you can reach with it. If message services cannot connect with one another, i.e., if you can only reach parties who subscribe to the same service, the development of messaging services may be retarded. Neither Telecom Canada nor CNCP provide interconnection with the other's message service at the present time. While the issue

is clearly not the same as basic network interconnection, it may be worth considering whether the carriers, if they are to be allowed in the messaging market as service providers, should be required to allow interconnection of the services with one another and with other systems.

2. The preceeding discussion has focused entirely on carrier/service provider and carrier/information provider separation in the context of the content/carriage debate. It may be, however, that service provider/information provider separation is an equally important issue and that the arguments in favour of content/carriage separation apply equally to the case of content/service provider separation.²⁷ There is, however, a difference, in that the carrier case, by virtue of the carrier controlling the means of service delivery, could preclude or distort market participation. This is not true in the same way for service providers or system operators. Packaging and content will be discussed below. For now we will simply note that, from a market development view, someone on the production side of the market must have control of both content and packaging if the product characteristics outlined in Chapter Four are to be the appropriate ones and are to be realized. The system operator is the only logical candidate for this role. There may still be an argument for forcing service providers who wish to offer content directly, i.e., to act as information providers, to do so through an arm's length subsidiary or to preclude them from doing so at all, but this argument, pragmatically, cannot be extended to control of content without doing, potentially, very serious damage to market development.

Financing

Financing for computer-communications systems is the third supply-side issue we wish to discuss. It refers to a consideration of alternative sources of funds to underwrite the costs of producing computer-communications services and returning a profit to the producers.

In general there are four sources of funds available for financing services: user charges, IP charges, advertising revenues and

government. User charges involve the question of prices and price structure which will be discussed below; hence user charges will not be discussed here except as a general alternative to other financing sources. IP charges, insofar as they are distinguishable from advertising revenue, would involve such things as system charges or data base storage charges. As such they are not likely to be overly important in relative terms and will not occupy our attention. This leaves advertising and government.

Many observers feel that certain forms of advertising are well suited to computer-communications. Catalogues, product information, classified ads, "barter boards," transactions (which, intrinsically, are a form of advertising) are all examples of this. On the other hand, what might be called "persuasive advertising" is probably not well suited to this medium. Even if colour and graphics are available, the medium will find it difficult to compete with the persuasive qualities of TV or magazine advertising. Some observers feel that advertising has its greatest potential on teletext systems.²⁸ It is also felt by some that computer-communications service advertising will be most effective when it relates to some decision making need or to a transaction decision.²⁹ In these cases the user will not find the advertising objectionable, because it is filling a need. Otherwise, however, as noted in Chapter Four, advertising is likely to be seen as intrusive and to be regarded as a negative characteristic of a service.

Users may, however, be willing to accept some trade-off between advertising and price, if advertising has the effect of reducing the portion of total revenue requirements necessary to recover from users. In such a case, prices should be lower than for a system without advertising. Lower prices will spur development, all other things equal.

Advertising and transactions-related services need a strong user base to succeed. A strong user base may only develop if advertising can be used to underwrite system costs in order to keep prices down and induce entry to the market. A vicious circle could develop out of this two-way causality if no way is found to break the impasse. Interestingly, transactions-oriented/advertising applications could provide a way out in two ways. First, some transactions-oriented information providers might bring with them, when they go electronic,

an already established clientele. This could well be so, for example, in the case of Sears for the videotex service announced in February 1984 as a joint undertaking in the U.S. by Sears, IBM and CBS. The service is at least two years away from introduction, however, so the hypothesis cannot yet be tested. Second, the value of transactions-oriented/advertising applications could be large enough, if the user population is large enough, that companies might be willing to underwrite, fully or in part, the terminal costs of users in order to ensure enough users. This point has been suggested by Larratt as a possibility:

Sellers want to make a pitch, advertise, be informative and be able to take the order... They also might be prepared to pick up the cost of reaching their customers. Consider the retailer's other non-store selling alternatives: direct mail, telephone shopping, and reaching the customer via home computers. Telidon covers the sellers' requirements best if the population has terminals.³⁰

Advertising does have a place in computer-communications systems. It is, however, most likely a narrower, more functionally defined role than many observers realize or appreciate. The intrusive characteristic of advertising is a problem. Insofar as advertising provides an alternative source of revenue to system operators, it can lower user charges which will promote overall market development. Insofar as colour and graphics are important, services which offer colour and graphics, such as videotex and teletext, may have an advantage over computer-communications services which do not. This proposition, i.e., that colour or graphics are important for advertising in this medium, has not yet been proven, however.

Government as a source of revenue for computer-communications services may also be important in furthering market development. Canada's experience with government support of Telidon demonstrates, however, that the mere infusion of government funds, by itself, is not sufficient to guarantee market development. Since 1978, the government has spent at least \$67 million on Telidon service developments;³¹ the market has not yet materialized.

There are several reasons why government financing/subsidization

of computer-communications services might be justified:

1. the advantages to the Canadian economy of developing high technology industries—this is a kind of industrial benefits argument. This argument must be treated with caution. To be used, it must be proven not merely asserted.
2. the advantages of computer-communications services for delivery of social services/goods—this may mean either increased levels of service delivery to the aged or handicapped, for example, or cost savings in the delivery of existing levels of service.
3. the advantages of computer-communications services for the fulfillment of government's statutory obligations regarding the public release of information—this is a cost saving argument. For the case of statutory obligations, economies depend on the market size being large enough to satisfy the definition of public availability.

Some other types of government information could also save money or improve performance if "put up" on a computer-communications service. Tender calls for government contracts, weather information, tourist information, education services, health and nutrition information, government directories, statistical information and so on could all fall into this category.

The important point regarding any or all of these justifications for government subsidization of computer-communications services is that the benefits must be real and the levels of subsidies must be consistent with the level of benefits. Otherwise government financing will have only a distorting effect on market development. In this case, government financing may help create a mass market which cannot be justified in market terms.

Pricing

The fourth issue for consideration is pricing. This has already been discussed at some length in Chapter Four. That previous discussion will not be repeated here except to reiterate the two major conclusions that flat rate subscription fees with unlimited usage are perceived as the preferred pricing scheme desired by users and tolerable price levels for computer-communications services will depend on the value of the

service(s) to users (subject to budget constraints).

From a producer point of view, prices are one of the primary revenue sources for recovering production costs and earning a profit, subject to how large other sources of financing (advertising, government) are. Prices and price structure also influence demand, however, as seen in the discussion of Chapter Four. Thus profit-motivated producers are constrained as to the maximum level of prices by the demand side of the market and they are constrained as to the minimum level of prices by the cost side of the market. Insofar as alternative sources of revenues (other than users) can be found, the latter constraint will be relaxed. Insofar as the value of the services provided to users can be raised, the former constraint will be relaxed.

A non-usage-sensitive pricing scheme will promote usage of the system and, all other things equal, increase the number of subscribers. This may enhance the attractiveness of the medium for advertisers. There may, however be costs associated with such a pricing scheme, since unlimited usage could require the service provider to provision a greater communications capability (number of ports, etc.) and/or to add to the size of the system's computer capacity. With a telephony-based system, unlimited usage could create real congestion problems, either in the service provider's system or in the telephone switched network. Costs could rise (perhaps disproportionately to revenues) and/or reliability could suffer. Another effect of flat rate subscription fees with no usage charges could be to create a kind of user loyalty to the service provider, to "lock in" users who, for budget or value of service reasons, might not be willing to subscribe to more than one service. This effect might not be beneficial to the market as a whole.

Usage-sensitive pricing schemes are economically more efficient than non-usage sensitive schemes. They will, however, likely discourage usage, all other things equal. They are less likely to put pressure on the capacity of the system; this could reduce costs or improve performance. Content which may be sponsored by an advertiser or transactions services will be difficult to charge for on a usage-sensitive basis other than perhaps connect time charges. Users are likely to resent receiving unsolicited advertising with something they are paying for directly. For many transactions services, they may

be unwilling to use the service if they must pay because they are not used to explicit charges for such services as, for example, banking. Connect time charges, being non-specific, may escape these problems. User resentment against paying for information in general may be a larger problem.³²

From a producer's point of view, neither a pure usage-sensitive pricing scheme or a pure flat rate subscription fee appears to be superior in the absence of more concrete market information than is presently available.³³ Hybrid pricing structures which adopt a tiered content concept would allow both types of pricing to be used and would also permit system operators to take advantage of relatively high usage, inelastic demand characteristics of certain services by placing these in usage-sensitive priced tiers.

