NORDICITY
GROUP LTD.

# An Assessment of the Market for Videotex, Teletext and Related Services

A Study Proposal Submitted by
Nordicity Group Ltd.
in association with
Peat Marwick and Partners

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SEPTEMBER 28, 1984

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# 1.0 INTRODUCTION

The market for videotex, teletext and related electronic information services is evolving rapidly, particularly in England, Canada and the U.S. Many developments have taken place since the Department of Communications conducted demand studies in this area, both technological and in terms of market acceptance and penetration. Considerable experience has been accumulated, through field trials and operational informational or transactional systems, in the practical application of the available technologies and in the obstacles and opportunities facing commercial development. There is an increasing recognition of the importance of service design, particularly with reference to the presentation of information, and its adaptation to information-seeking behavioural patterns.

Earlier market studies (conducted for the Department of Communications in 1979 and 1980) assumed that videotex and teletext services would rapidly penetrate the residential market in North America as the fundamental utility of electronic information access became apparent. In fact, significant development has taken place in the application of these services for specific industrial and commercial applications. These promising Videotex applications are in well delineated markets segments, such as tourism, banding, agriculture and financial services.

However the residential market potential remains to be tapped. Changes in the technological environment are of key importance here such as the rapid penetration of micro computers in the home and office. In the U.K., for example, Micronet, the Prestel service for personal computer users, has quadrupled the number of residential Prestel users in less than one year. Videotex in the U.K. has discovered that it is not a discrete technology and has aggressively started to exploit existing markets.

These and other factors have combined to significantly alter the outlook for electronic information delivery systems over the next ten years so that a fresh assessment of the market place has become appropriate. This section outlines in some detail the purpose of the proposed market study, indicating the main conceptual challenges of the project and summarizing the main tasks to be undertaken.

## 1.1 PURPOSE OF THE MARKET STUDY

As stated in the terms of reference, the purpose of the study is to carry out both an in-depth assessment for videotex and teletext-type services in Canada, and a more general assessment of the international market, with main emphasis on the U.S. The assessments will be conducted over both a short term (next 5 years) and long term (5 to 10 years) period.

The principle thrust of the study will be to forecast the development of the market, taking into consideration technological and economic factors as well as the dynamics of the electronic information marketplace. The forecasting exercise will involve a detailed projection of electronic information dissemination systems, and the kinds of services that they will be able to deliver over the forecast period. A series of specific service models will be identified. The business prospects of each model will be analyzed with reference to costs and pricing strategies, taking into consideration the likely vendors and customers of such services and the general characteristics of market demand.

The market forecasts will permit two key sub-objectives to be realized. The first is an assessment of the impact of the services, in terms of both the volume of economic activity and its effect on employment and the industrial infrastructure. The second is the development of recommendations to the Department regarding further research and development activity, application programmes and any regulations which may be required to maximize the industrial and social benefits to Canada.

## 1.2 CHALLENGES OF THE STUDY

The study presents methodological, and process challenges that require specialized research and analytical skills. The scope

is extremely broad, including "all electronic informational, transactional and other similar services provided by different types of vendors or service providers...through various hardware arrangements to various markets." The outlook for these services must be envisioned both for the Canadian and International markets, extending over a maximum time frame of 10 years. We outline below the specific challenges which these objectives create and which we propose to address.

### 1.2.1. FINDING PLAUSIBLE SERVICE DEVELOPMENT PATHS

The electronic communications industry is continually shifting. Its evolutionary direction is a function of changing trends in the technological environment which presage fundamental changes in work habits and the social infrastructure. These changes are taking place very rapidly so that prospects for individual services are subject to wide variation within very short time frames. To forecast market developments over a period of 10 years requires the anticipation of new, potentially transforming, events. The difficulty of the work is complicated by the fact that many of the services to be investigated are in a state of infancy, notwithstanding long histories of service concept evolution, technical developments and trials.

The projection of trends from current information on services also presents a problem. The value of available quantitative

data is limited by the relatively small number of operating videotex, teletext, electronic mail, and the other information processing services. At the same time much of the available qualitative data is subject to widely varying interpretations. Many participants in the electronic communications industry are affected by the emergence of the new information processing services, and there is a continual buffeting as entrenched interests become disturbed and/or new market opportunities are seen. This results in posturing and defensive strategies which can cloud the perspective of market observers. The challenge is to look beyond the publicly stated position of players and make objective assessments of how their business interests are likely to force service developments.

A related challenge is to try to anticipate how the intrinsic structure of the industry will affect future developments. There is a industry dynamic which tends to favour larger, more established companies in certain sectors but smaller-scale entrepreneurial activity in others. It is therefore essential to examine ~~the~~ both the services and the credentials of the service-providers in forecasting future events. However many electronic information services must evolve out of an interdependence between service suppliers and information providers, the dynamics of which are subject to continual change.

The industry is also frequently characterized by "chicken and

egg" relationships with regard to its marketplace. An interactive situation obtains, whereby the growth of market demand is dependent on the actions of the service developers while the service developers are in turn dependent on the actions of the market. Each of these considerations must be factored into the analysis.

Given this industry structure, the essential analytical objective must be to establish plausible development paths for the commercial evolution of existing or potential services. In meeting this challenge it is essential to examine without preconception the ability of operating services and service concepts to address the known characteristics of demand for electronic information, transactional and messaging services.

### 1.2.2. IDENTIFYING THE INTERESTS OF MAJOR PLAYERS

Videotex, teletext and related electronic information systems create the means to effect fundamental changes in the behaviour of users. These changes, which affect both business and consumer markets, inevitably impact on established patterns of information delivery, causing competitive threat as well as commercial opportunity. The response of entrenched information suppliers, including broadcasters, newspapers and specialized communication service providers, will play an important part in shaping future events.

The information industry is composed in part by large business entities, often multi-nationals, which have the market position and power to help or hinder the development of specific new technologies and services. Past experience shows that many of the services require substantial front-end funding to pay for marketing and demand stimulation. The presence of well-capitalized players can become a highly significant predictor of future events. Retail firms, financial institutions and a wide range of high street businesses may need to re-think their business strategies if the new services make headway. In this eventuality, the economics of supply, storage and distribution will be radically altered and the challenge will be to think through the competitive implications.

In forecasting future developments, the study must therefore consider critically the stake of existing players and their potential to affect developments within the forecast period and/or create barriers to the entry of potential competitors. This is a complex task since the advent of a new service is rarely a pure substitute for an existing one. The analyst much appreciate wide ranging implications for related market activities and the business entities which depend on them.

### 1.2.3. QUANTIFYING THE ANALYSIS

The entire electronic information industry in in a period of rapid change, driven by technological and competitive factors which are not easily amenable to quantitative analysis. Perhaps in no other field is the development of commercially viable business strategies more subject to the effect of rapidly changing technology. Certain electronic information services, particularly those catering to mass consumer markets, have the potential to evolve into extremely large scale businesses once a critical mass of subscribers has been established. The emergence and growth of the personal computer market, for example, radically transformed the outlook for all data retrieval, transaction and messaging services to an extent that was largely unpredictable some five years ago. It is possible that technical and service innovation will be sufficient to transform its present configuration and scope within the forecast period.

This complicates the forecasting process and makes it vulnerable to errors of scale that are potentially catastrophic. An important challenge is to therefore develop validation and sensitivity tools which will provide a check on critical assumptions and enable the effect of future uncertainties to be better understood.

## 1.2.3 CHOOSING AN APPROPRIATE FORECASTING METHODOLOGY

All of the above difficulties combine to create a formidable industry forecasting challenge, which is not amenable to either objective or subjective techniques on a stand-alone basis. Objective techniques, such as the direct manipulation of existing data, are a necessary but insufficient component of reliable demand forecasting. Thus extrapolations, curve-fittings of various kinds, econometric models, diffusion models etc, all have structural assumptions which make their application risky, and the problem is compounded when extended over a 10 year period within an immature industry. Objective techniques are invariably premised on the idea that future activities will follow past experience, even though the evidence in the electronic information industry frequently confirms the reverse.

On the other hand subjective approaches are subject to risks of an equal magnitude. Moreover, unless thé resulting data are collected and analyzed in a rigorous and systematic fashion, such methods can yield results that are either totally invalid or which raise substantial questions of credibility.

Our solution to the forecasting challenge is to combine information from several different processes to arrive at projections of demand. We will use traditional and innovative approaches, both qualitative and quantitative in nature which are discussed later in this proposal. In brief, we propose a

scientific method of collecting and modelling subjective data, incorporating existing objective data which includes industry demand statistics from each of several defined segments. The overall forecast will be subjected to the assessment of a team of industry experts, whose opinions will be incorporated through a sophisticated modification of the Delphi process known as qualitative controlled feedback(QCF).

## 1.3. OVERVIEW OF APPROACH

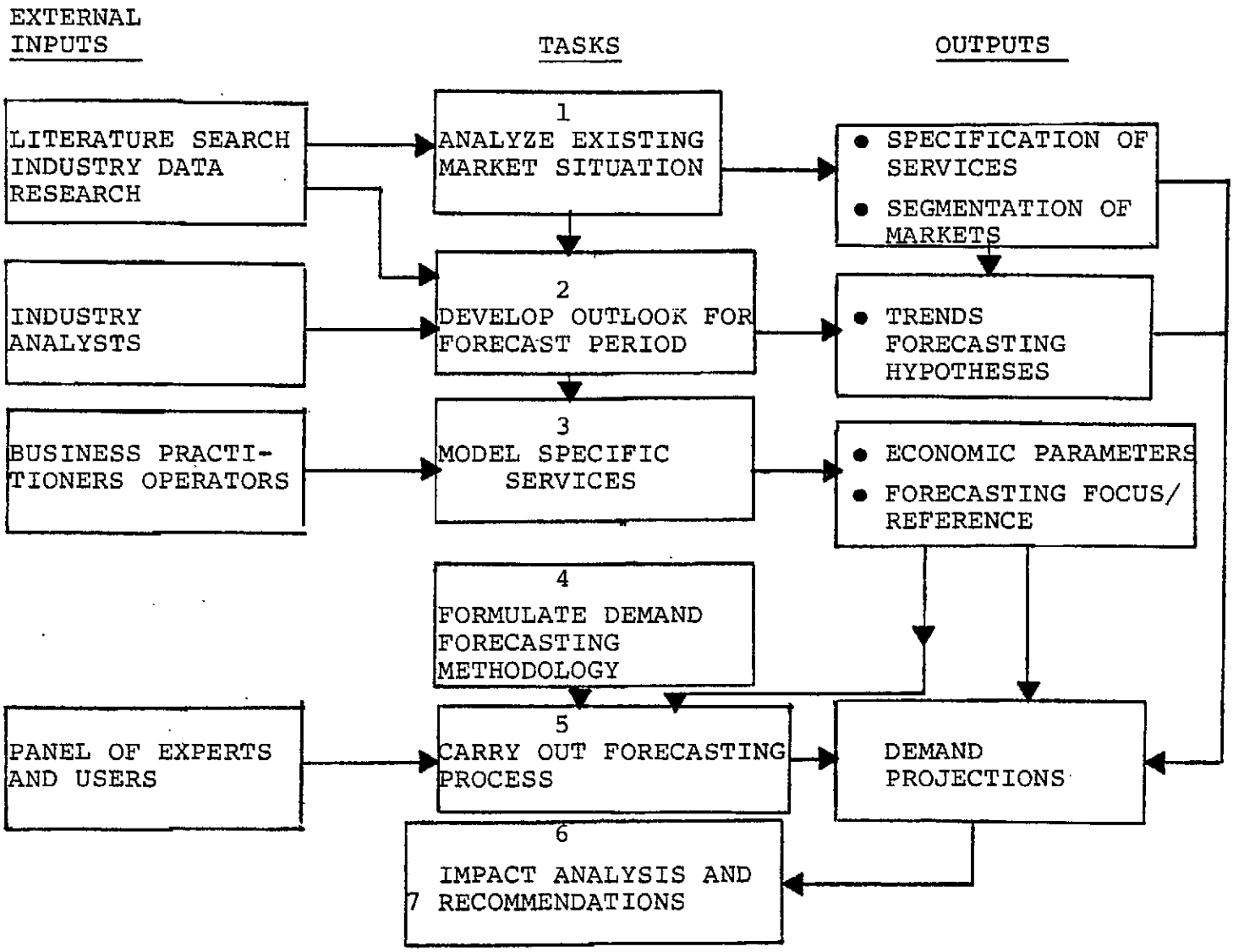
The terms of reference for the study provide a framework for defining the major tasks of the study and the sequence in which they are to be undertaken. The accompanying Exhibit 1-1 illustrates the overall approach we propose. The major highlights of this approach are described below.

### 1.3.1 TASK 1 : IDENTIFICATION OF EXISTING MARKET SITUATION

Here we propose a comprehensive review of existing operational services and service trials, identifying technologies used, markets served and business economics (capital, operating revenues and costs, return on capitalization and implications). The scope will be worldwide, with detailed emphasis on Canadian and North American markets.

Exhibit 1-1

OVERVIEW OF APPROACH



This task will be completed by reference to public domain statistical material, newsletters, supplier estimates and other published sources, supplemented by interviews with industry participants and observers. The output will be an assessment of the state-of-the-art in electronic information processing services and technology. (See Exhibit 1-2 for a preliminary list of data and information sources).

### 1.3.2. TASK 2 : OUTLOOK FOR FORECAST PERIOD

This task involves "scoping" likely events over the forecast period. The scoping process will include the projection of developments affecting existing services and a review of new service concepts, yet to be implemented but potentially relevant within the next 10 years. The likely competitive implications of these concepts will be examined and possible adjustments of overall industry structure will be identified.

The work will involve the identification of service trends, technological developments, market shifts and player strategies, which will affect the existing marketplace. In addition to Nordicity's own expertise in this area, certain external resources will be applied to the task. These will include the inputs of professional industry analysts from Europe and the United States.

The output of task 2 will be a broad definition of likely future

Exhibit 1-2

PRELIMINARY LIST OF DATA AND INFORMATION SOURCES

| | CANADA | UNITED STATES & INTERNATIONAL |
|---|---|---|
| Trade Literature | o Telidon Reports<br>o Canadian Communications Reports<br>o Canadian Communications Network Letter<br>o Cable Communications<br>o Videotex Canada<br>o Computer Data<br>o Broadcast Technology<br>o EDP In-Depth Reports (Evans) | o Videodata/Videotex Report (Link)<br>o Auerbach Reports<br>o Electronic Mail & Micro Systems (EMMS)<br>o VideoPrint<br>o Download<br>o Viewtext<br>o Data Channels<br>o Personal Computers Today<br>o Electronic Publisher (Paul Kagan)<br>o Electronic Market Trends (EIA)<br>o Screen Digest<br>o Communicate<br>o Connections World Communications Report (The Economist)<br>o Cable & Satellite |
| Reports | o Prospects for Cable Downloading of Non-Video Services in Canada (NGL, 10/83)<br>o The Information Economy (Canada Consulting, 5/83)<br>o The Electronic Future (NGL, 5/84)<br>o Technology Forecasts (H&W, 7/84)<br>o New Communications Technologies (NGL, 12/83)<br>o Telidon Behavioural Research Studies (DOC)<br>o Other reports prepared for DOC including Hough and Hickling-Johnston reports | o Videotex (Predicasts, 5/83)<br>o Videotex vs Audiotex (IRD, 8/83)<br>o Downloading & Teledelivery (IRD, 7/83)<br>o Teleshopping (IRD, 4/83)<br>o Teletext and Videotex in the US (McGraw Hill Data Communications)<br>o Microcomputers in the Home (IRD, 1/83)<br>o Other industry studies prepared by The Yankee Group, Fost & Sullivan, Creative Strategies |

| | CANADA | UNITED STATES & INTERNATIONAL |
|---|---|---|
| Conference Proceedings | o Workshop on Application of Telematics & Value-added Services in Office Automation (Telecom Canada)<br>o Cable Expo '84<br>o Canadian Industrial Communications Assembly | o Videotex '84<br>o Electronic Imaging '84<br>o Info '84<br>o Worldcom '84<br>o NCTA Convention<br>o Intelevent '84 (Cannes, France) |
| Data Sources | o Canadian Business Manufacturers Assn.<br>o Statistics Canada<br>o Bell<br>o DOC<br>o Canadian Information Processing Society (CIPS)<br>o Videotex Information Service Providers of Canada<br>o Participants in the Telidon Field Trials<br>o Rogers Cablesystems<br>o Cariboo College (Kamloops, BC) recently contracted by DOC to do a study for the establishment and management of a consortium for the creation of Telidon materials<br>o Canadian Videotex Industry Association | o Information Industries Association<br>o Electronic Industries Association (EIA)<br>o Warner Amex Cable<br>o Cox Cable<br>o Arlen Communications<br>o Kalba Bowen Associates<br>o Compuserv<br>o The Source<br>o MCI/Dow Jones<br>o AT&T<br>o IBM<br>o Time Video Information Services<br>o Times Mirror<br>o Argon International |

service scenarios and information processing applications in functional terms. This definition will be segmented by markets, providing a subject specification and analytical base for subsequent tasks.