Packaging, Content and Marketing

Turning to look more fully at the issues of packaging, content and marketing, several considerations emerge:

1. Some form of tiered content scheme will permit greater customization of service offerings and allow service providers to take better advantage of different preference functions of users.
2. Tailored services, assuming market segments have been appropriately identified and can be reached, will provide greater structure to service offerings (facilitating users' choice) and be most likely to maximize participation (customization represents an attempt to maximize the user's perceived value of the service).
3. A business/professional market orientation is more likely to be successful at the present (1984) level of overall market development than a general consumer/household orientation. Business/professional applications are likely to have a higher perceived value at the present time, in part owing to the relatively greater number of service offerings already available. Business users, in general, are regarded as being more price elastic and more income elastic in their demand. They are also regarded as being more usage sensitive.³⁴ The greater price elasticity has to be set against the greater expected value of the applications. The greater income elasticity is one of the strong

factors promoting this orientation; there is a greater ability to afford the services and to expand use over time. The greater usage sensitivity suggests that some form of usage sensitive price such as connect time charges may be most appropriate.

4. As noted earlier, the product must be "valid", i.e., it must respond to the needs of users. The services most likely to succeed are those which produce tangible value. Transactions services and messaging services appear to be the most promising areas in this regard.
5. From a marketing point of view, tiered systems provide a means of maximizing the number of different budget constraints that can be accommodated while increasing producer's revenues, all other things equal.
6. From a marketing point of view, appropriate identification of audience groups (market segments), the right content and the right prices will probably do more to sell the services than any other marketing technique.
7. For the short term at least, the "user friendly" characteristics of the system will be important, especially for the household market. As exposure gained in the business market spills over to the home and as more computer-literate people emerge from the educational system, "user-friendly" characteristics which reduce the capability of the system will become less desirable. For now, however, simplicity, ease of use, and high level presentation protocols³⁵ will all be important.

Carrier Options

The carrier issue is the last supply-side issue to examine. There are a number of carrier-related concerns/positions which need to be resolved/staked-out. Of these, the ones which are of greatest interest to us in the present context are:

1. the influence of the carrier or distribution mode on system capabilities and
2. the influence of communications costs on market development.

Several different carrier options exist for the delivery of computer-communications services: telephone, cable, over-the-air TV

broadcast (use of vertical blanking interval), FM radio broadcast, and satellite. In general, telephone and cable are regarded as the two major options at the present time. As the technology for FM radio develops, given its very low cost, it could become an increasingly important alternative for teletext or consumptive systems more generally. It could be an important delivery alternative for opening up particularly remote markets, given that these areas are often not served by cable or packet-switched data networks, meaning that relatively high long distance charges would result, inhibiting use in such areas. But for major population areas, where these constraints do not apply, and for interactive services, which require a two-way capability, the system would not be as competitive. It is still, however, at a relatively early level of development, although a trial system is now operating in Ontario.³⁶

Satellite systems also have not yet been fully developed as a sole carrier for data communications on other than a private or closed system basis. The basic problem is that a direct service to users via satellite requires that the user have an earth station. While earth station costs, for receiving stations at least, have been falling and the size has gotten smaller, this would still represent an additional hardware expense over cable or telephone systems. The earth station itself, even in a roof-top version, could be intrusive. With only a receiving station, only one-way consumptive services could be provided. To provide interactive services would require an uplink (transmission) capability as well as a downlink (reception) capability for the earth station, a feature which would significantly increase the cost.

All of these factors suggest that satellites as an exclusive distribution system for mass market computer-communications services is not likely in the foreseeable future. But satellites could have an increasingly promising place in supplanting long distance terrestrial networks or providing a competitive alternative to common carrier companies if used in conjunction with cable or telephony systems to provide local distribution. This option may be of particular importance for creating a cable-based, national, mass market computer-communications network in competition with the national telephony networks.³⁷ As direct broadcast satellite services and the number of

satellites grow in North America, the use of satellites for one-way consumptive services, distributed locally by cable, must be regarded as a high probability. For remote areas, where cable services are not available and where the demand for television signals may already make the purchase of an earth station a possibility for consumers, satellite distribution of consumptive services may also be feasible.

For telephony and cable distribution systems, the following points can be noted:

1. telephony systems have a capacity problem at present in terms of the public switched network, which could be a real problem if mass market computer-communications services suddenly take off, until such time as the existing plant has been replaced by digital switching centres and, perhaps, fibre optic cable.³⁸
2. cable has the problem that present cable systems in Canada are all one-way systems and the technology available for making them two-way is inferior to telephony in terms of response times, as well as being relatively expensive.
3. cable also has the problem that it has not traditionally wired office buildings and thus, is poorly positioned to capitalize on focused business applications as a way of getting the market started.
4. telephony has the problem that most residences and small business would be unable or unwilling to afford a separate data access line, making them dependent on the local voice-message network, which means lower transmission speeds (which has implications for response times) and disrupts the availability of the phone for normal purposes. New technology, which allows a separate data circuit to be overlayed on the voice circuit using existing copper wire pairs, could solve these problems.³⁹
5. the potential of transactions services and messaging services, as high user value services, as the initial content focus for mass market services and the fact that business applications are likely to require either interactivity or greater depth to consumptive services than vertical blanking interval broadcast or even full channel cable capacity may be able to provide, give telephony a major marketing advantage over cable at present.

6. cable's greatest potential may lie in services compatible with its existing television orientation.⁴⁰ This would mean services such as captioning, supplements to TV advertising, on-demand TV, and monitoring (which can be carried out with the existing cable without affecting television usage).
7. cable's potential as an advertising medium, while stressed by some,⁴¹ may be constrained by its inability to link advertising directly with transactions,⁴² as long as it is a one-way system.
8. cable is definitely a competitor for downloading systems which have a primary software orientation (versus a primary information orientation) aimed at the personal computer market, though its inability to provide interactive on-line services versus local interactivity is still a constraint in this regard.⁴³
9. the cost of using telephony systems may be an impediment to market development for long distance connections which do not go through a packet-switched network and for local connections if local measured service, i.e., usage-sensitive local calling rates, become prevalent.⁴⁴
10. insofar as present telephone rate structures do not impose usage-fees for local connections, this creates a market bias which favours the development of computer-communications services; which may, all other things equal, favour local system operators versus national system operators; which may favour local versus national information providers, all other things equal; and which favours urban versus rural inhabitants/businesses. None of these biases may be objectionable from a marketing point of view, i.e., a producer's perspective, but they may be objectionable on social policy grounds. This issue will be addressed more fully in Chapter Seven.
11. insofar as present telephone rate structures do not impose usage-sensitive prices for local calling, this creates a market bias in favour of telephony carriers over alternative carrier options, all other things equal, and in favour of systems with an interactive capability versus consumptive systems.
12. insofar as communications costs are made an explicit charge to users, this could inhibit market demand, both in terms of usage

and number of users. It may be useful for producers to consider the inclusion of communication costs as part of the price of the service, i.e., to not separate out communications costs as an explicit charge.⁴⁵ The disadvantages of such an approach are first, it will raise the price of the service which would have a negative impact on the market and second, if abnormal calling patterns arise, either in terms of the location of users or length of connection, the system operator could lose by this approach.

Conclusion

The discussion of this chapter has highlighted a number of considerations relating to the supply-side of the computer-communications services market which could influence market development.

The one issue not discussed, because it is taken as axiomatic, is that for there to be any supply at all, the services must be profitable, if not individually then at least per system provider, and if not in the short-run, then at least in the long-run. This last point is important to emphasize because, given that the mass market is starting virtually from zero,⁴⁶ and that profitability for producers will depend to a large extent on building a large market, the pay-back period on investments is undoubtedly longer than what is normal for mature industries. Barring any "surprises," in Larratt's words, producers will likely have to accept several years of losses waiting for the market to develop in order to be positioned in the market to earn profits in the long run.⁴⁷

We turn now to examine some possible market development scenarios over the next three to five years as a way of bringing together the demand analysis of Chapter Four and the supply analysis of this chapter.