### 1.3.3. TASK 3 : FORMULATING SERVICE MODELS

We see task 3 as the translation of the broad service definitions provided by task 2 into specific service categories that will be used in the forecasting process. This will involve the development of detailed economic models for certain key services. As far as is possible, we propose to make the models precise in terms of business concept, technology, and target market(s).

The model development process will involve an examination of business factors affecting each of the services. External inputs to the task will include data, opinions and insight from specialists, each of whom has in-depth experience of a particular aspect of the industry. We have identified for this purpose several industry participants who are actively involved in the commercial development of relevant services. These are business people, who can provide insight into economic forces and constraints affecting the industry.

### 1.3.4 TASK 4 : FORMULATING A METHODOLOGY FOR PROJECTING DEMAND

Task 4 will involve the assessment of alternative approaches to projecting demand both for the specific services modelled in task 3 and for other information processing services which cannot be effectively modelled at this time.

Demand projection tools to be considered include conventional quantitative techniques for such as trend extrapolation, structural and competitive industry analysis, historical service analogy and income and expenditure analysis, as well as qualitative tools. We will consider the pros and cons of these methods and validity issues pertaining to resulting market projections.

### 1.3.5 TASK 5 : PROJECTING DEMAND FOR SERVICES

Following the chosen methodological approach, we will develop demand projections taking into consideration factors specified in the RFP as well as our own extensive experience in related forecasting exercises. In addition to using objective data gathered for tasks 1 and 2, and the output of the economic modelling process, we propose to use a modified version of the Delphi process to synthesize subjective data obtained from a broad panel of electronic information processing experts/users. The panel will be selected to obtain a mix of expertise from a variety of backgrounds. A detailed description

of the QCF technique is provided in section 5.

### 1.3.6. TASK 6 : IMPACT ANALYSIS

In this phase of the study, we will undertake an impact analysis of projected industry developments. This will involve the estimation of overall economic activity implied by our market projections and an estimation of its effect on employment, related industries and the overall economy. We also propose to synthesize the industry and institutional analysis conducted as part of tasks 1 and 2 and assess the impact of projected developments on existing industry players, both from a technological and competitive perspective.

### 1.3.7 TASK 7 : RECOMMENDATIONS

Finally we will present recommendations, arising out of the work, relating to specific areas of intervention which are appropriate. This will include the general specification of government or industry sponsored programmes which could be beneficial in stimulating market development, a prioritization of research and development activity which could be undertaken, and the identification of regulatory options which may be appropriate.

# 2.0 MARKET DEFINITION

## 2.1 TASK 1 OVERVIEW

In this section we will present a review of the existing market situation, identifying, by category, operational services and service trials together with an analysis of market strategies and results. The work will encompass the entire range of electronic informational, transactional and messaging applications which we will collectively define as Electronic Information Processing (EIP). This includes informational services aimed at both broad and narrow target markets, transactional services including banking, teleshopping, general and specialized retailing, electronic mail and messaging and electronic publishing. Related services will be also be examined including downloaded or teledistributed information and entertainment, interactive cable television applications including security and monitoring and specialized informational and public address services used in educational and government contexts.

We propose to first characterize the overall market for information processing services. Our market segmentation will include three broad categories :(1) The Mass Residential Market, (2) The Broad Business/Institutional Market and (3) The Internal Corporate Market. We will then review services contending for these markets, grouping the services into three principal

categories : (1) Data Access and Retrieval Services (2) Transactional Services and (3) Computer-Based Messaging Services. It is important to realize that these service categories refer to functions rather than to specific information processing systems. Thus certain information processing systems, such as Videotex for example, span the different categories, offering data-access, transactional and messaging functionalities.

## 2.2. MARKET ANALYSIS AND SEGMENTATION

### 2.2.1 THE RESIDENTIAL MASS MARKET

This includes services aimed at the general public at home. While potentially the largest market segment, the key market segment has so far resisted substantial penetration by electronic information services. A major problem is the infinite diversity of needs represented by the segment and the difficulty of developing information, transaction and messaging services which can meet the user requirements for simplicity of operation and low cost while providing the desired range of service content and functions.

A key question relating to penetration of the mass market by information processing services is whether information

processing services should look to advertising and marketing-relating functions for the principal revenue source. Are the best prospects for EIP services those which address the simplification of ordinary household activities? If this view of the market is correct, transactional services such as home banking, home shopping, ticketing or program ordering should be prime service contenders.

It is a widely held premise that various kinds of electronic information processing services will inevitably reach most homes. Our objective in analyzing developments to date will be to shed light on the time frame and sequencing of events that will be necessary if widespread residential information processing is to become a reality.

### 2.2.2. THE BROAD BUSINESS AND INSTITUTIONAL MARKET

Services which have penetrated the broad business market include specialized data-base access services for various communities of interest such as the financial sector, providing financial news,stock and commodity information and other investor services; the agricultural sector, providing weather, crop and commodity information and transactions, the legal sector, providing reference and precedent-related information retrieval services; the specialist retail sector, such as travel services aimed at travel agencies; and the general retail sector,

offering merchandising services aimed at both narrow and broad markets.

Of key importance to the exploitation of the broad business market is the development of gateways providing access to a range of services, each of which is able to fill some information processing need more efficiently than a system specifically set up by the user for that purpose. In this way a "supermarket" of information processing services may be accessed by users without special customization of data bases or software.

The institutional market includes government and educational users and has been strategically important for the development of certain services, such as videotex, which is regarded as an effective tool for public communication requirements. For example, the CANTEL database, consisting of 50,000 Telidon-NAPLPS pages containing information on federal programmes, is linked to a network of videotex terminals at storefront Canada Service Bureaux across the country.Telidon-NAPLPS systems are also being used by Canadian museums, Statistics Canada, The Province of Ontario, the Canadian Hospitals Association, and many other public sector agencies and institutions. While much of this activity is publicly funded, the efficiencies provided in information dissemination provide economic validity and justification for the generic service concept, the impact of which is increasingly apparent in the private sector. For

example, public address applications in shopping centres have been developed and are being aggressively marketed developed by Video Press, a joint venture of Cableshare and the London Free Press, both of London, Ontario.

While Canada has established itself as a leader in many of these applications, there are significant developments in Europe, such as the West German Bildschirmtext system, and in the United States. We propose to analyze public and private sector public address applications of videotex, teletext and related technology on a global basis, drawing on the extensive resources and operational expertise which is available in Canada.

### 2.2.3. THE INTERNAL CORPORATE MARKET

The internal corporate market is today perhaps the most advanced of all market segments in terms of demand for various EIP services. Applications which serve the segment are those that increase administrative productivity and/or promote the more effective use of management information. They include electronic mail and messaging services, in-house training of personnel, the access of management information from internal databases and the presentation of information through videotex-like retrieval systems.

As in the broad business market, the gateway capability is an extremely important development for the exploitation of the

internal corporate market. It makes possible a vastly increased range of interactive applications and ultimately permits the linking of public and private EIP services.

## 2.3. THE SERVICES : THE STATE OF THE ART

### 2.3.1. DATA ACCESS/RETRIEVAL SERVICES

#### On-Line Data Base Retrieval

Computer-based data access and retrieval services are being rapidly integrated into every function of the business, academic and professional community. A wide variety of data-bases are made available for on-line retrieval encompassing financial services, such as Dow Jones Information Retrieval Service, general news and data services such as those offered by publishers including The New York Times and Knight Ridder, specialized services such as Lexis which provides legal data and many others. Most data-bases can be directly accessed by any telephone-compatible terminal, including personal computers and dedicated word processors. In addition services have been established providing gateway access to various combinations of data-bases of which the most popular in North America are The Source and Compuserve.

Videotex

We propose to discuss videotex services under the rubric of data access/retrieval services even though videotex technology is equally suited for transactional and some messaging services. Viewed as a data retrieval system, videotex-type services are directly competitive with on-line data-base and data-processing services discussed above. However videotex services are characterized by a tailoring of the information, transaction or messaging service to the specific needs of a target market. Unlike general purpose data retrieval systems, videotex systems therefore presuppose some purposeful selection and organization of the data base, generally to facilitate access by unsophisticated users, or to simplify a frequently used data search and transaction process that is required by specialized user groups.

We propose to review different kinds of operating videotex services, distinguishing two principal categories : (1) Alpha-numeric videotex (ASCII-based) and (2) Full-format graphic videotex (NAPLPS, or European graphic formats). Whereas videotex technologies such as Telidon are predicated on the emergence of fully functional NAPLPS systems, many of the private systems currently in operation are purely ASCII-based. In the review process we will assess the implications of the many videotex field trials which have taken place over the past decade

Teletext

Primarily a one-way transmission application, teletext appears in a variety of formats, which can employ different transmission media. The one-way characteristic prevents truly interactive data-base retrieval, although interactivity is simulated in user operation. Moreover limited two-way applications of Teletext have been developed using, for example, broadcast downstream transmission and a telephone return path. In broadcast applications, the teletext signal may be transmitted on a sub-carrier or via the vertical blanking interval while in cable TV applications, full-frame teletext systems have been implemented which provide the capability to transmit much larger data bases. (About 50 times larger) Typically, the teletext signal is transmitted as a continuous stream of data, where the entire data base is accessible to the user terminal. Frame-grabbing technology permits retrieval of desired pages for display.

Because it is primarily a one-way technology, Teletext cannot compete with videotex for transactional applications. For information retrieval, however it offers some significant advantages. For example, unlike videotex, the size and cost of a teletext system is not proportional to the number of subscribers, so the cost-per-subscriber goes down as penetration

rises. In two-way videotex, the capabilities of the host system computer must be directly proportional to the number of subscribers.

Several broadcast and cable-distributed teletext services are in operation in Europe and the United States. In Canada, the CBC is launching a trial system, project Iris, which will simultaneously serve English and French speaking audiences. In England, the BBC's Cee-Fax and the IBA's Oracle services have been in commercial operation for several years. We will review developments in these and other teletext initiatives, establishing economic parameters for viable teletext development in the context of the overall information processing marketplace.

Cabletext

Cabletext services are one-way information distribution systems deployed by cable television systems. A variety of techniques may be deployed varying from simple stand-alone character-generation to fully formatted Telidon displays. We will examine cabletext in the broad context of options open to cable operators for offering information processing services.

Downloading/Teledistribution

Downloading is the electronic distribution of software (music,

video, games, computer programs) for a central source to remote sites, in such a manner that the software can be used by recipients without further connection to the central source. It includes the selling of computer programs over telephone lines, music over FM subcarriers, video over VHF broadcast networks during otherwise idle time periods and games over cable TV systems. This is an embryonic industry accounting for total sales amounting to approximately U.S.$9 million in 1983

We propose to review the different forms of commercial downloading from a variety of primary and secondary sources both in terms of the current environment and the future outlook.

## 2.3.2. TRANSACTIONAL SERVICES

### At Home and Office Banking

The market for at-home and office banking transactions is potentially very large, although much of the financial services industry has to date adopted a wait and see attitude toward implementation. Over the long term evidence suggests that electronic banking transactions will play an important role in developing transactional service field. Potential benefits to the banks include:

* Profits from the sale of home banking products and services.

* Lower distribution costs if tranasction volumes become large enough to secure economies of scale.

* Expansion of distribution facilities at low cost, without the overhead of retail branches.

* Increased market share and enhanced competitive positioning for aggressive players.

We propose to review the state of the art in home banking, assessing the field trials that have been implemented by third party service providers such as Homeserv and banking institutions such as Chemical Bank's PRONTO service and the Nottingham U.K. videotex-based at-home banking system.

Retailing

Electronic transactional processing services have begun to penetrate the retail industy, although the concept of teleshopping or shopping-at-home is still very much in its infancy. The area has attracted the attention of a number of major industry players including Times Mirror, Videotex America,

Knight Ridder, AT&T, CBS, CompuServe and CompuCard, all of which have or are offering NAPLPS-based videotex systems predicated on exploiting retailing applications. Major merchandisers in the field include Sears, J.C.Penny, Dayton's, Kodak, Mattel, Sony, Coca Cola and Saks Fifth Aveneue. The carrot for these participants if an effective merchandizing service can be developed is a reduction of retail distribution costs and the expansion of market share. We propose to review salient retailing trials and operational services as part of our assessment of the transactional services field

## Other Commercial Applications

Transactional applications via information processing technology have become an established part of many service industries. For example most modern airline, travel reservation, car rental, show booking and other ticketing business depend on computer-based information processing systems. Other service industries are currently making the transition, such as real estate businesses, for example. The key uncertainty in these commercial applications is how and when transactional capabilities will be extended to on-line purchasers of the services.

## 2.3.3. COMPUTER-BASED MESSAGING SERVICES (CBMS)

### Electronic Mail Services

The electronic mail market is divided into public and private (in-house) e-mail systems. To illustrate Exhibit 2-1 shows the present status of the U.S. public e-mail market in terms of the number of messages per month and the share of the market held by the key players. The total of approximately 8 million messages per month, or 96 million per year, includes messages from general access e-mail services as well as computer conferencing messages sent via e-mail services operated by the SOURCE and COMPUSERVE. The newsletter EMMS estimates that as of 1984 the in-house e-mail segment approximately equals the public system segment (see Exhibit 2-1). In the past, electronic mail as a service concept has suffered from a lack of standardization in mailbox systems and the prohibitively high cost of stand-alone electronic mail terminals. The recent adoption of the CCITT Message Handling Facility (MHF) standard and growing use of personal computers has however dramatically changed the outlook. Specialized electronic mail networks, catering to narrowly defined user groups, have begun to appear in Europe and North America as a result. We propose to analyse the strategies and systems deployed by currently operational electronic mail services in the face of these fundamental changes.

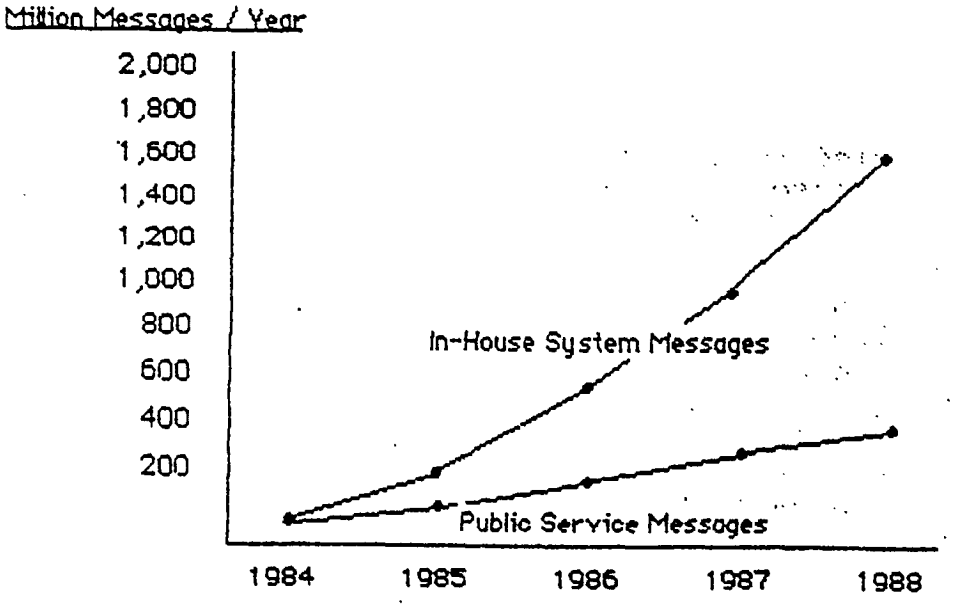
Exhibit 2-1

## ELECTRONIC MAIL SERVICES

CURRENT STATUS OF PUBLIC SERVICES (1984)

| Company | Messages/Month |
|---|---|
| Western Union Easylink | 2,000,000 |
| ITT Dialcom | 800,000 |
| GE Quik-Comm | 750,000 |
| MCI Mail | 700,000 |
| GTE Telemail | 700,000 |
| CompuServe Infoplex | 600,000 |
| The Source Mail | 600,000 |
| Tymshare OnTyme | 500,000 |
| ADP Automail | 350,000 |
| Autonet Unimail | 350,000 |
| CCA Comet | 350,000 |
| Conferencing | 250,000 |
| Total | 7,950,000 |

PROJECTED GROWTH OF IN-HOUSE SERVICES




Source: Electronic Mail and Micro Systems, August 15, 1984.

OTHER COMPUTER-BASED MESSAGING SERVICES

Here we propose to examine other CBMS developments such as the emerging voice-mail businesses and the increasing substitution of telex by services such as Computer Corp of America's Tina, aimed at companies presently sending large amounts of international telex messages. The Tina system permits a 1,500 word letter to be sent from France to the U.S.in 1.5 minutes at a cost of $3.46, while the equivalent message sent via Telex would take some 25 minutes and cost approximately $50. The order of magnitude savings that are possible using electronic messaging presage fundamental shifts in office practices over the forecast period.

2.3.4. GATEWAY SERVICES

We propose to review in some depth the emergence and implications of Gateway services offered by communications network providers to increase the value of their basic service menu. For example as part of its electronic mail service, MCI offers a gateway capability which currently features access to the Dow Jones Information Retrieval service. Similar access is provided by AT&T's Net 1000 service. These gateway services exert a direct impact on the market, for example by increasing exposure of the value added services and by encouraging specialization of the product supplier. In effect, Dow Jones is

enabled to concentrate on service production and content and shift emphasis away from its system operator function.

The rapid growth of such value-added networks, and the increasing number of available on-line database services, is creating a new application for the gateway function as a marketing/distribution vehicle. The gateway becomes a one-stop store for services and, via a single telephone number, users can both access a range of services and freely switch back and forth between them without having to re-initiate dial-up and log-on. At the end of the month they receive a single consolidated bill and the gateway operator handles payment to the individual services.

Gateways thus act as major stimuli on the EIP market. We propose to identify and classify the gateway systems and to assess how their development will impact the business economics of EIP service vendors. For example, the conventional model of videotex system operator economics reflects traditional distribution mechanisms and simply assigns delivery costs to the end user. It assumes that the user buys the service directly from the system operator and generally does not provide margins on the delivery function that would be significant to accommodate third-party service distribution. In effect the delivery component has been operated as a loss leader in order to sell the service. While this analysis suggests that delivery charges to the consumer will rise in the event of third-party

P 34 missing

# 3.0 THE FUTURE : MARKETS, TECHNOLOGIES AND APPLICATIONS

## 3.1 TASK 2 OVERVIEW

The objective of work in this stage is to assess the outlook for various EIP services over the ten year forecast period. We propose to identify and assess the likely impact of market and technological factors and to project the evolution of specific services in general terms. To do this we will first identify historical trends in information processing markets, technologies and applications and assess their relevance to individual services and undertake a critical examination of historical growth rates in the various sub-segments of the EIP market and identify projectable data. We are keenly aware that trends based on historical data cannot per se provide an adequate means of forecasting the future. However such trends provide a base by which to formulate forecasting assumptions, and permit certain observations and inferences to be made which are useful in understanding future events. A more detailed discussion of how quantitative data will be used in the modelling process is provided in section 4 of this proposal.

Having established fundamental trends or directions in service evolution, we propose to build up a picture of the prospects for individual information processing services. Since these services are premised on business concepts which arise at the junction of market and technological forces we propose to

analyze future service developments by by combining input from a market perspective and a technological perspective. The market perspective, is a "top-down" approach, predicated on the identification of communication needs in specific market sectors. The technological perspective is a a "bottom-up" approach predicated on the functionality of different electronic information systems. In combination, these perspectives will allow us to specify in some detail development paths for the individual services.

Finally we will review key structural factors affecting the industry's future. In particular we will identify the roles and interests of major players in the industry and the possible outcome of competitive interplay in the implementation and marketing of EIP services.

## 3.2 TREND IDENTIFICATION AND ANALYSIS

In 1984 the U.S.-based Information Industry Association estimates that its members will generate some $3 billion in on-line service revenues following a 10-year historical trend of 32% compound annual growth. We propose to develop an overall perspective of the development of the EIP markets by reference to public domain statistical material, trade associations, industry newsletters, supplier estimates and other published sources. We will review historical developments over a ten year period (1974 to 84) and identify general growth trends. By analyzing this and other data, we will be able to present an assessment of factors bearing upon the emergence and definition of the overall market, as well as individual market segments and their inter-relationships.

## 3.3 ASSESSING MARKET CHANGES

Needs for information processing may be served in different ways, and in different combinations, by available services. We will assess likely developments in the need structure, following the broad market segmentation structure discussed in section 2. Forces affecting each of the market segments will be identified and prospects for growth of demand will be assessed. For example in the mass residential market we will examine the effect of

changes in income and expenditure patterns on the demand for goods and services potentially substitutable by EIP services. In the broad and specialized business market, we will assess changes in overall patterns of using information. Thus implementation of EIP services in business may be seen in terms of a shift from conventional centralized systems through to distributed systems and finally integrative systems. We may identify these stages as follows:

Stage 1 : Management Information Systems (MIS)

Monolithic and centralized. Many may exist in parallel within each corporation.

Stage 2 : Distributed Data Processing (DDPS)

Functions are outloaded to remote processors, but information structure is still centralized, despite star configuration.

Stage 3 : Integrative Data Processing (IDP)

Three separate functions, computing, communications and electronic office equipment are integrated through software or gateways.

Following this approach we will define the current situation as

stage 2, and our key research objective will be to identify forces motivating the transition to stage 3 and constraints on this process.

An important output of the analysis of market changes will be the identification of market niches and/or discrete sub-segments in each of the major market segments.

## 3.4 ASSESSING TECHNOLOGY CHANGES

We propose to assess developments in the principal technologies associated with the delivery of EIP services. We will analyze the technological developments which determine how service capabilities are evolving and assess the implications for the users of the service and thus the service provider. The assessment will cover specific technologies and developments in computer-based information processing systems and software as well as transmission media and terminal equipment. In addition we will assess developments affecting the user interface (hardware and software) and assess how these in turn impact prospects for services. In the remainder of this section we will highlight some of the specific developments we propose to examine to set the context for our work.

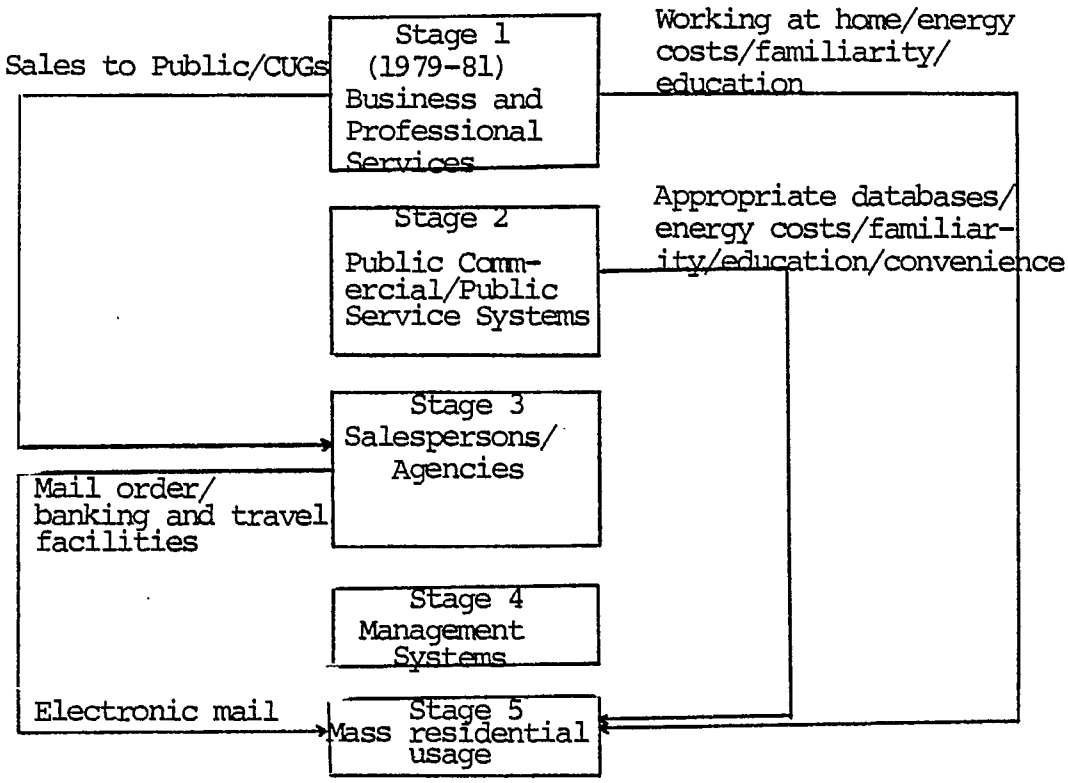
It is important to realize that for many EIP applications, such as videotex, the first steps in market development have been

truly technology-driven. The technological capability has evolved well ahead of any exploitable market demand and this has resulted in the charaterization of specific services in primarily technical terms. We do not propose to follow this practice. While it is clearly essential to anticipate the ramifications of technical developments affecting EIP applications, a technologically-based characterization of services is not appropriate for demand forecasting (which must look to services as businesses rather than as technical functionalities).

We propose to draw from the technology assessment process an overview which will assist us in confirming or rejecting assumptions regarding the direction of development for specific services. For example, considering the application of videotex Exhibit 3-1 provides a view of the evolving videotex market where the thrust of development activity moves from an initial emphasis on limited professional applications through to mass residential useage. Stages of development include, sequentially, the use of videotex for specialized closed-user group purposes, its adoption for public information systems, its adaptation for business-related information and transaction systems such as retailing, the emergence of corporate management information and communications systems and finally its exploitation by utility networks for general business and residential users. Gathering evidence which permits us to confirm or reject this and/or other evolutionary models will

Exhibit 3-1

VIDEOTEX: HYPOTHETICAL EVOLUTIONARY MODEL




Source: NGL

assist the formulation of forecasting assumptions.

### 3.4.1 MICRO-COMPUTER DEVELOPMENTS

The current microcomputer boom will likely continue to influence the market for EIP services in a very aggressive and positive fashion. A recent study by International Resource Development estimates that by the end of 1984 there will be an installed base of 7.7 million personal computers, of which 2.3 million will be in businesses and 5.4 million in homes. Some 25% of business micros will be equipped with modems and this percentage is predicted to increase to over fifty percent by 1987. Link/IDC estimates that by 1987 there will be almost 60 million personal computers installed in the U.S., 19 million of which will be in business. Other industry estimates project 110 million by 1990 of which 40 million will be in business. Exhibit 3-2 summarizes personal computer penetration projections through the forecast period.

The personal micro-computer dramatically alters the outlook for EIP applications by bringing about a convergence of technologies across different service fields. Most significantly, with the addition of a RS232 port and modem, low-cost micros can be used to receive and provide various data retrieval, transaction and messaging services, communicating freely with service providers and other micros.

## EXHIBIT 3-2

## PERSONAL COMPUTER PENETRATION IN CANADA AND THE US

A. Installed Base

| | Business | Home | Total |
|---|---|---|---|
| 1982[1] | 1.5 | 1.7 | 3.2 |
| 1983[2] | 2.3 | 5.4 | 7.7 |
| 1984[3] | 5.2 | N/A | N/A |

B. Shipments in 1984 - Business Only[3]

| | |
|---|---|
| IBM | 1,480 |
| APPLE | 370 |
| RADIO SHACK | 350 |
| AT&T | 65 |
| COMPAQ | 80 |
| DEC | 80 |
| ALL OTHER | 500 |
| TOTAL | 2,920 |

Sources:
1 Link Resources 1982
2 EMMS February 1983
3 EMMS December 1983

The implications of micro-computer developments for the penetration of videotex services are far-reaching. Until the arrival of the micro computer, the general exploitation of videotex was marooned on the chicken-and-egg issue of terminal cost. Simply put, the volume of demand was insufficient to attract the entry of telepublishers into the field and the resulting small market was unable to yield the required decline in terminal production costs. The micro computer has thus changed the outlook for this specific service in a very fundamental way.

While initially micros were limited in terms of their ability to provide services such as videotex, most personal computers can now provide these services through the addition of simple software and firmware. (i.e. expansion cards). Indeed, for the IBM PC and its clones, the addition of an enhanced colour graphics board or a Telidon/NAPLPS decoder board along with the required software, transforms the computer into a fully-fledged SRM-conforming NAPPLS terminal.

Micro computer developments are also central to the future of electronic mail systems. As with videotex, stand-alone electronic mail has suffered from the chicken and egg problem of terminal cost. Personal computers provide a solution because their purchase is justified independently of their ability to send electronic mail. The small incremental cost of equipping a

PC to access e-mail systems can no longer be considered a significant barrier to development.

In assessing the outlook for other EIP services over the next 10 years, it will be essential to analyze areas of potential growth and development within the micro-computer industry. We propose to identify and project new developments in micro technology which are likely to affect EIP services, including networking, multi-tasking (concurrency) and high speed data processing as well as likely next steps in personal computer design and application. Today, most PCs feature monochrome display and are concerned with static, character-oriented applications. Future developments, already discernible from industry trends, will emphasize colour pictures which can be rapidly created and moved around. Graphics-oriented environments which utilize windows and icons such as the Lisa-Macintosh system, will become widely adopted.

We will also examine innovative computer-based office automation products which directly affect the outlook for EIP services such as Prod/Net, developed by Computer Corp of America, part of the Toronto-based Crowntek conglomerate. Prod/Net is a series of hardware,software modules that integrate a series of functions including word processing file translation, local area networking and gateway access. It can be thought of as an umbrella system designed to support many thousands of corporate users with integrated electronic mail, document distribution and and filing services.

### 3.4.2 TRANSMISSION MEDIA

One of the central questions facing phone-based information processing services, is the problem of economically supporting communicating between a large base of residential subscribers within a metropolitan area and the handful of major service operators serving that area. For applications such as videotex, the local telephone exchange remains a critical bottleneck for local distribution. Alternative transmission media such as multichannel MDS or coaxial cable offer promise for solving this problem but raise a variety of others.

We propose to examine the potential of cable-based information processing services such as the MetroNet interactive cable data network and Communicom videotex terminal products developed by General Instrument. Difficulties associated with cable distribution include the industry structure, comprising many different individual operators ranging from sophisticated Fortune 500 companies to "mom and pop" operations, the lack of truly two-way capable plant (significant upgrading required by many systems to permit reliable upstream communications) and the general reluctance of the cable industry to invest in data services.

### 3.4.3 TERMINALS

A study published by the Institute for the Future in 1982 stated

that " there is no single piece of technology that constitutes a videotex terminal," and that "the evolutionary path of the terminal will be determined by the trade-offs between costs and the various attributes required by videotex services and by market demand." (Teletext and videotex in the United States, 1982) In the forecast period, we will encounter a number of distinct but potentially incompatible terminal implementations. The effect of this is that there will need to be either a set of system processors to accommodate the varying terminal types or single system processors having multi-protocol capabilities. In the shorter term it is likely that multiple information services will have to serve individual users with terminals of varying capability. As a result information and service providers will have to accommodate multi-protocol end-user configurations.We propose to address significant uncertainties relating to useage of terminals for EIP services, including the role of the dedicated user terminal in the context of widespread adoption of micros.

### 3.4.4 THE USER INTERFACE

Of primary importance to the future development of computer-based services is the evolution of the software, protocols and languages which jointly constitute the user interface. The development of truly friendly user-environments is a precondition for the effective penetration of the mass market by

any EIP service application. Poor user-environments will act as a constraint to service development and effective implementation. This is a key concern for the commercial development of videotex, for example, where the organization of the data base has to be designed to permit a variety of user functions. While a particular design may be suitable for one function, it may severely impede another. An analogous situation is the over-friendly personal computer program, designed purely for the impatient novice, which subordinates flexibility and versatility to the requirement for minimal user-training.