Notes to Chapter Five

1. The NABU Network for example requires the use of NABU's own personal computer. Viewtron in the U.S. requires the use of AT&T's Spectre videotex terminal. Infomart's Grassroots system also has a dedicated decoder/terminal device.

2. Personal interview, Infomart.
3. The idea of consumers "piecing together" their own information system over time is noted by M. Irwin, "Technology and Telecommunication: A Policy Perspective for the 80's," Working Paper No. 22, Economic Council of Canada, Ottawa, 1981, p. 83.
4. J. Helliwell, "Micro innovation shifts to software," The Globe and Mail, March 2, 1984, p. B17.
5. R. Lerch, "Now videotex software can replace decoder," The Financial Post, October 18, 1983, p. 19.
6. J. Chevreau, "Radio teletext eliminates telephone costs," The Globe and Mail, September 23, 1983, p. B19.
7. Personal interview, Infomart and others.
8. D. Climie, "Pioneers change path on videotex highway", The Financial Post, January 28, 1984.
9. Ibid.
10. Each of these possible sources of reduction in unit costs is discussed in Chapter 2.
11. Hickling-Johnston, op. cit., p. 36.
12. Larratt, op. cit., p. 13.
13. R. Hooper, "Applications of Viewdata," in Online Review, 3rd International Online Informational Meeting, (Oxford: Learned Information, 1979), p. 283.
14. Personal interview, D. Carlyle.

15. E.F. Schumacher, Small Is Beautiful, (London: Cox and Wyman, 1973). Schumacher's actual phrase is the "idolatry of giantism." (p. 56)
16. For a discussion of the content/carriage principle in the context of videotex see B. Lesser, Alternative Market Structures for Videotex Service in Canada: The Public Policy Implications (Halifax: Centre for Development Projects, Dalhousie University, 1982), pp. 57-66.
17. Parkhill, op. cit., p. 93.
18. This point was made in several personal interviews.
19. Tamec Inc., op. cit.
20. Lesser, op. cit., p. 62.
21. Press Release, Computer Communications Group, TransCanada Telephone System (now Telecom Canada), May 20, 1981.
22. Personal interview, Bell Canada.
23. CNCP Telecommunications also has plans to introduce a gateway network for computer-communications services.
24. If it is a condition of participation, this could influence/bias the participants. Many service providers are reluctant to have anyone else know their customers and customers' characteristics. Thus they might wish to opt out of having anyone else do their billing. The carrier would have the information anyway, of course, but not necessarily in the same detail and also there would not be the same need to keep the information beyond some relatively short period of time.
25. Personal interview, Bell Canada.

26. For a brief discussion of electronic mail or message systems now in place, see "Electronic Mail: Idea whose time has nearly come," The Financial Post, Special Report, February 4, 1984, p. s7.
27. Lesser, op. cit., p. 62.
28. This argument is advanced, for example, by Tamec Inc., op. cit.
29. Personal interview, Time, Inc.
30. Larratt, op. cit., p. 68.
31. J. Chevreau, "Videotex service set for next year," The Globe and Mail, March 9, 1984, p. B17.
32. Many kinds of information such as news, weather, etc. are presently available free in the sense that there is no marginal cost to consuming such information. If computer-communications systems try to charge for such information, they may face strong consumer resistance. This general problem is discussed by Thompson, op. cit.
33. Some of this information may be known from various field trial experience and other market research but, in general, it is considered proprietary and is not available to the public.
34. Personal interview, Infomart.
35. The importance of presentation protocols is stressed by Larratt, op. cit., p. 77.
36. See footnote 6, this chapter.
37. Personal interview, NABU.
38. Personal interview, Bell Canada.

39. Personal interviews, GTE Telenet and AT&T. A lack of engineering/technical knowledge on the part of the interviewer may mean that the description of this technology is not accurate but the effect of the technology is as noted.
40. Personal interview, Rogers Cablesystems.
41. See, for example, Tamec, Inc., op. cit.
42. Personal interview, Time Inc.
43. This type of system is exemplified by the NABU Network.
44. LMS is regarded as quite likely if the long distance market is opened up to competition.
45. This is the case at present for many services which use connect time charges, where the connect time charge is inclusive of the communications cost involving the use of specified long distance data networks.
46. It is not zero in that some services do exist such as Teleguide and Grassroots, which meet our definition of belonging to the mass market and because some specialized, closed-user group applications which already exist could be opened up to the general public, although their price/price structure may not support such a move.
47. Certainly this has been the case of companies such as Infomart and others in Canada. Infomart's Grassroots system, for example, is not expected to be profitable until the end of 1985 while their Teleguide system in Toronto is not expected to be profitable until 1986. (J. Chevreau, "Videotex service set for next year," The Globe and Mail, March 9, 1984, p. B17.)

Chapter Six

SCENARIOS OF MARKET DEVELOPMENT

The analysis of Chapters Four and Five has identified and analyzed a number of factors on the demand and supply sides of the market, likely to influence market development for mass market computer-communications services in Canada. In this chapter the analysis of the two sides of the market together are combined in an effort to predict, qualitatively, how this mass market may be expected to develop over the medium-term, i.e., the next three to five years. To do so a number of different scenarios will be examined of how the market might develop under different assumptions.

Some Existing Scenarios

Thompson¹ sets out a market development scenario which he labels "the information market-place...strategy."² He begins with the proposition that "Innovative applications of information-technology that have significant higher order impacts and are wealth creating, transformative and socially beneficial seem to be constrained from occurring."³ The constraints which Thompson feels are holding back development in the direction he seeks are "our centuries-old experience with the trade of hard goods, our dedication to industrial technology, and our poor understanding of wealth creation".⁴ The information market-place is a "pluralistic" strategy intended to overcome these constraints.

The basic idea of Thompson's information market-place is that anyone and everyone would offer information for sale, using intelligent terminals and intelligent networks to coordinate/operate the market.

Individuals providing information would be rewarded in proportion to the usage rate for their information. Consumers would pay a flat rate subscription fee and have unlimited access to a kind of popular material, general audience sector of the system. A second sector of the system would contain more specialized offerings or less popular offerings and would operate on a usage-sensitive pricing scheme, probably a cost-per-page scheme. Contributors would decide for themselves in which sector to place themselves. Storage charges would be charged to contributors, with the low-price, high-use sector probably paying more than the high-price, low-use sector in order to maintain a proper balance between the two. Over time, the high-price, low-use sector is expected (by Thompson) to generate "the interesting and economically significant material".⁵ Because of the complexity of the system, brokerage type services ("information about information") can be expected, creating a further level of activity and opening up new entrepreneurial opportunities. The coordinating body for this market would be the "General Information Corp.,"⁶ which by implication, appears to be the telecommunications carrier(s). General Information Corp. would deal directly with its customers (i.e. users), "through the computer-based record-keeping facility of the information marketplace".⁷ Emphasizing the individuality of the value of information, Thompson argues that, "A given information package will appeal to only a few individuals, and many, many such packages must be prepared to give a collection of information any utility to a user population."⁸ The system will be driven by small independent, entrepreneurs. It is this pluralism that, to Thompson, is "the important key to overcoming the little-understood constraints that appear to be inhibiting the application of this new technology in both socially and economically beneficial ways of major significance."⁹

Thompson's scenario, regardless of its merits, is one that would have no chance of coming about in the next five years or even of getting started. Thus on purely pragmatic grounds it is not an option of major concern here, except to the extent that, if it were accepted as a longer-run objective, there would be a need to ensure that the medium term development of the market was consistent with this longer-term goal. The argument has a variety of other problems, however, which

suggest that, at least in the specific form proposed by Thompson, such an approach is not likely to work. Perhaps one of the most serious problems, setting aside a variety of questions concerning government's role, regulatory problems, content/carriage separation, carrier competition, the information absorption capacity of individuals and others, is the fact that Thompson seems literally to be talking about information. That is, in the context of our functional classification, he seems only to be discussing "information-retrieval" services.

The problems notwithstanding, the primary value of Thompson's scenario for purposes of this study is in certain of the characteristics of the information market-place which he identifies as important:

- open access for information-providers¹⁰
- the individuality of the value of information
- the use of intelligent terminals
- the use of intelligent networks
- tiers of content
- a combination of flat rate subscription fees and usage-sensitive prices, according to different tiers of content
- innovative applications
- centralized billing

These are all characteristics which have been referred to in the preceeding analysis and many of them are ones deemed important and/or desirable.