We propose to investigate a series of issues which affect the user interface. These range from the design of teletext menus to the effect of inter-system protocol incompatibility on the development of electronic mail. Social and psychological problems to be addressed by a successful videotex system, for example, would include:

* Simplifying dial-up and log-on procedures

* Modifying the tree search structure to permit effective browsing

* Sophisticated implementation of keyword searching and self-prompting features.

## 3.5 ASSESSING THE OUTLOOK FOR SERVICES

### 3.5.1 EG. OUTLOOK FOR VIDEOTEX IN CONSUMER MARKETS

Revenue strategies

A key question underlining the form in which videotex will develop revolves around the most effective revenue structure. Put simply, will videotex service be most effectively marketed as an advertising medium, where a substantial or majority of the revenue stream is provided by the suppliers of the content, or as a product, where the revenues come mainly from the consumers of the content? Seen one way, the measure of success of videotex is the amount of time subscribers can be induced to spend with it. Seen the other, the measure of success is the amount of money they are willing to spend for the actual content (benefit) of the service.

The medium vs product issue raises fundamental concerns for the industry since the alternatives call for different business strategies. The higher the quality of the graphic image, and the more time and trouble taken to construct the retrieval structure, the better may be the advertising revenue prospects. But such content development is expensive, and not necessarily justified on a pure product basis. For many user purposes, non-graphic, ASCII-based, videotex systems may in fact be able to

generate comparable user revenues to the full NAPLPS versions.

A similar strategic question for Videotex operators relates to the service emphasis. Videotex is a hybrid technology which serves the purposes of both information retrieval and transactional services. The conclusion of an early European-based analysis was that consumer desire for information could not be the driving force for the market. Instead, the analysis suggested that transaction services will be the preferred product. Three factors were identified in this analysis: the efficiencies afforded in overall cost and effort, cost savings to the service provider and price-inelasticity resulting from the low price of the transaction service relative to the value of the transaction itself. We propose to critically examine this assessment in the context of recent developments in technology and user preferences which are being established by both European and North American system operators.

## Competition

Videotex service providers will have no monopoly on the delivery of electronic information and transactional services to target markets. Many functions initially ascribed to videotex can be effectively provided by communicating micro computers. In fact the PC can often perform more sophisticated versions of such functions because Videotex, by definition, limits the amount of computational power available to users in favour of obtaining

the most cost-effective access to pages of information by large numbers of simultaneous users. In effect the very differentiating characteristic of Videotex is also its greatest competitive liability. By drawing on specialist opinion we will project the implications of these constraints over the forecast period.

An essential ingredient in our analysis will be an assessment of the way in which ASCII and NAPLPS videotex systems may co-exist. Applications which primarily require amounts of computational capability, or which employ static information that can comfortably reside in PC-based storage may be done via PC alone. Applications involving very large data bases and/or simple retrieval of highly dynamic data, will tend to make use of videotex. Neither method will likely be used exclusively in either context.

Exploiting the Mass Market

Unlike the business sector, Videotex exploitation of the mass residential market may not be directly tied to the penetration of the home market by micro computers. Thus while home micro-computer sales have climbed rapidly in recent months, there is little evidence of programs or home-computing applications that can sustain the growth rate and encourage the widespread utilization that is seen in the business sector. There is, as yet, no home equivalent to programs such as Visicalc or Lotus

123 which were pivotal in generating momentum in the business micro market. The primary use for home computers at present is video games and there are indications that the demand for this particular service may have already peaked. Evidence suggests that other functions which could potentially drive the home market revolve around simplifying daily tasks rather than massaging words and numbers, and so far the available software for this is inadequate.

However this may be potentially bullish for Videotex in that the very applications sought by homeowners from microcomputers are those which Videotex systems can provide. In effect Videotex is ideal for the relatively simple transactional services such as home banking and home shopping. Moreover the graphic capability of Videotex permits its content to be structured as entertainment rather than pure information, consistent with home requirements. In this way, Videotex may assist the ultimate success of home computers by providing the product which has been lacking to date. If this is true, the potential market for Videotex is very large, even though the timing of penetration may not necessarily be within our forecast period.

### 3.5.2 EG. OUTLOOK FOR TELETEXT

International and domestic observation of the teletext industry today suggests that widespread acceptance is likely within the

next ten years. Teletext delivers information at low cost and provides substantial economies of scale. Moreover transmission facilities (broadcast and cable) are fully established. However as with Videotex, the identification of viable market niches for teletext operators is an ongoing process.

Successful implementation requires focussing attention on the way in which the product - information - can be packaged to stimulate consumer interests. Possible future developments here include the development of innovative systems for simulating interactivity so that the user can "dialogue" with the data base, using telesoftware to allow, for example, game playing, or problem solving applications. As an example of this, stock market information might be continuously transmitted and a telesoftware program might be provided to allow the user to calculate or monitor his own portfolio. The ability of the viewer to effectively control and enjoy data access, and to use the information provided in a constructive way, may be a useful way to stimulate demand.

In examining the outlook for teletext we will review significant recent industry developments such as the relatively recent decision by Time Inc to abandon its teletext service development program. This decision was made following a substantial investment of resources into business planning and product development. We propose to review the implications and rationale for this move as part of an overall examination of the

competitive restructuring of the information processing marketplace.

We will also examine the competitive relationship between teletext technology, videotex and downloaded services and review the prospects for hybrid systems. For example, a hybrid approach to Videotex-Teletext has been advanced for data retrieval applications, where Teletext is used to reduce the load on two-way videotex systems in cases where perhaps 90% of accesses to the system is to 10% of the data base. Here teletext can provide an efficient way to deliver the most frequently-accessed information. In transactional applications teletext downstream transmission might be used to provide ordering information, switching to videotex mode for the actual transaction and to an electronic downloading process for product delivery. The switching would be automatic and totally transparent to the service user.

### 3.5.3 EG. OUTLOOK FOR ELECTRONIC MAIL NETWORKS

We propose to identify and quantify key developments in electronic mail networks including the formation of specialized e-mail networks serving closed user-groups and development of many other private (in-house) e-mail systems. Industry newsletter EMMS predicts explosive growth of in-house messaging over the forecast period with the number of messages per year in the U.S. alone escalating from 95 million to over 1.7 billion

over the next 5 years. By contrast EMMS anticipates that growth in public e-mail services will be much slower, growing perhaps from 95 million to 450 million. Contributing to this trend is a projected migration by corporations and large business users from public to private networks. As a significant component of this part of the project, we will examine the implications of workgroup system software for micro-computers which will permit file and peripheral sharing by multiple users. In-house electronic mail is seen as a primary beneficiary of such software, which will interconnect work groups within an office, permitting the automation of many tasks that are now done manually.

## 3.6 ASSESSING STRUCTURAL DYNAMICS IN THE EIP INDUSTRY

We propose to assess certain structural characteristics of the electronic information industry by identifying the strategies of principal industry players. These business entities, including communications carriers, media conglomerates, cable television operators and telepublishers, are frequently associated with proprietary services or technologies which cut across the services spectrum. They include such players as AT&T, IBM, MCI Communications, Dow Jones & Co.,GTE, Western Union, Knight-Ridder, Readers Digest, The Times-Mirror Group, and Cox Communications, amoung others. The high marketing costs associated with many information processing services place these

larger established companies in a superior position for new service exploitation, forcing smaller entrepreneurial businesses into more specialized market niches.

## 3.7 WORK INPUTS AND PARTICIPATION

We have described the work to be covered in this stage in some detail because it is fundamental to the model development and demand forecasting stages that follow. It will provide the infrastructure on which the economic models are constructed and the demand forecasting assumptions are based. We believe it will be necessary in this stage to survey international experience with some intensity in view of the high degree of migration of technological and market experiences in electronic information processing. We therefore propose to undertake the work in this stage on a global basis, with equal emphasis on Canada, Europe and the United States. To assist Nordicity in this we have arranged for the direct participation of professional industry analysts in Europe and the United States on the work, described in section 8.

# 4.0 FORMULATION OF SERVICE MODELS

## 4.1 TASK 3 OVERVIEW

The objective of work in this stage is to translate the generalized outlook for services into mathematical models which simulate the economic operation of specific services. The models will be used to as an integral part of the demand forecasting process. They will define the product for which demand assumptions and estimates are constructed, creating a frame of reference for the various demand forecasting procedures. Most importantly, they will provide a common focus for the generation of expert opinion on the likely development of demand, which is a central part of our proposed forecasting methodology. (Refer to sections 5 and 6).

We propose to undertake the modelling process in detail for services aimed at Canadian markets, and in a more general way for those aimed at offshore markets. As a preliminary to the work it will be necessary to distinguish between services that can be usefully modelled and those which cannot. This latter category will include those services where the direction of evolution is unclear or where available data is insufficient for modelling purposes. At a minimum we would anticipate modelling varieties of Videotex, Teletext and Electronic Mail services.

The modelling process will require an in-depth understanding of the commercial and economic viability of different sectors of the EIP industry. It will result in quantitative business models of the targeted services, each of which will be defined in terms of market, service concept and technology deployed. To the extent permitted by the overall EIP developmental and environmental situation, we propose to identify precise marketing, revenue and cost scenarios for each service over the forecast period, which in total will permit an appreciation of the overall pattern of economic activity.

## 4.2. WORK REQUIREMENTS AND PARTICIPATION

A key requirement for successful completion of work in this stage is the concentration of business expertise on specific modelling issues. In order to be of value, the models should reflect to the greatest extent possible the commercial realities of implementing services in the marketplace. To assist us in this exercise, we therefore propose to directly involve a team of market practitioners. These will be business people actively involved in providing information processing systems or services to different markets. We will draw primarily on Canadian expertise, since as described above the modelling process will be undertaken in detail only for domestic markets.

Members of the team will also be asked to submit discussion

memoranda on (1) business observations and inferences based on their operating experiences and (2) cost and revenue facts/hypotheses/assumptions pertaining to specified services. The team will also review work discussed in section 3 regarding future events and the specific outlook for key services. They will also critically review the output of the economic modelling process, providing input where appropriate.

## 4.3. INTEGRATING DATA FROM OPERATING TRIALS AND SERVICES

Our ability to effectively model the business parameters of EIP services will be heightened by the accumulation of evidence from field trials and start-ups of commercial services. Because most of the cost and revenue characteristics of services change radically as they are scaled up from the market-trial stage to commercial operation, the evidence of trials alone is not a substitute for quantitative modelling. However, when the two approaches are combined, useful intelligence on future patterns of activity can be accumulated. In effect the two activities are complementary. The modelling work helps to identify the key business uncertainties, whereas the trials and start ups provide data that can be incorporated to make the models more realistic. Throughout, the quantitative modelling process provides a framework for calculating what these data, when obtained, imply for the potential profitability of future applications.

## 4.4 ILLUSTRATION OF THE MODELLING PROCESS

While the specific modelling process will vary from service to service, we provide for illustrative purposes a general description of an approach that could be taken to the modelling of one key sector of the industry : mass-market residential videotex (pure videotex system operator as opposed to an information provider). A similar approach could be used for analyzing other EIP businesses such as the information provider business, broadcast teletext or cabletext services, specialized electronic mail service, and indeed corporate applications of videotex.

On the cost side the approach would involve analyzing and costing the various delivery systems capable of providing the service to the residential market. For example, videotex might be delivered via a two-way residential cable system in which the system operator supplies user terminals, either configured into or separate from the cable converter. Alternatively it might be delivered via a telephone-based system where the terminal are assumed to be videotex adapters, or firmware inserted into personal computers. In each case an assessment of the operator's required capitalization and operating costs will be made, drawing on data supplied by the team of specialists.

On the revenue side the approach would involve the identification of different revenue sources such as direct

expenditures by subscribers (primarily on information services), advertising, fees from financial transaction services and fees from retail "shop at home" transactions, messaging and miscellaneous "supplier-financed services such as online information and reservation systems.Pricing would be arrived at by an assessment of current market practices, needs analysis, competitive and substitutable service pricing, efficiencies gained and other related factors. Determination of pricing would also require an examination of household expenditures for related services, together with an appraisal of the whether expenditures on videotex would cannibalize or increase the current amount expended.

Changes in costs, pricing and revenues would be predicted for the forecast period, drawing upon the work completed in earlier stages of the project. The effect of forecast technological and market changes would be considered and factored into the analysis. The model would thus permit an assessment of rates of return for the specific service over the period. Conclusions drawn about the economic viability and profitability of the service would in turn provide a basis for the refinement of industry and competitive trend projections. (Since it must be assumed that developmental energies and entrepreneurial activity will gravitate to the area promising highest economic returns.)

## 4.5 APPLICATION OF THE ECONOMIC MODELS

The models will be used in a variety of ways to assist the formulation of demand projections for the services. This may be done both by directly projecting demand from the models, under varying growth assumptions, and by using the models as a focus for gathering subjective data on demand, a process which is discussed in detail in sections 5 and 6. The modelling exercise will also impose a fundamental discipline on the overall task of demand forecasting, forcing more concrete specification of operational issues. In addition, as mentioned above, the exercise provides a useful feedback system, and can be used to refine industry and competitive analysis described in section 3.

It should be stressed that the extrapolation of demand data from economic models will comprise only one part of the overall forecasting task. As discussed in section 5, we propose to utilize a variety of tools for this purpose in order to validate step in ask of ways. This multi-tool approach will help the process of validating demand projections. Moreover since modelling is not appropriate for all services encompassed by the study, the multi-tool approach provides an essential way to round out the analysis and provide the basis for an developing an overview of demand growth.

# 5.0 FORMULATION OF DEMAND METHODOLOGY

## 5.1 TASKS 4 OVERVIEW

As pointed out in the RFP, there is no generally accepted methodology for estimating demand for new electronic information services. (Or indeed for any new service of this kind.) However a variety of different approaches have been used in previous exercises of this kind, which may be both relevant and useful here. In developing an appropriate demand methodology we will consider these different methods, bringing to bear Nordicity Group's experience in undertaking other directly comparable demand estimation projects. We will assess their advantages and disadvantages and draw conclusions as to how the value from each might be accumulated within the parameters of the project. Below we briefly describe some of the techniques that will be considered,

The techniques include direct projection from historical data and established trends, projection by historical analogy, projection based on income and expenditure analysis, projection based on industry structure and competitive analysis and projection by expert industry opinion and/or consensus. It is emphasized that in developing this proposal, we have already spent considerable time in evaluating these techniques and have reached initial conclusions about the overall preferred methodology. Project work anticipated under the task of formulating demand methodology, will therefore comprise the

further refinement of this preferred approach.

## 5.2 ASSESSMENT OF OBJECTIVE TECHNIQUES

We define objective techniques as those which use empirical data to provide the basis for projections. Whereas many such techniques are available, their universal premise is that future activities can be estimated on the basis of past experience, a premise which makes them potentially highly vulnerable to forecasting error. The essential problem is that new technologies and services do not exist in a static environment but exert a dynamic force on the market place, which may impact and shift its course in various ways. This is particularly true in the case of the information industry, where the introduction of new services can have a dramatic effect on the social and working environment, since these services fundamentally change the way things are done.

Nevertheless, objective techniques impose an important discipline on market demand forecasting, and the utilization of a combination of such techniques can produce reliable results. Projection from historical data and trends is a direct approach, involving the extrapolation of observable movements in the market to the forecast period. It provides a baseline projection which can be extremely useful, particularly for comparison

purposes. The historical analogy approach is a more complicated technique which can also make a valid contribution. Its essence is to consider the development of new services in the light of how other successful innovations have grown in the past, using actual historical data where available.

The historical analogy method was developed some 15 years ago for forecasting demand for new information transfer services. Like the present study, the context of the original use of this method was to assess the growth for aggregated, cross-cutting telecommunication services. It involves the collection of sets of time series data on various products and services and the synthesis of demand growth patterns from this data. Typically, an averaging method is used to combine the data sets and produce a pattern or model which can be applied to the new service in question. The inherent limitation of the approach results from this averaging process since it tends to mask the variations in the data sets. Moreover the technique begs the question as to which of the data sets is actually relevant to the specific service projection issue.

Income and expenditure analysis provides a third alternative route to the estimation of demand. This approach has to do with the income and expenditure patterns of the target market and proceeds by estimating the amount of money available for the consumption of the services in question. We believe that this approach can be extremely useful in demand forecasting

particularly for residential or mass market applications, even though it is subject to inherent limitations. The logic of income and expenditure analysis is that revenues for new services are associated with the alteration of current spending patterns and that by analyzing these patterns one can make intelligent statements about demand. The approach also involves the analysis of service or product substitutability, since subscription to a new service generally replaces some previous service, at least in part.

Income and expenditure analysis applied to the mass market demand for information processing services generally involves an assessment of the proportion of household budgets spent on information and communication. While this varies from country to country, within any one country the proportion of income spent on this category of goods and services has remained relatively stable over time. A conservative projection approach does not generally assume any major reallocation of the household budget. Instead it assumes that households' expenditures on information services will be diverted from other information-related goods and services. Thus likely sources of revenue for these services are approached by estimating the likely diversion of funds from existing non-electronic businesses. This method of deriving revenue estimates for a service is conservative to the extent that a new communication medium with exceptionally attractive qualities can generate additional (i.e. new) revenues as well as divert existing (i.e.old) revenue streams from other communications media.

## 5.3 ASSESSMENT OF SUBJECTIVE TECHNIQUES

Subjective techniques we define as those which are based on inference or opinion and which generally involve moving from non-quantitative observations directly to quantitative conclusions. Such subjective techniques are not necessarily less reliable than the objective techniques discussed above, and their use allows for the deployment of direct insight and experience in the forecasting process. Moreover these techniques permit the application of non-quantitative industry and competitive analysis and conclusions, which can be a highly productive in demand forecasting. However subjective techniques are also vulnerable to distortion, a problem which is aggravated by the lack of an empirical foundation. Thus when using these techniques it is essential to collect and analyze data in a rigorous and systematic fashion. Otherwise, they will yield results which are either invalid or suspect by virtue of various factors such as unstated assumptions or lack of replicability.

A variety of procedures are available for collecting and modelling subjective data so that it can be reliably incorporated within a forecasting process. For example, expert opinion can be solicited within a framework which encourages the challenging of assumptions and hypotheses in an attempt to find a defendable proposition. By the use of group judgement and decision making through a series of iterations, movement toward

consensus can be encouraged, the resulting product,being a collectively validated view or opinion. A key problem is to avoid counter-productive group dynamics which can freeze out minority or non-mainstream views, even when they are valid.

## 5.4 COMBINING OBJECTIVE AND SUBJECTIVE TECHNIQUES

In choosing an appropriate demand methodology we propose to combine both objective and subjective techniques. The "objective" approach will be grounded in our detailed work plan for assembling and assessing data pertaining to the current state of the art and the outlook for EIP services. This work will result in a projectable data base to which we will apply trend analysis and other direct projection techniques to provide initial demand ranges for the various services. We will also compare the ranges with comparable data from other related experiences, using historical analogy techniques where appropriate. In the case of consumer markets we will employ income and expenditure analysis as a check on our projections. The result of this work will be a series of empirically derived forecasts for individual service applications.

The "subjective" approach will be grounded in the detailed models, built from industry experience with the assistance of our team of specialists. The models will be used as the basis for opinion collection from a separate broad panel of

users/experts in information processing using the QCF survey approach. Through an iterative survey process forecasting assumptions will be tested and either confirmed, rejected or modified. The result will be a consensually validated expert view of the likely evolution of demand for the specified services. This forecasting approach is now detailed below.

## 5.5 FORECASTING APPROACH

Forecasting models and quantitative predictions are essential aspects of this study; forecasts are required for technology costs, services, overall market demand, etc. Our workplan involves stress on a planning and model specification stage, where specific details of the forecasting approach will be developed. In this section, however, we will present the broad outlines of the methodology and approach to be utilized in this study.

As discussed earlier, we begin with the premise that pure modelling of objective data is not a valid stand-alone methodology for obtaining the required forecasts. In other words, extrapolations, curve-fittings of various kinds, econometric models, diffusion models, etc., all have numerous structural assumptions inherent in them which would make their

application extremely risky, at least in an auto-projective* sense. The other side of this is that subjective methods, unless the data are collected and analyzed in a rigorous and systematic fashion, will yield results either equally invalid, or certainly with a large element of credibility problems (due to unstated assumptions and lack of replicability).

What is thus required is a scientific method of collecting and modelling subjective data, incorporating where possible existing objective data.

There are two basic ways in which we proposed to do this:

* in eliciting opinions and predictions from experts/users in the formats described later, we intend to present as input summarized historical data. By presenting this information in a uniform and concise way, we will make better use of the experts' knowledge by assuring more similarity and accuracy in their starting-points

* In other words, letting the structure of the past determine on its own the predictions for the future.

* depending on the nature of the data, we may use historical data models as a format for expert input. For example, analysis may convince us that a logistic diffusion model is appropriate for a particular forecast. We would then frame our questions to the experts in a way which would elicit their comments on the parameters of the model (eg. where the inflection point will occur).

The major point in this discussion is that these extrapolative methods on their own, are far from adequate. The opinions and perceptions of experts and users, tailored by knowledge of relevant extant data, will yield the most satisfactory forecasts.

## 5.6 OVERALL FORECASTING METHODOLOGY

In all the forecasting with which we are dealing in this proposal, the forecasted variable is a function of a number of other factors (eg. forecasted long-term market demand may depend on costs, terminal devices, service types, etc.). In other words, we will always have, at least conceptually, a mode:

$$y = f(x_1, x_2, \ldots . x)$$

Whether one uses objective or subjective methods, there are basically two ways to forecast future values of y:

* a direct assessment of y, disregarding the relationship to the independent variables (this would be the pure auto-projective techniques, like Box-Jenkins, if we used objective data)

* forecasting of the values of the x's, modelling the relationship between y and x's, and then estimating a value of y.

Because we will be ocunting on experts to supply us with the necessary forecasting data, it is possible to utilize both techniques. We believe the second method is better, in the sense that it allows us to better understand the rationale behind forecasts and also allows us to see the effects of different scenarios (and potentially the effects of certain actions which may be in the Government's power, like regulatory). However, the first method will be extremely useful as a confirmatory check on the predictions. It should also be added that our Qualitative Controlled Feedback method proposed for data collection will allow us to work from method 1 to method 2, i.e., go from the direct predictions to some of the structure underlying it. This occurs via the modelling of the reasons stated for the forecasts;

in other words, changes in the dependent forecast is modelled on the reasons stated for the forecast. By carrying this out, we will get additional insight into the model relating the forecasted variables to its explanators.

To summarize our overall approach, we have the following:

* summarize and analyze existing objective data. Model specification (not estimation) will be done as appropriate here. Specification must, however, go so far as to determine the relevant explanatory variables for each required forecast

* pose to the experts/users a series of questions to systematically and rigorously determine:

  - forecasts of the y's

  - forecasts of the individual x's

  - structural relationships between the y's and the x's.

There are a number of ways to obtain the direct forecasts of the y's and x's. these range from direct estimation (how likely is that...) to comparisons with other events, such as throwing dice.

The specific format will be worked out in the planning phase of this study. It should be mentioned, however, that all such forecasts are seen to be probalistic in nature. We believe building this into the forecasting process yields more meaningful results than the alternative of eliciting deterministic predictions.

The modelling side, relating the forecasted variable to its explanators, will be a direct result of the interviewing/questionnaires process (although it may be supplemented by model specifications coming from analysis of historical data.). This would be a straightforward simulation where predictions would be made based on various scenarios. For example, demand for services would be elicited under various configurations and situations (pricing, technology, etc). The key part in the design will be understanding that, from a modelling point of view, what you are doing is fitting a response curve to data. This means the scenario variables must be selected and spaced with experimental design considerations in mind. It is thus similar to conjoint analysis, except that:

* direct forecasts, not preferences, are of interest

* continuous, rather than categorized, explanatory variables are of interest

* relating to the above point, it is the functional relationship, not just individual utilities which are of interest. This means, of course, that traditional conjoint analysis methods, like MONANOVA, are inappropriate, since we are interested in determining the best function.* We would thus use various types of linear and non-linear regression functions in fitting a response curve.

This completes our general description of the conceptual forecasting approach. Next, we present a structure of data collection and analysis which allows us to use the knowledge of experts and users in a systematic and rigorous fashion.

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* MONANOVA operates by maximizing fit over all monotonic functions, no matter how meaningful, and does not in the end output the actual function used.

## 5.7 QUALITATIVE CONTROLLED FEEDBACK (QCF) TECHNIQUE

Our basic methodology for capturing forecasts will be a modification of a Delphi process, known as Qualitative Controlled Feedback (QCF). The rationale and structure of this methodology is discussed below. We envisage the experts being given 3 iterations of the QCF questionnaire. If major movements still seem to be occurring at the third stage, we will consider further iterations.

The response curve fitting exercise will likely be only a part of the first-stage questionnaire. The later iterations will be primary for direct forecasting assessments. This will be confined during the planning and design phase. It should be stressed that our approach to both the Delphi-QCF methodologies and hte modelling procedures is a rigorous, systematic, and scientific one. It is our experience that the validity and credibility of the final product will depend greatly on the rigour of the methods used. Thus, as will be seen in our discussion of the procedures and our subsequent workplan, we emphasize questionnaire design, careful statistical analysis/modelling of results, and use of experimental designs (in the response-curve-fitting). We accept that our procedures may be somewhat more difficult to design (compared to standard Delphi methods, for example), but feel this is a reasonable price to pay for the extra credibility carried by a rigorous and systematic approach.

### 5.7.1 THE QCF PROCEDURE

The QCF procedure differs from many other groups judgement and decision-making methods in that:

* it does not require the members involved in the group interaction to reach a consensus of a "group decision"

* it does not allow the group members to have face-to-face interactions when they are making judgements

* it does not permit the group members to know the identifies of fellow group members, or their judgements on the issues in question.

The QCF method directly meets the criticism of many of the traditional group judgment-forming methods, which often involve individuals discussing issues on a face-to-face basis. The ultimate objective is to obtain a unanimous judgment or decision from the group. In situations involving judgment or decision-making, it is generally felt desirable to examine alternatives in light of opposing arguments and reasons. It is generally understood that in situations involving group judgment or decision-making, the group members will generate a greater

number of alternatives, contrasting arguments, and reasons, than would be generated in situations involving individual judgment. Social psychologists, however, have found that group judgment performs better only when the interpersonal environment fosters independent thinking, free expression of ideas and views, and respect in one individual about others' views. the QCF method is designed to take advantage of this aspect of group interaction.

In the traditional group sessions, there are a variety of obstacles obstructing the required free interaction. the main sources of the obstacles are status hierarcy, personality styles, leaderhsip styles and the pressure of group conformity. The impact of these obstacles may be that alternative views do not get represented, or undeu weights are placed on irrelevant factors. These factors may give use to what the social psychologist Janis has termed "group think". This occurs when group members, in spite of their high intellectual ability, refrain from critical thinking and manifest concurrence-seeking hebaviour with an unrealistic optimisim about the success of their decision.

The QCF method is similar in some respects to the Delphi method, which often forecasts events on the basis of the combined judgment of experts. QCF shares with Delphi the use of "controlled feedback". Using "controlled feedback", a panel of experts is asked to give judgments, individually and independently, on issues of interest. The requested judgments

are generally numerical, and are collected by an intermediary. The intermediary then computes a summary of some quantitative measures of the response distribution (eg. means, interquartile ranges, etc.). These measures, or sometimes the entire distribution, are fed back to the individual panel members. The individual members then give their judgment again. Anonymity of the panel members i preserved, and the process of feedback and judgment solicitation continues until convergence occurs.

The above protocol can be termed quantitative controlled feedback. This is different from QCF, where no quantitative measures are fed back to the panel. Instead, panelists are asked to provide reasons for their answers. These reasons are merged into a composite, and the composite is fed back to the group members.

While the Delphi method solves some of the problems mentioned by Janis, a number of undesirable features remain. A major problem relates to the idea of quantitative feedback. When quantitative meausres, such as means, are fed back, panelists tend (for psychological reasons) to shift their answer toward the group mean. Thus members of a Delphi groups tend to be artificially "pressured" into agreeing, possibly on wrong answers, and likely without careful consideration of all arguments and alternatives. In carrying out activities like forecasting, where a true or optimal solution often is non-existent, it is essential that panel members are presented with all perspectives and arguments

before judgment-making. Since QCF requires the feeding back of only reasons supporting panelists' individual judgements, group members tend to shift responses on subsequent interactions only on the basis of the logic of the reasons generated by the panel (and not due to the average value of the group's response).

A related issue concerns the convergence to a group judgement. Since in many real-life cases, no optimal or correct solution exists, the resulting unanimous decisions reflect artifacts more than anything else. Diversity of opinion among experts is also a very important piece of information for policy makers. Finally, a study like this one requires an emphasis on predictive models, rather than pure forecasts. The QCF method, with its emphaiss on reasons and then important, is particularly multi-suited for the objective.

### 5.7.2 COMPONENTS OF QCF

#### The First-Step Questionnaire

We have not yet formulated the particular questions to be addressed in the questionnaire. This will be an output of the design phase. As a hypothetical example, we might have:

> To what extent do you see an increase in the demand for electronic mial services in 1990 compared to today:

0-30% 31-60% 61-90% 91-120% over 120%

As indicated before, we will first focus on identifying and refining the important issues, and turning them into appropriate questions.

In addition to the basic questions, for some or all of the questions we will ask the panel for the reasons they answered as they did. Analysis of reasons and change in reasons is an integral part of the QCF methodology. As we observe and relate changes in forecasts to changes or additions to reasons, we will gain insight into the underlying relationship between the forecasted variable and its predictors. This can then be used to refine or confirm the other parts of the modelling exercise.

Finally, baseline information (experience, position, company background, academic training, etc.) will also be obtained. This will allow for analysis of responses/reason by these characteristics.

Because "some experts are more expert than others", we need to be concerned with weighting individuals in the analysis. For each issue area, we propose to present the list of experts, and have each panel member rate the expertise of each one in a given issue area (excluding himself). This will allow us to create a weighting index to use in the analysis. We believe this gives a highly valid and credible method for using maximum information, but in a realistic and accurate manner.

## The Second and Third Stage Questionnaire

All reasons provided by the panels on the first-stage will be merged. The composite will be presented, at the beginning of the second stage. Each panelist will be advised of his earlier responses. After answering the basic questions, panelists will be requested to select reasons from the composite list which they had used in support of their second-stage responses. New reasons will, of course, also be permitted.

The third-stage questionnaire will follow the same format as the second stage format.

## Analysis

The specific types of analyses to be carried out will depend on the nature of the Questionaire. Potential methods will include:

* final distribution of responses, broken down (if required) by characteristics of respondents

* changes in distribution (including averages, variances, and frequencies) through the three or more stages

* relationship of responses (and changes in responses) to reasons given. This may include, for example, regression models, which relate the responses (and changes in responses) to stated reasons,

* detailed analysis of changes in responses will usually be done in QCF via a transation probability matrix. Exhibits 5-1 and 5-2 are examples of this type of analysis. Looking at Exhibit 5-1, we see an individual scoring 1 on a given question in stage 1 has a 100% probability of scoring 1 in the second stage, ie, he is not changing. However, an individual scoring 2 in stage 1 has a 33% chance of moving to a score of 3 in stage 2. This type of analysis gives a good under standing of the dynamics of the QCF process.

## 5.8 QCF IMPLEMENTATION

### 5.8.1 PHASE 1: PLANNING/DESIGN

Selection of Panel

Exhibit 5-3 illustrates a first cut and putting together a suitable panel covering the major sectors of electronic communications. Our target is about 50 individuals. We will

## EXHIBIT 5-1

### TRANSITION PROBABILITIES FROM STAGE 1 TO STAGE 2

SECOND STAGE

| FIRST STAGE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | | | | | | | | |
| 2 | | .67 | .33 | | | | | | |
| 3 | | .33 | .66 | | | | | | |
| 4 | | | .5 | .5 | | | | | |
| 5 | | | | .5 | .5 | | | | |
| 6 | | | .2 | .2 | .2 | .4 | | | |
| 7 | | | .08 | .08 | | .16 | .6 | .08 | |
| 8 | | | | | | | .2 | .8 | |
| 9 | | | | | | | | | 1.0 |

EXHIBIT 5-2

TRANSITION PROBABILITIES FROM STAGE 2 TO STAGE 3

THIRD STAGE

| SECOND STAGE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | | | | | | | | |
| 2 | .33 | .67 | | | | | | | |
| 3 | | | .75 | .25 | | | | | |
| 4 | | | .2 | .4 | .4 | | | | |
| 5 | | | .5 | | .5 | | | | |
| 6 | | | | | | .8 | .2 | | |
| 7 | | | | | | | .88 | .12 | |
| 8 | | | | | .17 | | .17 | .67 | |
| 9 | | | | | | | | | 1.0 |

EXHIBIT 5-3

PROPOSED EXPERTS/USERS PANEL

David Carlisle, President/Manager, Carlisle Videotex Consultants Inc., Toronto.