Larratt considers three general development scenarios for achieving the "public/consumer information utility":¹¹

1. Way A involves a "home system which is a complete micro-computer system... Such a system would be programmable and very flexible."¹²
2. Way B involves "a function centered pre-programmed "black box"...easy to use and operate because it would be dedicated to one task... The supplier controls this system, rather than the user."¹³
3. Way C is a combination of Way A and Way B; it is "a standard player piano when you want it to be...and yet still retains its non-automatic mode when desired."¹⁴

Way A is considered by Larratt to be for computer literates; the

user microprocessor for the system is a programmable computer. Way B is for computer illiterates; the microprocessor is an appliance. Way C is for the computer semi-literates; the microprocessor is a programmable computer with software packages as appliances.¹⁵

The relevant characteristics of the market place which emerge from Larratt's scenarios are:

- the importance of the terminal device to the character of the system
- the relationship between the terminal device and the range of service offerings
- the distinction between an information orientation and a software orientation
- the potential impact of computer literacy on the character of the system
- the importance of functional applications—transactions, messaging, monitoring and information retrieval—but not necessarily computing
- for Way B, the importance of "user-friendly" systems.

Roger Hough¹⁶ does not so much offer a scenario as raise a number of questions, in particular whether Telidon systems can perform various functions (information retrieval, calculations, transactions, person-to-person communications, quizzes and games, education, opinion polling, telesoftware) as well as alternative technologies and whether "the market is necessarily ready for interactive information capabilities of the type that Telidon provides."¹⁷

Out of these questions Hough derives three conclusions which are relevant in building scenarios of what is to come:

1. for Telidon to succeed against competing, non-Telidon, computer communications services requires a reduction of costs, provision for the use of already-prepared data bases, provision for alphanumeric as well as numeric-only input and, what might be paraphrased as, aggressive marketing;
2. teletext development, based on the development of an inexpensive decoder to allow the market to capitalize on the base of existing television sets in North America suggests itself as a short to medium term strategy to achieve market penetration; in the

longer run teletext may be favoured by home users over two-way videotex in any case; and

3. government support for Telidon will be required until, and to ensure that, Telidon systems reach market maturity.

While these conclusions are framed in terms of Telidon, making the discussion even more narrow than videotex, the implications for the computer-communications mass market, in general, are:

1. consumptive systems may be a preferred marketing strategy for home market penetration
2. government support is necessary for at least some parts of the mass market to succeed
3. cost is an important characteristic of computer-communications services
4. choice and diversity will be important
5. data base creation cost is an important characteristic of the producer side of the market
6. systems which have more limited capability relative to alternatives will have less chance of succeeding in the market, all other things equal
7. the technology will not sell itself.

The Wescom evaluation of the Telidon field trials in Canada¹⁸ contains a great deal of very useful discussion. One interesting part for our present purpose is an identification of "critical developments for market take-off":

- the need to develop interactive services
- the need to enhance capabilities and possibilities for electronic banking
- the need to develop more effective public services
- the need to reduce the price of hardware for IP's and end users below \$1000 and preferably to a level between \$300 and \$600
- the need to provide incentives for the investigation of new applications focusing on content.¹⁹

While these points also are made specifically with regard to Telidon, they can easily be translated to computer-communications services in general. A particularly striking feature of this list is that, with one exception, all the items relate in some way to content. The

message is the same as one derived from Hough—the technology will not sell itself; it must be needed.

Other strategic considerations which have been noted by industry observers, some of which have already been referenced in Chapters Four and Five are:

1. an initial business applications focus
2. a narrowcasting or targeted audience approach
3. an integrated market approach
4. a carrier-based approach.

While much of this immediately preceeding discussion accords with the analysis in Chapters Four and Five, virtually all of the views just presented, from Thompson through Wescom, are incomplete in that they do not project a total view of the market and market development. They do however provide many of the pieces with which an attempt can be made to construct a total view.

A List of Options

Drawing on the discussion of this chapter so far, Table 6.1 presents a list of possible market development strategies for mass market services. The listings in Table 6.1 are distinguished in terms of the primary focus of the strategy. The listings are not necessarily mutually exclusive alternatives. Indeed, some of them necessarily would have to proceed in combination.

Table 6.1
Possible Market Development Strategies

- Pluralistic based	- Content based
- Telidon based	- Focused applications based
- Videotex based	- Residential based
- Teletext based	- Business based
- Personal computer based	- Price based
- Carrier based	- Hardware based
- Information based	- Advertising based
- Government support based	- Software based

Table 6.2 examines possible combinations of strategies which represent potential complementary combinations of strategies shown in Table 6.1. The numbers across the top of Table 6.2 correspond to the numbers assigned to each strategy in column 1 of the table. Table 6.2 identifies potential complementarity between strategies, not compatibility. In other words, certain strategies may be able to co-exist but might not be complementary in the sense that the combination enhances the characteristics of either taken separately. Table 6.2 also identifies only two-way complementarities, i.e., potential complementary combinations of more than two strategies are not indicated by the table. In addition, Table 6.2 does not indicate where complementary strategies involving a common element may be incompatible with one another. For example, a Telidon strategy may be complementary to either a videotex strategy or a teletext strategy. But insofar as videotex and teletext, as development strategies, represent alternatives, the Telidon/videotex and Telidon/teletext combinations would also be alternatives. Further, Table 6.2 has eliminated complementary combinations where the combination would force one of the two strategies to be of a form which would be overly restrictive. For example, while a carrier-based strategy and a personal-computer based strategy could be combined, the personal-computer strategy could be severely restricted in its characteristics by the imposition of a pre-determined carrier choice. Finally it is emphasized that in cases where a strategy may involve some further level of choice, for example, a hardware strategy, the designation of a complementarity with some other strategy may imply a prior selection amongst these choices. For example, in the hardware case, the complementarity with carrier strategy may restrict the hardware being emphasized. Teletext terminals as a hardware focus do not go with telephony as a carrier focus.

A number of things stand out from Table 6.2. First, a content-based strategy could be combined with any of the technology based strategies (videotex, teletext, etc.), although it must be recognized that the range, depth, and structure of the content could differ significantly depending on the technology. Second, the focused applications, software and information strategies, the strategies which could be

Table 6.2
Potential Complementarities Between Development Strategies

Strategy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Pluralist																
2. Telidon																
3. Videotex			x													
4. Teletext			x													
5. Personal Computer	x	x	x	x												
6. Carrier																
7. Government Support	x	x	x	x	x	x										
8. Content	x	x	x	x	x	x	x	x								
9. Focused Applications	x	x	x		x	x	x	x								
10. Residential		x	x	x	x		x	x	x							
11. Business					x		x	x	x							
12. Price	x	x	x	x	x	x	x	x	x	x	x	x				
13. Hardware		x	x	x	x	x	x			x		x				
14. Software		x	x	x	x		x	x		x		x	x			
15. Information		x	x	x	x		x	x		x		x	x			
16. Advertising		x	x	x		x	x	x		x		x			x	

considered together with content itself to fall within the class of "content-related" strategies, could also be combined with any of the technology options. Third, a carrier based strategy is not considered complementary to any of the specific technologies on the grounds that substantial differences between the capabilities allowed by a particular mode of carriage would overly constrain the functionality of a technology while no differences would make a carrier-strategy redundant if imposed on a technology-based strategy. Fourth, Telidon, videotex and teletext strategies are not considered complementary to a business based strategy on the grounds that the former would imply an exclusivity of focus which would be inappropriate to the varied and, at times, sophisticated needs of a business audience. There is no problem thinking of Telidon, videotex or teletext services existing in the business market. But this is not the same thing as when they are the basis of a development strategy. Fifth, a price based strategy is potentially complementary to any other strategy, if one considers a price strategy to be one of pricing services (and other system costs) so as to gain widespread use while offering producers a reasonable return on their investment. A pricing strategy, defined thus, does not necessarily mean making prices as low as possible overall, it could involve differential pricing by type of content or type of user (e.g. business versus household) or number of services and so on. Sixth, the complementarity of a hardware strategy with a Telidon, videotex, teletext, personal computer, or carrier strategy, has necessary implications in each case for what the hardware strategy can be. It can only be consistent with one of these insofar as they are alternatives when considered as strategies. Seventh, a personal-computer strategy can be made complementary with any other strategy. Again the nature of the resulting network(s) will be considerably different depending on which combinations are being considered. Also, being compatible with any other strategy does not make a personal computer strategy simultaneously compatible with all the other strategies. Nonetheless, Table 6.2 does emphasize the flexibility in system options which would result from a strategy of building the network(s) around the personal computer as the primary terminal device.²⁰ Eighth, although advertising is shown as compatible with a number of other strategies, a

pure advertising focus would have major implications for content and applications. In the context of Table 6.2, advertising is primarily complementary to technology based strategies and economic based strategies and not to content based strategies. Ninth, and finally, a strategy of government support is shown by Table 6.2 to be complementary to any other strategy. This result could be interpreted in various ways. One interpretation is that it suggests that government support in itself will not lead to the development of a mass market, i.e., the program of support must have some additional focus. The market still may not succeed with such an additional focus but it certainly will not succeed without it.