Gary Arlen, President, Arlen Communications Inc., Washington, D.C.

Martin Lane, Director, Videotex Planning, Link Resources, New York

Martin Nisenholtz, Manager, Videotex Development, Ogilvy and Mather, New York.

Mitzi Bootzin, Videotex Manager, Keycom Electronic Publishing, Chicago, Illinois.

Shelley Isaacson, Director of Electronic Text Services, WGBH-TV, Bostom, Mass.

Ted Mendelsohn, Vice-President, Information Services, Grolier Electronic Publishing Inc.

William Seelinger, Videotex Market Development, IBM' Boca Raton, FL.

Brian Dugan, Vice-President, Videotex, Gartner Group

James Holly, Times Mirror Videotex, Irvine, Calif.

William Frets, Norpak Corporation, Ottawa, Ont.

Barry Ashdown, Langton Electronic Publishing, London, UK.

Barry Stapley, MD Stapley Communications, London, UK.

Alan Morris, Managing Director, Select TV Communications, London, UK.

Jennifer Stothers, Consultant, CSP International, New York.

Paul Lancaster, Vice-President, Engineering, Glenayre Electronics, Vancouver.

Martin Fournier, Vice-President, Engineering, Teleglobe Canada, Montreal.

Bill Trainor, Vice-President, Sales and Marketing, RF Communications, Markham.

Charles Forbes, Vice-President, Chemical Bank.

Roy Bright, Managing Director and CEO, Intelmatique, France.

William Thomas, Manager, CATV Communications Products, Zenith Radio Corp.

W. T. Lalonde, Engineering Manager, Norkpak Corp., Ottawa.

William Frezza, Program Manager, Communicom General Instrument.

John Farnsworth, Senior Vice-President, Chemical Bank, New York.

Alice Romero, Videotex Manager, Pacific Bell, San Francisco.

Georg Dej, President, Canadian Business Telecommunications Alliance, Toronto.

Gunter Kurz, President, Genesys Group Inc., Ottawa.

Michel Dufresne, Le Groupe Videotron, Montreal.

Brian Gordon, Former Manager of the Technology Office of MTC, Downsview.

Dot Allen, Research Associate, Institute for the Future.

Keith Chang, Manager, Industrial Applications, DOC, Ottawa.

Thomas Rauh, Director of Retail Consulting, Touche Ross & Co., San Francisco.

Stephen Caswell, Editor, EMMS, Norwalk, CT.

Kenneth G. Bosomworth, President, International Resource Development, Norwalk.

David Thomas, President, Inmedia Telematics Inc., Hudson, Que.

Gordon Hutchinson, Pubisher, Canadian Communications Network Letter, Ottawa.

Mitch Kapor, President/CEO, Lotus Development Corp., Boston.

David Simons, President, Digital Video Corp.

Charles Touchton, Senior Planner, IBM, Boca Raton, Fla.

Zavis Zeman, President, ZZ International, Toronto.

Roger Badertscher, President, Mindset Corporation.

Stuart Lipoff, Senior Staff Member, Electronic Systems Section, Arthur Little.

C. Thomas Taylor, Vice-President, Advanced Network Applications, GEO-Telenet.

William Carlisle, Manager, Publishing Services, Digital Equipment Corp.

Doug Parkhill, formerly Asst. Deputy Minister, Research, DOC.

work with the department in finalizing criteria for selection, and ensuring a credible mix in the end. We look forward to DOC's assistance in arranging cooperation with the proposed panel, similar to that undertaken for the HDTV project.

## Design Instruments

We will design the two basic data-collection instruments - the first stage questionnaire and the later questionnaire. The first-stage questionnaire will involve tombstone questions, QCF requirements, forecasting to scenarios, and other questions as identified in this phase. It will be administered by mail, although we will be meeting with 10-15 panel members as part of the fact finding in task 1. The second and later stage questionnaires will likely involve only the QCF component, with a section for composite reasons to be fed back. It will be administered by mail.

## Pre-test

The instrument will be pre-tested on 1 or 2 individuals in the office of the department. Wording ambiguities, response burden problems, etc. will be examined and the instruments refined in light of this analysis.

Analysis Preparation

We will put together forms, procedures and software for the analysis of the QCF module. This will allow efficient processing and feedback to the panel. Software for the modelling module will also be put in place.

### 5.8.2 PHASE 2: DATA-COLLECTION

Administering the Stage 1 Questionnaire

This questionnaire will be administered in person, and will be part of a wider interviewing format.

Analysis of Stage 1 Questionnaire

We will analyze these questionnaires, compiling the reasons and other data for feed-back. This will be incorporated into the stage 2 questionnaire.

Further Stages of Questionnaires

The stage 2 questionnaire will be sent out, and telephone follow-ups will occur. Data will be analyzed and fed-back to the

panel. This will be similar to the stage 1 analysis. Stage 3 (and later, if required) questionnaire preparation, delivery, and analysis will follow along the same pattern. We will work with the client in determining when the process should terminate. Our estimate at this time is after the third phase, and possibly after the second.

## PHASE 3: ANALYSIS AND REPORTING

Some analysis will be obviously occurring while data-collection is transpiring. This is due to the need for analytic feed-levels for later stages of the questionnaire. However, more of the analysis will follow the steps discussed below (subsequent to the data-collection).

### Computer Input and Analysis

Some of the data (e.g., for the modelling work on the QCF component) will have to be computerized. We will thus carry out the keypunching, editing, and initial runs to ensure production of a clean database.

We will use statistical software for the various analyses required. Determination of the appropriate software will be made in the design phase of this study. Project team members have

experience with most of the major packages, including SPSS, BDMP and SAS.

## General Analysis and Interpretation

A good deal of the analysis will be based on reasonably simple statistics, like cross-tabulations. This will be carried out, and interpretations made, in close association with the project team and client. The more sophisticated analyses will also be carefully presented to the client on an ongoing basis. We usually find the simple and more complex analyses work in an interactive way. For example, a multivariate model may point to some explanatory variables as being important, which then lead to some particular cross-tabulations being required. These may then, in turn, lead to further modelling.

# 6.0 FORECASTING THE MARKET DEMAND

## 6.1 TASK 5 - OVERVIEW

As described by way of example in section 4, the service models (or classes of service) selected for analysis would be modelled in terms of all relevant costs and revenues. The economic would be constructed to generate 5 and 10 year forecasts. The forecasts would be in terms with the assumptions carefully developed in the procedures detailed in section 6, combining objective and subjective techniques as described.

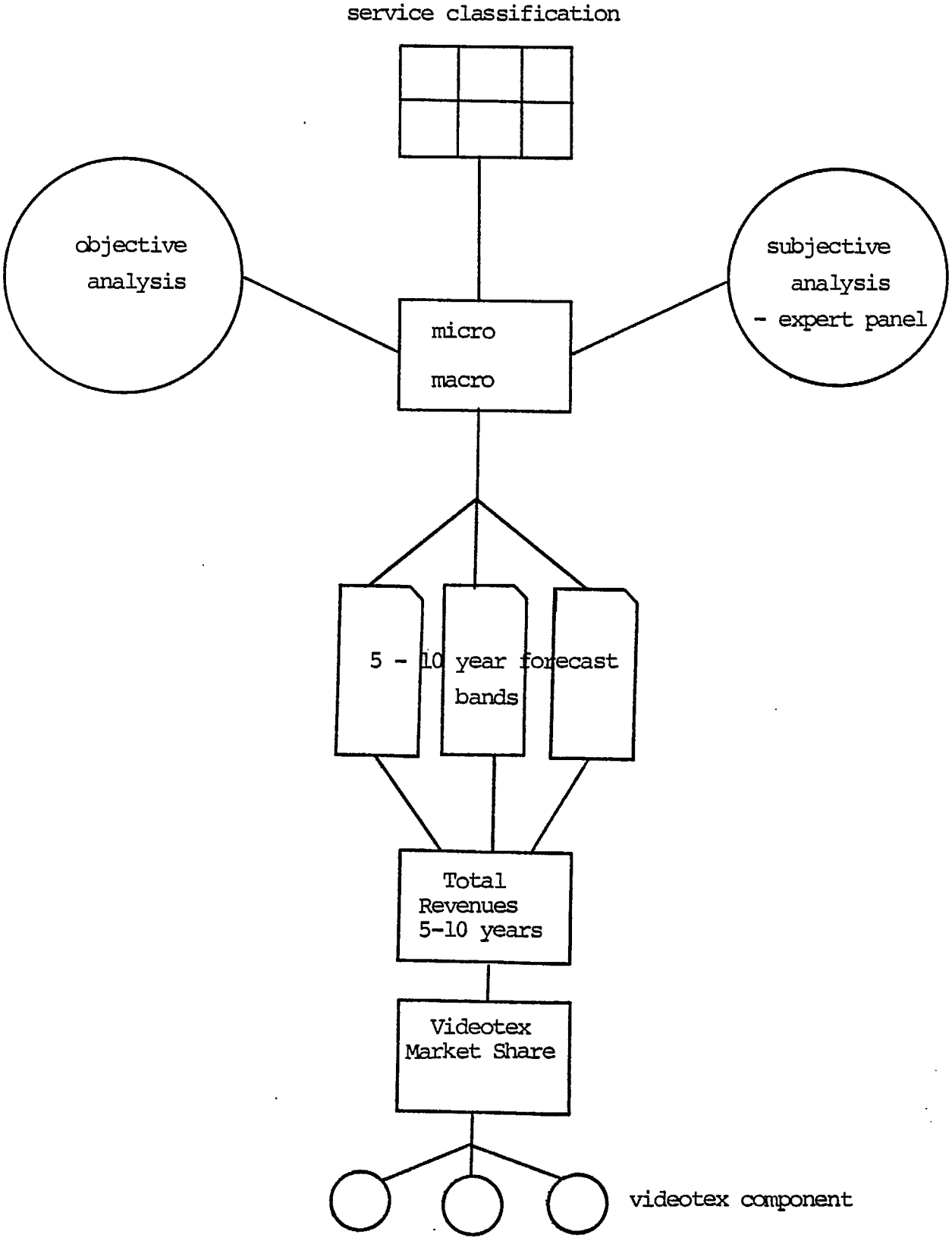
## 6.2 FORECASTING PROCEDURE

The demand forecasting approach brings together the output of the previous tasks - market and application identificatin, articulation of service models, and process for formulating assumptions and obtaining data. Exhibit 6-1 illustrates generally the procedure outlined, as follows:

- o develop a service classification system incorporating appropriate markets, service and technology categories;
- o develop assumptions at a micro level about the viability of certain kinds of companies entering specific businesses, eg, cable operators, carriers, publishers, office automation product vendors, etc.;
- o based on businesses that are viable, formulate macro market development assumptions;

EXHIBIT 6-1

FORECASTING PROCEDURE



- o formulate 5 and 10 year bands of demand projections (high and low);
- o accumulate net new economic activity (revenues) aggregating the totals of each segment;
- o identify the videotex-related components of these markets: systems/software products page creation, encoders and teletext/videotex terminals and adapters;
- o more specifically, assess the positioning of videotex in the context of all the emerging markets identified.

At this point, we cannot be more precise as to the exact nature of the service classification scheme, beyond that discussed in sections 2 and 3. That classification, the critical step to the analysis, must relate market segment, service and technology which all cut across each other.

The micro/marco relationship is simply the necessity to roll up demand based on assumptions about how specific individual markets will develop. That can occur through market analysis where needs are identified and related to companies hoping to achieve viability by exploiting these markets. Such companies can be cable operators examining software downloading services (partly via NAPLPS graphics), or software/system developers with specific products, eg, ATT-Aregon's IVS-5 videotex software.

The heart of the forecast is the position of videotex in this complex market structure that takes in transactional, data base vending, E-mail, etc. as well as videotex services. Our approach is to forecast the market demand for these services and then determine videotex' market share. This approach gets away from

videotex as solely an information retrieval technology, but rather a technology that fits into the world of transactions and communications. The analysis is to determine where videotex fits into the market demand for E-mail, downloading and other services, and thus the positioning of videotex.

The output of this market demand forecast will be in terms of Canadian, North American, and international revenues by market/service category and videotex component. Again it is stressed, however, that the forecasts will be envelope in nature, rather than single estimates in view of the complexity of the market.*

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* Under the subtitle, The Future is not Predictable", Renaud de Camprieu of Telesat writes (in a forthcoming Canadian Satellite Users' Conference paper): "In a recent address, the president of Informetrica, M.C. McCracken, noted a change in the philosophy underlying economic forecasting. In the sixties and early seventies, it was believed that one could forecast the future. However, the "humbling experience of the 1970s" has challenged that belief and nowadays many forecasters postulate that the future is not forecastable. As a result, the goal of forecasting is not to select the "most likely" scenario but rather "to have available at anay point in time a constellation of scenarios that might include the principal areas of change in the future".

# 7.0 INDUSTRIAL IMPACT AND RECOMMENDATIONS

## 7.1 TASKS 6 AND 7 OVERVIEW

The methodology proposed for this task flows from the macro and micro level requirements listed in the RFP.

At the macro level, the net economic activity generated, as determined in Task 5, will be used to estimate new employment in person years by dividing the net economic activity by the average cost to create a person-year in this section for each year of the forecast period. The Canadian Advanced Technology Association (CATA) accepts that it takes about $60,000 in value-added sales to create one person-year of permanent employment in high technology in Canada.

The micro level impacts on industry will be obtained as follows:

1) a profile of the industry will be established (ie, key firms, revenues, employment, etc.) from field trial and other information sources;

2) the forecasts of demand of hardware and software obtained in task 5 will be matched against the profile in (1) above. For example, if the existing level of activity in Canada for a component is $X and comprises Y firms, while the demand over the forecast period is $3X the impact on the Y firm can be established and the potential for new firms estimated;

3) the aggregate of potential industrial activity will be estimated to indicate the size of the industrial activity or the import bill without industrial activity;

4) from the demand forecasts, traffic patterns for new services will be established to evaluate the impact of those videotex services or telephone networks and others technically affected by the introduction of videotex services.

The recommendation will be derived from matching the results of the market assessment with Canadian capability. It may well be, for example, that systems and software opportunities are more realistic in terms of Canadian capability than large production volume hardware product lines. From this analysis, we will examine government policy levers - particularly but not exclusively those identified in the RFP - to formulate recommendations.

The examination would begin with a thorough briefing for the project team on the last few years of videotex R&D, demonstration, and manufacturing stimulating programs. The emphasis that is likely to result is market oriented without a speacific videotex "product" in mind, and thus the inclusion of other government instruments like procurement.

## 7.2 MICRO ANALYSIS OF INDUSTRIAL IMPACT

The Canadian firms that have participated in the development of videotex are fairly well documented given the federal government's Telidon support programs. Our intention is to cost a wider net to cover activity in the electronic communications field more generally. The profile of firms, referred to above, would be drawn from the research and interview process covering all EIP sectors, with systematic canvassing of associations like

CATA, CADAPSO, and the EIC. The result would be a thumbnail sketch of these firms' activities, including their potential role in electronic communications.

We anticipate that as we formulate service models, we will be identifying Canadian firms around which specific corporate initiatives could be organized. This approach should bring into focus the potential role of such disparate companies as OCRA, Trigon, Immedia, Matrox, Cableshare, etc. and thus prepare the federal government for further initiatives in the electronic communications sector. While the scope of the project does not permit actively stimulating particular interests, we will be able to portray the potential impact in statistical as well as corporate specific terms.