From Table 6.2 and the conclusions that have been drawn from it, the strengths and weaknesses of certain strategies are made clearer. In particular, a pricing strategy, a personal computer strategy and a content strategy stand out as elements which are interdependent with each other and with all other strategies identified in Table 6.2.

Some Further Conclusions

From the analysis of Chapters Four and Five some additional conclusions can be drawn with respect to the various strategies shown in Table 6.2:

1. The case for building the mass market around any particular production technology to the exclusion of others is not a particularly strong one. The service characteristics desired by various users, the cost implications of different production technologies relative to the enhancement of value for users and the functional capabilities of different production technologies, suggest that an exclusive focus on any one technology will fail to take full advantage of the multi-dimensional, individualized character of the market, both on the demand and the supply side of the market and/or will fail to take full advantage of the economics of the market, the fact that different users have different means. From a technology point of view, the market will serve users better and be larger the more universal it is in the aggregate.²¹
2. The case for building the terminal market around the personal

computer is a strong one because of the support this would lend to universality both in technical terms and in functional terms. Once again universality must be defined in aggregate terms rather than at the level of individual services or systems. Also, it is important to remember that the personal computer may require an additional expenditure to acquire certain capabilities, for example, the purchase of a videotex software package to make use of a videotex service. Very importantly, for both the residential and the business segments of the market, the personal computer will offer the advantage of an installed, existing terminal base, given the sales penetration already achieved by personal computers, and one which is expected to continue to grow quite substantially over the next several years. Coupled with the greater capability of the personal computer, the advantages of this strategy appear considerable. This is Larratt's "Way C."

3. The case for emphasizing content issues is extremely strong. This includes not only what services are offered but how they are packaged and to whom they are directed. For the residential market, transactions have consistently been identified by most trials and field surveys as a major characteristic or capability desired by consumers. Messaging services have also ranked high in terms of functional categories. Information retrieval, by itself, is not highly ranked. This is not surprising when one considers the non-essential character of the vast majority of information coupled with the present availability of relatively reliable, inexpensive alternatives to serving pure information needs. The relatively high cost of initial entry to the market means that high-value services must be offered or available before consumers will enter the market. Transactions and messaging services as well as monitoring services are the most likely candidates for delivering high-value. Content packaging will also be important in two respects: first, focused applications will increase the perceived (and actual) value of the service to users and may allow higher initial prices as a way of at least partially offsetting the higher per unit costs which can be expected until market size

grows; and second, within systems, tiering of content offers the advantages, for users, of being able to: restrict initial expenditures to wanted items while still having some choice, make their range of choices much simpler and more manageable at the beginning, when the system may seem intimidating to all but the computer literate, and allow them to get to the services and functions they want more easily and faster. For producers, tiered content opens up opportunities for: differential pricing and value-added pricing while still staying within a subscription-based service; combining subscription fees with usage-sensitive prices and/or with advertising; and limiting or controlling usage patterns so as to minimize the costs associated with communication and computer capacity necessary to meet peak-demand.²² Business applications as an initial market strategy have considerable appeal given the existing penetration of microprocessor technology in offices, the market experience already at hand for dealing with the business market resulting from the on-line data base market which already exists; and the higher, and more easily recognized, value of many business applications, which makes the business market more willing (as well as being able) to support higher prices, an advantage given the higher unit producer costs of services that can be expected initially.

4. Prices and price structures will be important and, again, flexibility in the aggregate is what is called for, at least until such time as a clear indication of consumer preferences becomes obvious. The presently available evidence suggests that residential consumers favour flat rate subscription fees, but this conclusion is still based on relatively limited evidence and, more importantly, perhaps, on relatively limited systems. In other words, the availability of many services and many systems has still not been experienced; when and if it is, attitudes towards paying many subscription fees versus "paying-as-you-go" for each system or service may change. Business consumers are perceived to have a preference for usage-sensitive prices and, for this side of the market alone, it will be important to have both pricing options available in the aggregate. The level of prices is a

greater concern for residential users than for business users, subject to the general qualification that, all other things equal, tolerable price levels will depend on the perceived (actual) value of services. Certainly it is true from the perspective of overall market development that lower prices are preferable to higher prices and, all other things equal, the lower the better. In this regard, the use of advertising could help considerably in keeping prices low. The potential of the medium for advertising purposes relative to other mediums should not be overemphasized, however. Advertising applications have a place in the market, particularly when tied into a transactions capability or some other specific purpose. But as a general purpose advertising medium, computer-communications is inferior in technological terms, could be regarded by users as intrusive and hence unacceptable and would greatly restrict or limit the functionality of the market, if made an exclusive focus for content. Ultimately, from the point of view of helping to keep prices low while providing producers with adequate revenues, transactions services paid for by the transactions vendor, a kind of quasi-advertising or directed advertising, is likely to be more important.

5. With regard to carriers, the case for building the distribution network around any particular mode is highly questionable. Communication costs could be an important factor in market development. Carrier competition costs are minimized; competition will be greater when there are competing modes rather than only competing firms for the same mode. Further, certain production technologies are best suited to certain carrier systems or cannot be accommodated by all carrier systems. If all production technologies have a place in the aggregate market, then all carrier modes must also have a place in the aggregate market in order to meet the needs of producers. Teletext is a broadcast or cable technology. Interactive systems are a telephony technology (given the present development of the cable industry). Satellites could compete with both telephony and cable but the present technology and economics of satellites do not support satellite distribution as the exclusive carriage mode.

A General Scenario

Out of this analysis of market development a number of conclusions emerge regarding the general shape of the market most likely to maximize development of the market at large:

1. non-exclusivity of production technologies and distribution channels,
2. convergence of the terminal market around the personal computer,
3. a recognition of content (versus hardware) as the basis for the market,
4. transactions and messaging services as the primary functional applications offered,
5. gateway facilities to re-enforce the universality of the network(s) being promoted on the hardware side,
6. focused applications directed at identifiable market segments, emphasizing high-value content for those segments,
7. initially at least, a focus on business applications with general consumption/residential consumption services following on the basis of spillover from the business market, increased personal computer penetration of the residence market, and the use of transactions and messaging services by the residence market; this does not imply an exclusive focus on the business market, however, even initially,
8. price structures and price levels which maximize the market entry possibilities for as large a number of people as possible; this will mean: tiered-content, information-provider financed content/services (advertising, transactions, etc.), a combination of subscription fees and usage-sensitive fees on multi-tier/multi-service systems and, possibly, differential pricing to different classes of users,³³
9. financing arrangements which draw on information-provider revenues (including storage charges, sponsored information, advertising, and sponsored transactions services) and user charges to support the service; government support, except for government sponsored information, may be a short-run source of financing (which we will discuss in the next chapter) but cannot be

counted on and should not be counted on in the longer-run.

How large will this market be within five years? This is a question that cannot be answered. The analysis offered here has produced conclusions regarding the shape of the market most likely to promote market development. But how quickly the market develops will depend on how quickly this shape emerges. If and when it emerges, the market could move very fast. Until then, development will be much slower. One of the factors which will matter most will be the provision of high-value content; this must be regarded as the single most important factor governing the emergence of the mass market and the timing of that emergence. Personal computer sales, under the scenario drawn here, will also heavily influence the development of the mass market for computer-communications services. While there are many forecasts of what personal computer sales will be in the next several years, few of these can be treated with any great reliability; price trends, new models, manufacturing company failures, all combine to make predictions in this market highly uncertain. As a representative of Apple Computer recently noted, "Five years is a lifetime in the computer field."²⁴ One forecast, made at the end of 1983, predicts a world-wide increase in production of micro-computers of almost 90 percent in 1984; for the U.S. the forecasted increase is 98 percent. 1983 production figures were in the millions.²⁵ Canadian sales are, of course, only a fraction of these totals but the rate of growth in Canada should be strong. The Canadian market does suffer, it should be noted, from higher prices than in the U.S. An IBM personal computer costs approximately 50 percent more in Canada than the U.S.,²⁶ a ratio which is said to hold for other brands as well.²⁷ This price differential will likely cause Canadian sales growth to lag behind the U.S.