As indicated in the RFP, part of the impact of widespread use of videotex services could be negative in the sense that it would disturb other communications facilities. Our approach in this regard would be to incorporate some appropriate questions in the QCF panel as well as discuss it with carriers and telecom manufacturers. The Knight-Ridder Florida service may have begun to determine the extent of the potential problem, and it would form part of the impact analaysis.

## 7.3 RECOMMENDATIONS CONSIDERATIONS

While it is premature to formulate applications programs and R&D priorities, or identify regulations and standards requirements, some of the considerations will be the following:

- o market-driven applications: DOC has ample experience with Telidon and OCS applications programs to establish a strong market-driven criterion to the formulation of applications programs;
- o spin-off R&D support: with the establishment of the Jeanne Sauve Institute, the new international cooperative program on informatics, and specific allied R&D projects at the CRC, like CVSNET, marrying government and private sector R&D thrusts;
- o non-programming services encouragement: an example of a regulatory thrust that might be combined with an applications project is to permit cable operators rapid entry into the non-programming field (cf, the CRTC's 1985 issues hearing on the subject);
- o limitation of standards as an industrial development tool: while perhaps a contentious subject with respect to Canada's advantage gained in the North American adoption of NAPLPS standard, the over-reliance on standards essentially set by market leaders should be recognized.

In the course of this project, the project team would undertake a careful canvass of the different relevant R&D foci. We are particularly sensitive to this need in light of our own participation in the evaluation of the CCIS concept. At the same time, the recommendations in that report were reinforced by the recent Wright Task Force, and we would be fully taking the industry orientation into consideration.

# 8.0 MANAGEMENT PROPOSAL

In this section, we outline the work plan and schedule, the project team organization and assignments, and highlight the qualifications of the professional staff. Resumes and project experience of the firms involved are attached as appendices.

## 8.1 WORK PLAN AND SCHEDULE

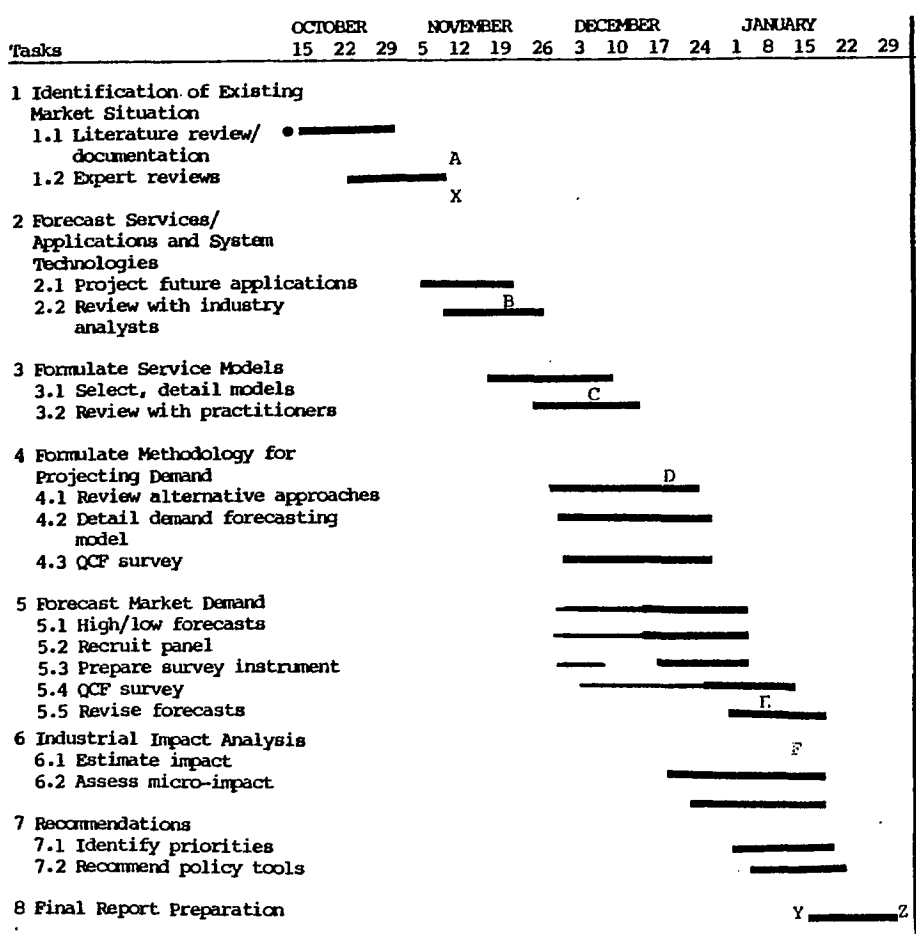
To fulfill the objectives and sub-objectives as defined in the request for proposal, tasks will be undertaken according to the schedule proposed in Exhibit 8-1. As this exhibit shows, we have planned the assignment to the sub-task level. Task 5 receives most of the effort, which will be conducted as described extensively above, particularly in sections 3, 4 and 5 of this proposal.

The following deliverables as stipulated in the RFP will be provided:

| Deliverable | Completion (week ending) |
|---|---|
| Draft Table of Contents | November 12 |
| Progress reports submitted at end of each Task | |
| A | November 12 |
| B | November 26 |
| C | December 3 |
| D | December 17 |
| E | January 1 |
| F | January 8 |
| Draft Final Report | January 22 |
| Final Report | January 29 |

EXHIBIT 8-1

SCHEDULE OF ACTIVITIES




| Tasks | Participation (Hours) Nordicity Group Ltd. SM | PL | LE | RV | CD | MD | Peat Marwick DZ | Analyst | Aregon |
|---|---|---|---|---|---|---|---|---|---|
| 1 Identification of Existing Market Situation | 20 | 5 | 10 | | | 50 | | | 10 |
| 1.1 Literature review/ documentation | | | | | | | | | |
| 1.2 Expert reviews | | | | | | | | | |
| 2 Forecast Services/ Applications and System Technologies | 20 | 5 | 10 | | 10 | 10 | | | 10 |
| 2.1 Project future applications | | | | | | | | | |
| 2.2 Review with industry analysts | | | | | | | | | |
| 3 Formulate Service Models | 20 | 10 | 10 | | 25 | | | | 10 |
| 3.1 Select, detail models | | | | | | | | | |
| 3.2 Review with practitioners | | | | | | | | | |
| 4 Formulate Methodology for Projecting Demand | 20 | 5 | | | | | 60 | 55 | |
| 4.1 Review alternative approaches | | | | | | | | | |
| 4.2 Detail demand forecasting model | | | | | | | | | |
| 4.3 QCF survey | | | | | | | | | |
| 5 Forecast Market Demand | 60 | 10 | 10 | | 15 | 20 | 45 | 31 | 20 |
| 5.1 High/low forecasts | | | | | | | | | |
| 5.2 Recruit panel | | | | | | | | | |
| 5.3 Prepare survey instrument | | | | | | | | | |
| 5.4 QCF survey | | | | | | | | | |
| 5.5 Revise forecasts | | | | | | | | | |
| 6 Industrial Impact Analysis | 20 | 5 | | 30 | | 20 | | | |
| 6.1 Estimate impact | | | | | | | | | |
| 6.2 Assess micro-impact | | | | | | | | | |
| 7 Recommendations | 15 | 5 | | 10 | | | | | |
| 7.1 Identify priorities | | | | | | | | | |
| 7.2 Recommend policy tools | | | | | | | | | |
| 8 Final Report Preparation | 25 | 5 | | | | | | | |
| | 200 | 50 | 40 | 40 | 50 | 100 | 105 | 86 | 50 |

X Draft of Table of Contents

Y Draft Final Report

Z Final Report

● Kick off meeting

## 8.2 PROJECT TEAM ORGANIZATION

In order to develop reliable forecasts for the market for videotex, teletext and related services, it is essential the project team bring to bear a sound understanding of the structure of the videotex/teletext indsutry, its present market situation, and wide expertise in forecasting methodologies, industrial impact and demand analysis.

The team assembled for this project consists of highly skilled and experienced consultants and researchers from Nordicity Group Ltd. (NGL) and Peat Marwick and Partners (PMP). Nordicity Group will be prime contractor responsible for all tasks as outlined in this proposal, with Peat Marwick in a subcontracting role primarily responsible for developing, executing, and analyzing the QCF forecasting technique.

The study team will be jointly directed by Stephen Moss (BSc, MBA), Nordicity Group Associate and Principal of Moss Roberts Associates, and Peter Lyman, NGL's Managing Partner. Mr. Moss will assume project management responsibilities and provide the central conceptual and analytical direction to the project. Mr. Lyman will assume NGL responsibility for the project and work with Mr. Moss in formulating the analysis. Both Mr. Lyman and Mr. Moss have led several multi-disciplinary studies in the broad fields of informatics and communications.

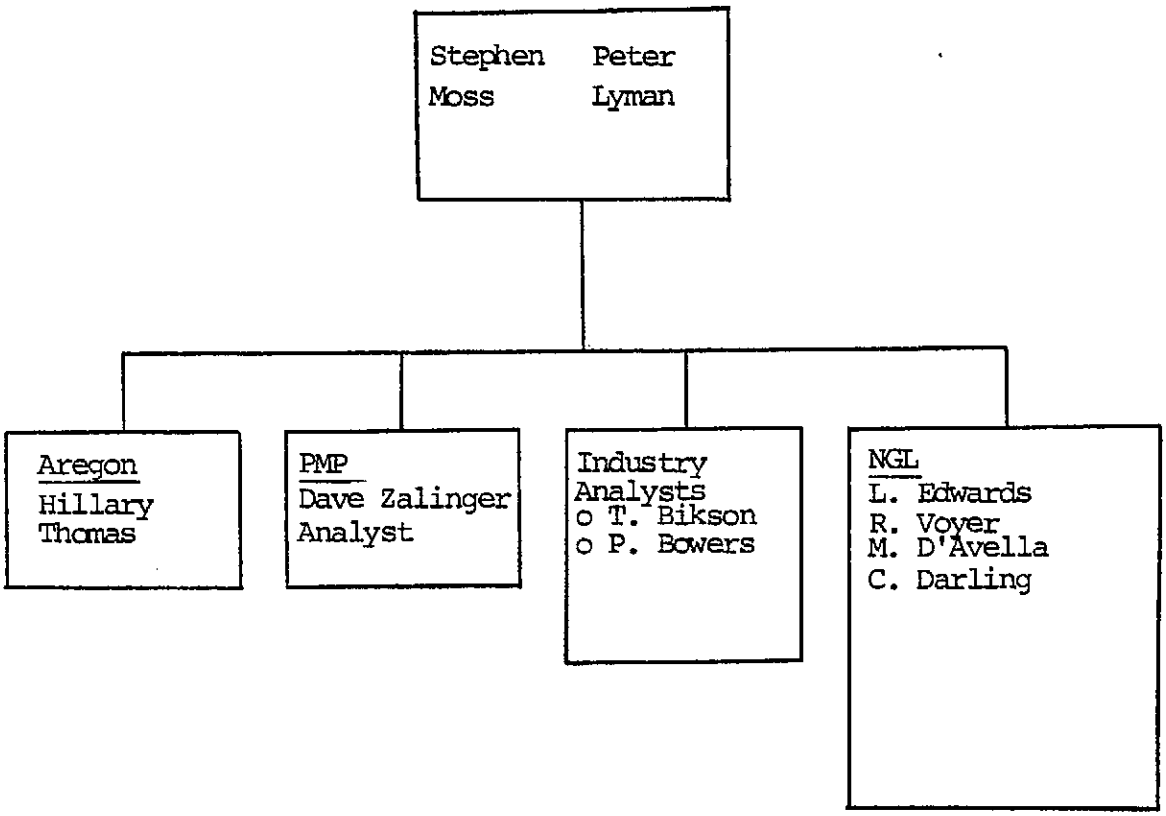
To reinforce the project team's technical expertise in videotex/teletext and related fields, NGL has arranged for some specific outside assistance. As part of the project team, we are pleased to have recruited Ms. Hilary Thomas, Managing Director of Aregon's consulting activities, known to Nordicity through our UK connection and well known in the videotex field for the last decade. Aregon is one of the world's leading suppliers of videotex software with 150 installations in 20 countries, including emphasis on videotex applications in office communications as well as public/consumer systems. In view of the professional experience of Ms. Thomas and the achievements of Aregon, we believe it will be advantageous for the project team to have the benefit of experience of how videotex has evolved differently in different markets. While we are conscious of the sensitivity there could be toward involving an international "rival" to Canadian enterprise, the project stands to gain far more through the participation of one of the leading experts in the field.

In addition, we have recruited Tora Bikson and Peter Bowers, formerly Managing Director of TVOntario, to the project. Both have a particular experience in the videotex field and will be called on as advisors in the development of applications and service models with reference to Canadian and US activities.

The project team organization is illustrated simply on Exhibit 8-2, listing the professional staff of the organizations involved.

EXHIBIT 8-2

PROJECT TEAM ORGANIZATION



Detailed personal biographies of the proposed professional staff and descriptions of the range of services and experience of our firms are provided in Appendices A and B. Exhibit 8-3 highlights Nordicity Group's skills and areas of expertise relevant to this study. In the paragraphs that follow, we highlight some of the more pertinent qualifications of the study team.

NORDICITY GROUP LTD.

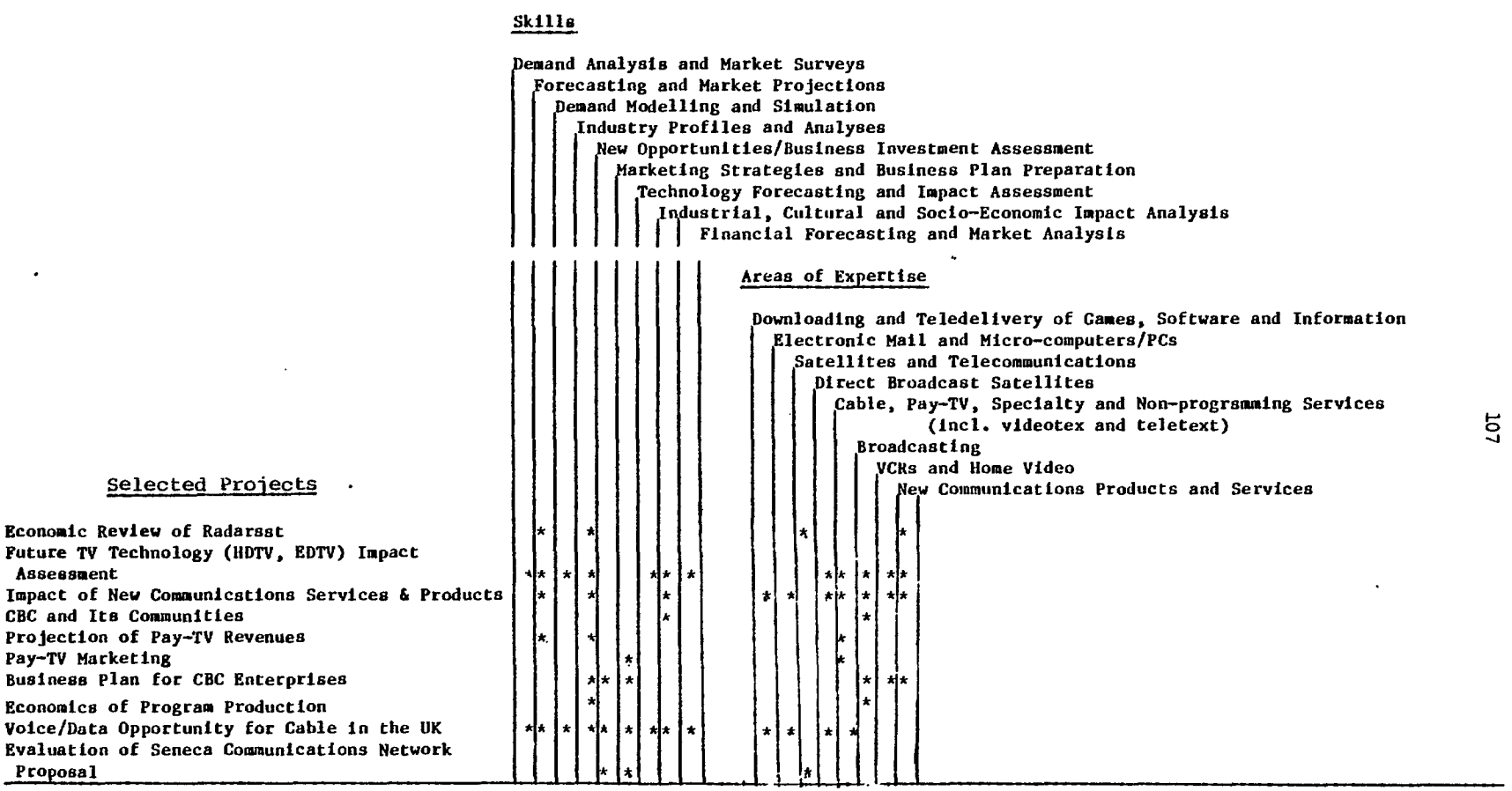
The Nordicity Group team will include Peter Lyman, Managing Partner, Stephen Moss, Managing Director - Europe, Dr. Roger Voyer, Partner, Laurie Edwards, Partner, Carol Darling, Senior Consultant and Michael D'Avella, Research Manager.