Conclusion

There is one notable omission in the scenario that has been arrived at and that is any explicit mention of government either in terms of government subsidization of computer-communications market development, other government policy measures which could assist market development or a consideration of alternative policy objectives for computer-communications services and the implications these may have

for market development.

Government's potential influence on the development of a mass market for computer-communications services could be crucial to whether the desired shape of the market we have outlined is realized and how quickly it is realized. Thus, by way of conclusion to this study, the next chapter turns to a consideration of government's role in the development of mass market computer-communications services.

Notes to Chapter Six

1. G. Thompson, op. cit.
2. Ibid., p. 29.
3. Ibid., p. 29.
4. Ibid., p. 29.
5. Ibid., p. 31.
6. Ibid., p. 31.
7. Ibid., p. 31.
8. Ibid., p. 32.
9. Ibid., p. 33.
10. This may be considered to be a "weak" interpretation of Thompson's concept of "pluralism" or as an implicit condition for his pluralism to be realized.
11. Larratt, op. cit., p. 61.
12. Ibid., p. 62.

13. Ibid., p. 62.
14. Ibid., p. 63.
15. Ibid., p. 79.
16. Hough, op. cit.
17. Ibid., pp. 138-139.
18. Booth and Wills, op. cit.
19. Ibid., pp. 44-45.
20. In a business context and perhaps in some residential contexts, a personal computer strategy means the use of a programmable computer as part of the user's hardware unit. The term should not be taken literally to mean the particular class of computers known as personal computers or micro computers, although the price and size advantages of this class of machines does make it the dominant focus for mass market services.
21. This simply means that each service or system need not be universal in its technology so long as the market as a whole provides all technologies for which there is a definable demand.
22. If on-line games, for example, threaten to create congestion, rather than provision extra capacity, games might be put in a tier to which access can be gained only during off-peak hours.
23. Differential pricing will depend on the ability of producers to segment markets and to prevent cross-overs between market segments. Given the character of computer-communications technology, it could be very difficult to prevent cross-overs. One possible way of accomplishing a form of differential pricing might be in the total packages offered to targeted audience groups; if

more general content is attached to specific content and one price charged for the whole package, implicitly the general content may be priced differently in each case.

24. Quoted in S. Ginsburg, "New Perspectives on Software Design," Interface Age, January 1984, p. 83.
25. These figures are from the company Dataquest. They are quoted in D. Chandler, "Green Grows the (Silicon) Valley," Interface Age, January, 1984, pp. 82, 84. Other forecasts differ considerably from these in absolute terms but all predict strong growth.
26. J. Chevreau, "PC Junior having tough time leaving nest, entering homes," The Globe and Mail, March 2, 1984, p. B11.
27. J. Chevreau, "Videotex service set for next year," The Globe and Mail, March 9, 1984, p. B17.

Chapter Seven

GOVERNMENT POLICY AND THE ROLE OF GOVERNMENT

Government could be crucial to whether, how, and when the mass market for computer-communications services develops in Canada. Government has the potential to retard the development of the market by the actions it does or does not take; it has the potential to alter the shape of the market by the actions it does or does not take; it has the potential to promote the market's development by the actions it takes; and, finally, the social and economic policy objectives which the government adopts for computer-communications services may have different implications for the shape and timing of the market's development.

This latter concern is slightly at odds with the central focus of this study, in that, to this point, market development per se has been the concern. In this regard we have defined the market, classified the components of the market, examined the characteristics of the demand side of the market and the supply side of the market, examined different scenarios of market development over the next few years, and outlined the ingredients or characteristics of the market which are felt to be necessary to the emergence and survival of a mass market for computer-communications services. Implicitly, this analysis has assumed the desirability of a mass market dictated by economic concerns as expressed in the market place. The questions asked and the analysis offered have been primarily concerned with how to get there.

This assumption may not be shared by government, however. There are various objectives, both social and economic, which, from a public policy perspective, might be considered for computer-

communications services. Some of these may not be consistent with a mass market concept at all, some may not be consistent with the shape of the market outlined in Chapter Six and some may imply a quite different timing for the emergence of the mass market.

The issue of public policy objectives for computer-communications services will be considered in more detail at the end of this chapter. For now the focus on market development will be continued and the role which government might play in either fostering or retarding such development examined.

Government Subsidies

One obvious policy which government might consider which would affect market development is direct subsidization. This is the policy which the Canadian government has, in fact, pursued for the last six years approximately with its support for Telidon videotex/teletext technology.

In economic terms, direct subsidization programs of any kind in any area are justifiable only if there are net social benefits expected to be realized, i.e., net benefits over and above the private returns earned by producers, which are consistent with the level of subsidies provided.¹ These social benefits will depend to a large extent on the public policy objectives government has determined for the economy or for the particular sector. In other words the existence and the "magnitude" of social benefits present will depend, to a large extent, on subjective judgements regarding goals and the relative priority of goals.

Discussion of specific policy objectives, as already noted, will come at the end of this chapter. As a general conclusion, however, it can be noted that before government embarks on a direct subsidy program or offers concessions of other kinds to an industry, there must be some determination that the subsidy program is justifiable.

Assuming this is the case there are a number of additional points to be emphasized regarding subsidy programs:

1. in general, subsidy programs to support an industry at large should be regarded as short-term programs. The longer a subsidy program continues the harder it will be to justify the program, all other things equal.

2. exceptions to this general rule may arise for cases where there are on-going social benefits of a type which would be lost if the subsidy were discontinued and there are no better alternatives for achieving these social benefits.
3. even when social benefits are present, if the private market would undertake the economic activity without government assistance, the government subsidy program will not be justified.
4. the justification of subsidies still leaves open the question of how to implement the subsidies; this is not a trivial question.

For the case of the computer-communications market, the strongest argument in favour of government subsidies is a kind of infant-industry argument. Because of uncertainty and/or higher than normal costs at the beginning of a new venture, government assistance may be required to help an industry get established, i.e., to reach some level of maturity, if, otherwise, the initial impediments would keep the industry from developing at all. In the case of Canada, it can be argued that short-term subsidies are needed to get the computer-communications industry to the point where it can stand on its own. U.S. competition, the lack of an adequate existing labour force to produce services, the lack of established distribution channels, the inability to realize economies of scale because of the initial small size of the market and the inexperience and lack of familiarity with the medium on the part of consumers are all arguments which would support short-term government subsidization of the industry.

In the longer run, specific subsidies of, say, public access terminals or special services for the disabled, etc. may be justified on the grounds that the market would be unwilling to provide such services without subsidization. This assumes, of course, that the benefits of such services are felt to justify a subsidy at all. Such subsidies as these may represent an important part of the government's role in the computer-communications mass market. They should not be confused, however, with general subsidy programs for the industry. If these cannot be justified on a short-term basis, the case for having them is severely weakened. In the long run, if the market cannot exist without subsidization, with the exception of specific subsidies to serve special social policy goals, this implies that computer-communications services

are not sufficiently valued by consumers to make it worthwhile for consumers to support the market at a level which allows it to survive. If this is the case, it is not clear that government should keep it alive. Given that it is much harder to remove subsidies which already exist than not to introduce them in the first place, the need to justify subsidy programs at the outset becomes very important.

Finally, how the government subsidizes the computer-communications industry may be very important. The experience to date with Telidon illustrates this very well. Essentially, the Telidon experience was a hardware subsidy program, where the emphasis was on the production of Telidon terminal equipment and on technical field trials. The Hickling-Johnston report, as relatively far back as 1979, made the point that "unfortunately, in our view, much of the consideration to date has focused inappropriately on the hardware aspects of viewdata systems, and relatively little thought has been given to the serviceware aspects."²

In terms of the characteristics of the preferred market development scenario set out in Chapter Six, we are in accord with Hickling-Johnston's view expressed five years ago. Content (i.e. serviceware) has been identified as the single most important characteristic with respect to market development. A single hardware focus, such as Telidon, will limit the market potential of computer-communications services to a single technology and dedicated terminal equipment. More significantly, it will be emphasizing the wrong side of the market. The hardware pieces are already there; what is required is something to use them for.

The government's hardware strategy has not worked—at the end of 1983, there were only 5000 Telidon terminals in use in Canada.³ The government itself appears to have recognized this and has reoriented its support program towards software development.⁴ The government "suggests" two reasons for this: slow acceptance of standards and the recession.⁵ Both of these have some validity but primarily with regard to producers. In other words, some producers (information providers and system operators, actual and potential) may have held back their development plans because of the lack of standards and the recession. Consumers also may have been affected by the recession. But most

consumers probably don't understand Telidon technology well enough to understand that there has been a standards problem. The main point which consistently resurfaces is that without a viable product there can be no market.

The shift in government funding towards software development that is now occurring is, according to the analysis here, a shift in the right direction. But, insofar as government funding is still directed predominately towards Telidon technology, it can still be questioned. The place of Telidon in the market has not been established vis-a-vis the alternatives except as a graphics protocol, which is not the same thing as Telidon as a videotex or teletext system. The analysis of this study suggests that technology choices should be left to the market to decide on the basis of product/service characteristics and costs. There is no reason to believe that the market will choose only one technology and no reason to believe that one technology would be a best choice for the market. The available range of options for consumers will be maximized by the use of multiple technologies, with software and/or hardware peripherals being developed to provide any necessary interface between alternative technologies that is required.

Regulation

A second area of government action which will be important to market development is the way in which the industry is regulated. At the present time, by virtue of existing regulation of both telephone carriers and cable companies, the emergence and timing of development for the entire market is significantly affected by regulatory control.

It is beyond the scope of this report to comment on the regulatory process in detail. Three general comments, however, will be offered, relating to process:

1. if the industry, or parts of the industry are to be regulated, then it will be important for producers to know this and, more significantly, to know what the "rules of the game" are going to be.⁶ The "rules of the game" will also be important for other areas of government policy;⁷
2. the timing of market development, under a given set of rules, will be heavily influenced by how soon the regulator makes the rules.

Regulatory delay could hold back market development for a considerable period of time. It may be important not to delay not only in terms of when Canadian producers will be able to enter the market but also because, in the meantime, the U.S. market is developing rapidly. U.S. services could supplant Canadian services in the Canadian market if the development of Canadian services is delayed. U.S. competition is likely to be a very real market force in Canada under any circumstances. But if the U.S. market develops first, the battle between U.S. and Canadian producers may be over before it ever starts.

What both of these comments regarding regulation tell us is not what should be decided but that decisions should be made and made as soon as possible, if market development is not to be retarded. Delays have already occurred in the CRTC in hearings for enhanced service offerings by the telephone carriers and non-broadcast service offerings by cable companies. Permission for Telecom Canada to begin the market-trial phase of iNet held up the start of the market trial. It is, of course, not necessary for the government to leave these decisions to regulatory bodies like the CRTC. Government could set the policy directly. If regulatory delay continues to be a problem, then, perhaps, this option should be considered.

Other Policies

A heavy emphasis has been placed on the personal computer in the scenario of market development outlined in Chapter Six. The much higher prices for personal computers in Canada versus the U.S. was also noted. One reason for this price difference is the Canadian tariff. A policy initiative which government might consider is the reduction or elimination of tariffs on micro-computers. It is emphasized that the concern of this study is with the development of the computer-communications services market. Equipment costs will influence that development. It is highly questionable whether Canadian producers of equipment will be able to compete effectively against multinational firms in this market without protection. Even with protection, it is not clear they can compete. What is clear is that, with protection, prices are being held artificially high and creating a bias in consumers' choice

between computer-communications services and alternative technologies.

In the long run, it is quite possible that Canada can establish a competitive position in software and in systems for computer-communications services. If this is so, then this is where attention should be focused, as has already been argued. An important corollary of this, however, is that a successful software/content focus is dependent on the hardware being available and affordable. To the extent that hardware sales are retarded through policies such as the tariff which raise hardware prices, the software/applications market will also be retarded. A tariff on micro-computers is justified only if a hardware focus is shown to be the way to develop the market and it can be demonstrated that a tariff will be successful in promoting a hardware industry in Canada which, in the long run, will be able to compete on its own, i.e., without the tariff. The first condition has been rejected by our analysis and the second condition is highly questionable.

Consistent with the emphasis of our analysis on the personal computer as the standard terminal device, but without restricting the market to personal computers as the only terminal device, a government policy of tax incentives to consumers to purchase a personal computer or other designated terminal equipment may be worthy of consideration.

This list of potential policies which might be considered by government could go on. But it is not the purpose of this report to make recommendations on specific government policy initiatives. Rather, the purpose is to point out how what government does decide to do (or not do) will influence the development of the mass market and to illustrate the role which government could play if the goal and priority of developing a mass market for computer-communications services is accepted by government. Before proceeding to consider the question of goals, however, one other point should be made.

Direct Government Benefits

It was noted in Chapter Five that government participation in the computer-communications services market might be justified on the

basis of direct financial benefits to government. The medium could be used to provide government information, to improve social service delivery or make social service delivery more cost effective, to do likewise for education, to tender government contracts, and so on. All of these could be cost-justified uses of computer-communications services by government acting as a producer. On the consumption or demand side, government might also be a buyer of services produced by others, again on a cost-justified basis.

This possible aspect of government involvement in the market is important to note for two reasons:

1. it does not, in itself, rest on any explicit goal(s) government may adopt for the market; rather it is based on government's own budgetary considerations and general efficiency considerations; and
2. it could provide a basis for government subsidization of public access terminals, services for disabled, aged or impaired citizens, education-related services, etc. which are based on the private benefits realized by government rather than social benefits.

These benefits may or may not be large and it is likely that they would only be fully realized once the market has developed. If they promise to be substantial, however, and if government otherwise does adopt explicit goals in favour of market development, early adoption/implementation of government uses/usage of the market could inject an additional revenue stream and range of service offerings that would accelerate the rate of market development. Apart from this, however, is the more fundamental point that this form of government involvement in the market is independent of any social or economic policy goals, outside of government efficiency.

In terms of social/economic goals, the government has, to date, failed to officially indicate precisely its goals for the computer-communications sector, the priority of this sector relative to others or the relative priority of different goals within the sector.

In part, the delineation and prioritization of government goals for the computer-communications services industry have been confused

1. by discussions which focus on micro-electronics based industries at large rather than computer-communications services

2. the dominant attention which has been paid to Telidon technology and
3. arising out of 1. and 2. the dominant attention which has been paid to hardware related issues rather than service related issues.

There have been some unofficial statements of goals. In 1980, Bernard Ostry, then Deputy Minister of DOC, set out five guiding principles for information technology markets. These are:

1. freedom of expression (including "both freedom of speech and freedom to create")
2. freedom of access (on the part of users for the "full range of interactive and one-way...services")
3. freedom of enterprise
4. freedom of development (which involves issues of "economic independence," "technological sovereignty," and "cultural integrity")
5. the freedom to enjoy privacy (in terms of individuals, corporations and the state).⁸

These are all potentially valid goals. But they also, in a number of instances, conflict with one another. And they are ambiguous in a number of very important respects.⁹

Ostry's statement parallels very closely a slightly earlier statement by John Madden,¹⁰ at the time a senior official in DOC. Madden lists four objectives:

1. To 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. To give information providers access to the public and to ensure that they encounter the lowest possible barriers to entry into the market place
3. To ensure that the resultant benefits accrue, to the maximum extent possible to Canadian industry, and
4. To ensure that the rights of individuals are not transgressed.¹¹

Madden's list of goals, like Ostry's, is ambiguous in many respects and does not recognize potential conflicts and hence trade-offs between goals. It is noteworthy that both accept implicitly the desirability of development of computer-communications services. It is also

noteworthy that they do not question the impact of the goals they recommend for the development of the market.

As an example of this latter point, consider Ostry's first goal (freedom of expression) which is paralleled by Madden's second goal (IP access to the market). Both goals endorse the principle of guaranteed access by IP's to the market. But what does that mean? If it means simply the right of anyone to list a service for sale and to have access to the public carrier network to deliver it, that is one thing. But if it means that anyone, on demand, could be listed on any service provider's system, that is quite another thing. The latter interpretation may be quite defensible on egalitarian, social welfare grounds. It is not likely to be defensible on economic grounds. It might mean, for example, that the focused applications strategy discussed previously could not be realized because system operators would have no control over the content listed on their system. It might mean pushing the market in the direction of the monolithic structure discussed in Chapter Two. This, from a practical viewpoint, is not only inappropriate from the vantage point of meeting consumers' characteristics preferences but is at odds with what the limited marketing experience gained in the last five years has shown to be acceptable to consumers.

This illustration illustrates that different objectives will have different implications for the shape of the market and, in the process, for the growth of the market and the timing of that growth. To say that everybody must be allowed to participate as IP's, even qualified as Madden makes it ("lowest possible barriers"), could significantly alter the marketing approaches open to system operators, the structure of the market in terms of participants, integration, and pricing and the user potential of the market in the short run. There may be ways of reconciling this with economic objectives¹² but the shape of the market will be necessarily influenced under any circumstances.

In general, computer-communications services could be regarded by government as serving one or more of the following general policy objectives:

1. industrial benefits
2. employment benefits
3. economic sovereignty

4. cultural integrity
5. technological sovereignty
6. rights of citizens
7. competition
8. social welfare

There is no necessary inconsistency between the analysis of Chapter Six and an industrial benefits/employment benefits objective if benefits in these two cases are defined in terms of software and applications rather than hardware. As previously argued, a hardware focus is not likely to be successful while a software/applications focus could be quite successful in terms of Canadian participation both in the Canadian market and in external markets.

The same point can be made with respect to economic sovereignty. Without becoming a completely closed economy, Canada cannot be sovereign in everything if sovereignty is interpreted to mean self-sufficient. Choices must be made. In this case, a focus on software/applications, i.e., content, rather than hardware, holds much greater promise.

Cultural integrity has the same implication. Content is clearly the fundamental concern in terms of culture. Canadian-built machines which display U.S. content do not promote Canadian culture. Here, perhaps more than with any of these other goals, rapid market development in Canada may be of primary importance. The existing on-line data base industry is already heavily dominated by the U.S. Mass market services are now beginning to emerge in the U.S. If Canadian services do not develop quickly, the market may be filled by U.S. operators who will, at that point, have the advantages of an established system, not to mention the advantages which the larger U.S. market base may provide.

Technological sovereignty is not a goal compatible with the market development scheme set out in Chapter Six if technology is interpreted in hardware terms. It is, however, important to realize that technology is not just machines. Software is also a technology. Interpreted in this way, technological sovereignty poses no problem

Citizens' rights is a multi-faceted goal. Interpreted to mean guarantees and protection of privacy it may be almost a necessity for

many consumers in terms of building and maintaining their confidence in the system. In this case there is definitely no conflict with the market development scenario of Chapter Six. Interpreted to mean guaranteed access for users, and/or information providers, there could be a problem. The information provider case has already been discussed. For guaranteed user access, if this is not subject to an ability-to-pay criterion or if it means access to all services rather than any service, then certain elements of the preferred market development scenario will be impossible. The definition of the mass market used here includes being available to the general public. But this is intended to be in contrast to closed-user groups where entry is restricted on some basis other than ability and willingness to pay. It does not mean guaranteed access. A goal of guaranteed access could influence the adoption of focused applications, system financing, price structures, hardware orientation and profitability. None of this denies that guaranteed access may be a very important goal. Mention has previously been made of the potential for computer-communications technology to widen the information gap between rich and poor, well-educated and less well-educated. Guaranteed access, in itself, will not solve this problem but it may help make a solution possible. Ultimately much depends on the willingness of government to assume the responsibility for implementing this goal if government chooses to adopt this goal. Public access terminals supplied by the government or government subsidies of certain user groups (low-income, for example) are possible solutions which do not shift the burden of meeting the goal onto the industry and do not retard or distort the market's development as a result.

Competition is something which our scenario stresses, in terms of maintaining flexibility in technology options, content options, pricing options, etc. The support recommended for gateway networks would, so long as they are offered on a non-restricted basis to both ends of the market (i.e., to users and to information providers and/or system operators), promote competition. Very importantly, the value of the overall system will be enhanced for consumers the more diversity and choice they have. Competition is the best way of achieving this. Two sub-issues related to competition are non-Canadian, in particular U.S.,

competition and the economics of the Canadian market place. Foreign competition in services is a concern that could have implications for our development scenario, particularly in terms of influencing price. But there is some basis for believing that Canadian producers will be able to compete in content/software areas. The economics of the Canadian market place argument is one which takes note of the relatively small size of the Canadian market compared to the U.S. (in population terms, Canada is approximately one-tenth the size of the U.S.). Because of this smaller size, Canadian producers may be unable to achieve the same scale of operation as their U.S. counterparts and therefore may not be able to compete in terms of price and/or, if there is too much competition, everybody will operate at a scale below optimum and prices will be higher as a result. If Canadian produced software is competitive, however, there will be an export market potential which will do away with this market size argument for such cases.

Finally there is social welfare goals, other than those mentioned in their own right such as rights of citizens and cultural integrity. Other social welfare goals might include assistance to the aged or the handicapped or rural residents; regional development considerations; reducing technology-induced unemployment; and so on. Basically social welfare goals relate to equity considerations. Again, there is potential conflict with a market development objective; again the ability to find a solution to this problem rests in part on government's willingness to assume the responsibility for implementation as well as definition.

Conclusion

Overall, it is important always to remain mindful of one of the points made in the introduction. Computer-communications services represent a technology with the potential to exert an outstanding impact on Canadian society. It could truly be a transformative influence on our society. For this to be achieved, however, the technology must achieve widespread usage, a mass market must develop. How it develops, who participates and on what terms, what it does, and who benefits are important questions for government policy. Unbridled market development is not obviously best. The market

development scenario set out in Chapter Six is not, however a scenario of unbridled development. What has been demonstrated is that the various policy goals which government may have can be interpreted in ways which are consistent with the scenario or can be reconciled with it. Where this is not the case, it is because the goal has a different interpretation. But many of these alternative interpretations (e.g. a hardware versus software interpretation of the industrial benefits goal) may not be superior choices as has been demonstrated. Services, i.e., content and applications, are what matter and what should be the concern for the industry, for consumers and for government alike.

Notes to Chapter Seven

1. This means that the net social benefits must be large enough relative to the size of the subsidy to yield a social rate of return that is commensurate with the opportunity cost of the government funds devoted to the subsidy program.
2. Hickling-Johnston, op. cit., p. 28.
3. This figure is quoted in several different newspaper sources. See, for example, J. Chevreau, "Videotex service set for next year" The Globe and Mail, March 9, 1984, p. B17 and K. LaPointe, "Deputy Minister doubts Telidon will reach goal," The Citizen, Ottawa, January 17, 1984, p. 3.
4. In January 1984, \$4.9 million in software development grants were awarded. (K. LaPointe, op. cit.)
5. Reported in J. Chevreau, "Videotex service set for next year," The Globe and Mail, March 9, 1984, p. B17.
6. Uncertainty arising out of the regulatory process is cited by some cable companies, for example, as a major reason for delaying plans for introducing service. Quite understandably there is a reluctance to spend a great deal of money modifying plant and

setting up service offerings if the regulator has not yet granted permission to do so.

7. The running of most of the Telidon field trials, for example, was in the hands of carriers. But if content/carriage separation is imposed on carriers in this area, they will not be system operators or content providers. A great deal of expertise has been built up in a sector which may not be able to take advantage of it and lost to others who might.
8. B. Ostrey, "Keynote Address," in Communications, Computers, and Human Settlement, Proceedings of the Ninth Annual Urban Studies Symposium, York University, March 1980, p. 4-5.
9. For a critical discussion of Ostrey's five principles see Lesser, op. cit., pp. 24-29.
10. J. Madden, "Videotex in Canada," Delta Dialogue Series Seminar No. 9, Toronto, May 1979.
11. Ibid., p. 6.
12. One possibility would be to create a class of common service providers analogous to the concept of common carriers. (See Lesser, op. cit., p. 93.)