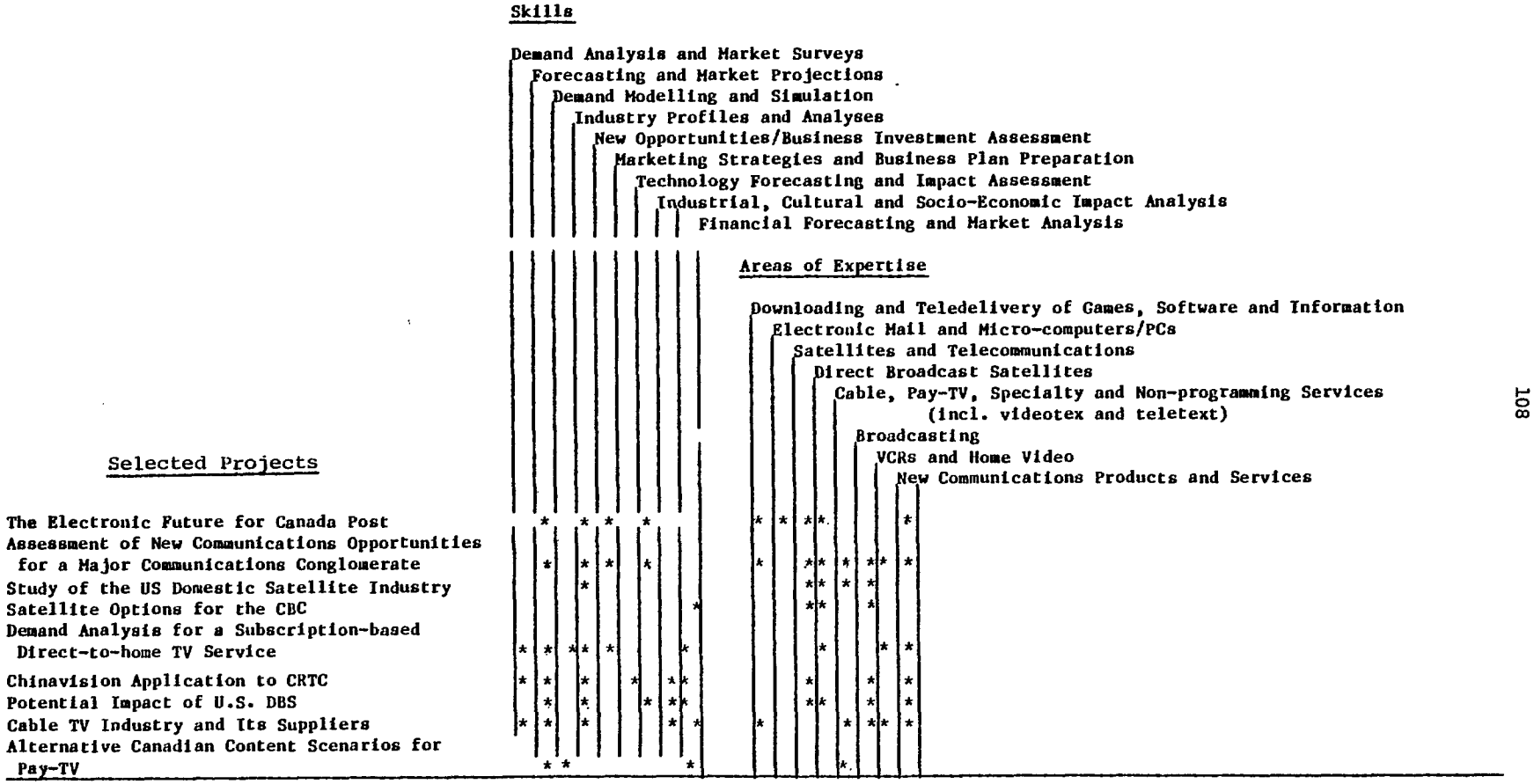
Stephen Moss (BSc, Economics, MBA), who will be project manager and primary analytical resource on this project, particularly in formulating service models (task 3) and forecasting demand (task 5). He has extensive professional consulting and project management experience, specializing in the areas of cable, broadcasting and the development of new communications services. He has been extensively involved in the conceptual development and financial planning for state-of-the-art cable development in the United States where he was the architect and principal author of many successful major market franchise applications. Related consulting projects which Mr. Moss has directed include the development of cable-based institutional network proposals for the cities of Portland, Oregon; Chicago, Illinois and Pasadena California. He has also participated in a variety of new services development projects embracing broadcasting and specialty service networks, cellular mobile radio services, satellite network distribution and pay television.

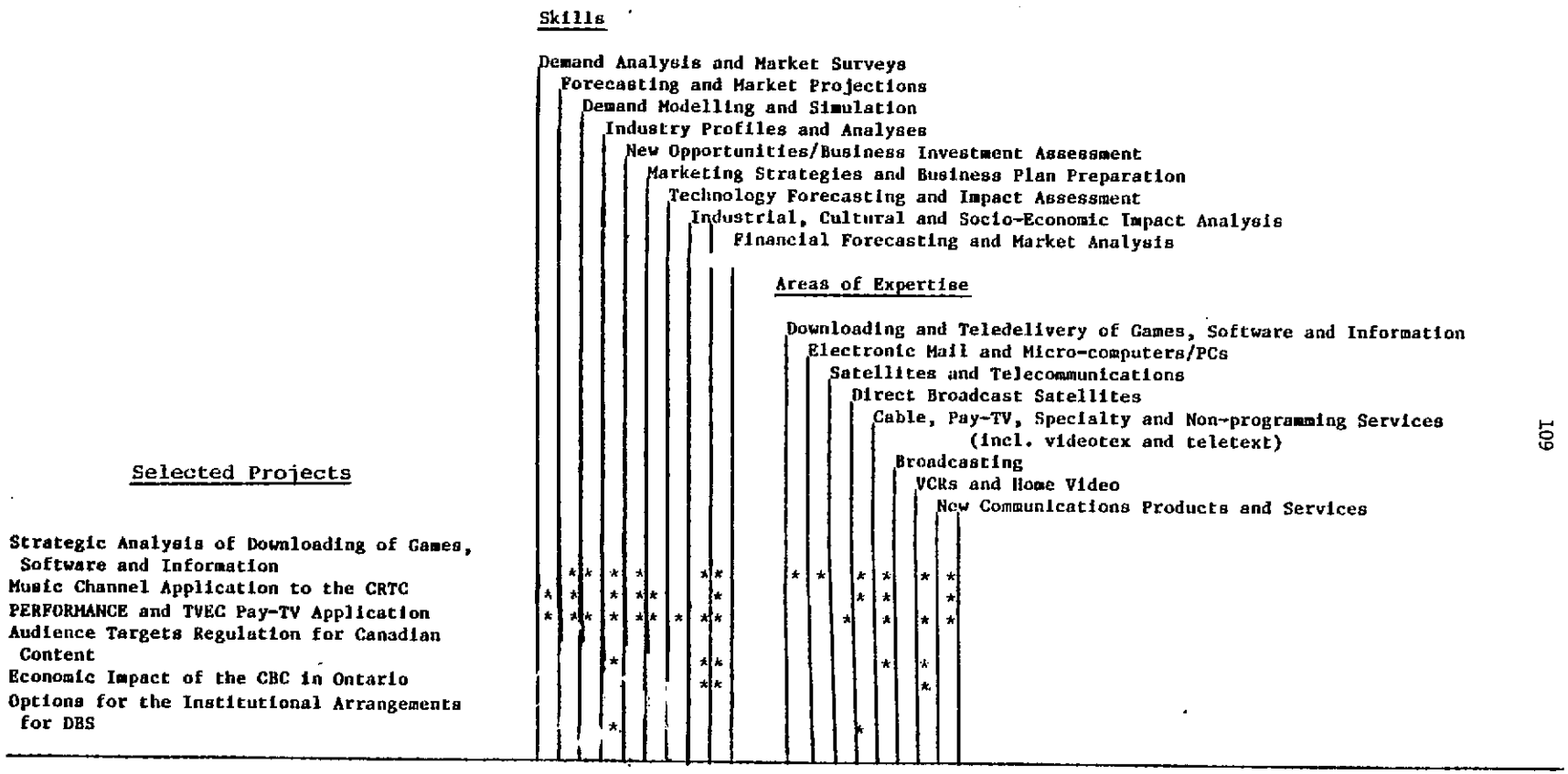
Exhibit 8-3

Nordicity Group - Relevant Skills and Areas of Expertise

| Selected Projects | Demand Analysis and Market Surveys | Forecasting and Market Projections | Demand Modelling and Simulation | Industry Profiles and Analyses | New Opportunities/Business Investment Assessment | Marketing Strategies and Business Plan Prepsration | Technology Forecasting and Impact Assessment | Industrial, Cultural and Socio-Economic Impact Analysis | Financial Forecasting and Market Analysis | Downloading and Teledelivery of Games, Software and Information | Electronic Mail and Micro-computers/PCs | Satellites and Telecommunications | Direct Broadcast Satellites | Cable, Pay-TV, Specialty and Non-programming Services (incl. videotex and teletext) | Broadcasting | VCRs and Home Video | New Communications Products and Services |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preparation of Market Study and Business Plan for Data and Institutional Cable Services | | * | | * | * | * | | * | | | * | | | * | | | * |
| Preparation of Cable Franchise Applications for Major U.S. Markets | * | * | * | * | * | * | * | * | | | | | | * | * | | * |
| Strategic Plan for Canadian Cable Industry | | * | | * | * | | * | * | | | * | * | | * | * | * | * |
| Assessment of Potential Telecommunications Demand for Satellite Services | * | * | * | * | | | | * | | | | * | | | | | |
| Feasibility Study for Communications, Informatics & Space R&D Centre | | | | | | | * | * | | | | * | * | * | * | | * |
| Cellular Mobile Radio Market Assessment | * | * | | * | | | | * | | | | * | * | * | * | | * |


Skills
Demand Analysis and Market Surveys
Forecasting and Market Projections
Demand Modelling and Simulation
Industry Profiles and Analyses
New Opportunities/Business Investment Assessment
Marketing Strategies and Business Plan Preparation
Technology Forecasting and Impact Assessment
Industrial, Cultural and Socio-Economic Impact Analysis
Financial Forecasting and Market Analysis
Areas of Expertise
Downloading and Teledelivery of Games, Software and Information
Electronic Mail and Micro-computers/PCs
Satellites and Telecommunications
Direct Broadcast Satellites
Cable, Pay-TV, Specialty and Non-progrsmming Services
(incl. videotex and teletext)
Broadcasting
VCRs and Home Video
New Communications Products and Services
Selected Projects
Economic Review of Radarsat
Future TV Technology (HDTV, EDTV) Impact Assessment
Impact of New Communicstions Services & Products
CBC and Its Communities
Projection of Pay-TV Revenues
Pay-TV Marketing
Business Plan for CBC Enterprises
Economics of Program Production
Voice/Data Opportunity for Cable in the UK
Evaluation of Seneca Communications Network Proposal


Skills
Demand Analysis and Market Surveys
Forecasting and Market Projections
Demand Modelling and Simulation
Industry Profiles and Analyses
New Opportunities/Business Investment Assessment
Marketing Strategies and Business Plan Preparation
Technology Forecasting and Impact Assessment
Industrial, Cultural and Socio-Economic Impact Analysis
Financial Forecasting and Market Analysis
Areas of Expertise
Downloading and Teledelivery of Games, Software and Information
Electronic Mail and Micro-computers/PCs
Satellites and Telecommunications
Direct Broadcast Satellites
Cable, Pay-TV, Specialty and Non-programming Services
(incl. videotex and teletext)
Broadcasting
VCRs and Home Video
New Communications Products and Services
Selected Projects
The Electronic Future for Canada Post
Assessment of New Communications Opportunities for a Major Communications Conglomerate
Study of the US Domestic Satellite Industry
Satellite Options for the CBC
Demand Analysis for a Subscription-based Direct-to-home TV Service
Chinavision Application to CRTC
Potential Impact of U.S. DBS
Cable TV Industry and Its Suppliers
Alternative Canadian Content Scenarios for Pay-TV


Skills
Demand Analysis and Market Surveys
Forecasting and Market Projections
Demand Modelling and Simulation
Industry Profiles and Analyses
New Opportunities/Business Investment Assessment
Marketing Strategies and Business Plan Preparation
Technology Forecasting and Impact Assessment
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Areas of Expertise
Downloading and Teledelivery of Games, Software and Information
Electronic Mail and Micro-computers/PCs
Satellites and Telecommunications
Direct Broadcast Satellites
Cable, Pay-TV, Specialty and Non-programming Services
(incl. videotex and teletext)
Broadcasting
VCRs and Home Video
New Communications Products and Services
Selected Projects
Strategic Analysis of Downloading of Games, Software and Information
Music Channel Application to the CRTC
PERFORMANCE and TVEC Pay-TV Application
Audience Targets Regulation for Canadian Content
Economic Impact of the CBC in Ontario
Options for the Institutional Arrangements for DBS

Peter Lyman (BA, MBA) has extensive professional management consulting and project management experience specifically in the areas of communications and informatics. Mr. Lyman also has extensive forecasting, impact assessment and demand analysis expertise particularly with reference to new communications products services. Mr. Lyman will assume overall responsibility for the project and will be actively involved in all of the tasks. Some of the projects which Mr. Lyman has directed include: a study of downloading opportunities for the cable television industry, a study of the impact of emerging communications and informatics technologies on the traditional activities of the Canada Post Corporation, a demand analysis for subscription-based direct-to-home television service, institutional arrangements for a Canadian DBS system, a study of the US domestic satellite industry, studies on the impact of US DBS services on Canada, evaluation of a proposal for a broadcasting videotape satellite distribution and communications network for the far north, preparation of applications for specialty service applications to the CRTC (Chinavision and the Music Channel) preparation of the Performance and TVEC pay-TV applications, and a study of the cable television industry and its suppliers in Canada. He is presently directing a study of future television technologies and their future impact on Canada to the year 2000, as well as a strategic planning assignment for the Canadian Cable Television Association, which will assess, for example, the future role of and potential market for non-programming cable services including videotex and teletext.

Mr. Lyman is author of the book, "Canada's Video Revolution", which describes the impact of new technologies on Canada. In particular, specific chapters are dedicated to the implications of new television services, the introduction of pay-TV and future satellite broadcast services.

Laurie Edwards (BSc, MA), who will contribute to tasks 2 and 3, has extensive experience in communications policy research, strategic planning, and business and marketing consulting. He has directed over 30 major multi-disciplinary studies in the broadcasting and cable sectors in Canada, covering public broadcasting, marketing of Canadian programming to the US, marketing of pay television, home video market development, introduction of new communications technologies (eg, DBS), and pay television economics. Specifically, for the English Services Division of the CBC he managed and directed a series of studies (including the critical software definition requirements for CBC's IRIS service) leading to the development of CBC Enterprises, led a study on how to strengthen Canadian content in the Canadian broadcasting system, and managed the CBC's planning effort toward the preparation of a pay-TV strategy. Mr. Edwards has more recently coordinated the filing of the national pay-TV application of PERFORMANCE and the specialty service application of Chinavision. He is also currently involved in the strategic planning assignment for the Canadian Cable Televisin Association in which he is examining, among other things, the future of cable delivered non-programming services including videotex, teletext and the downloading of games and software.

Roger Voyer (BSc, MSc, PhD, Physics), who will be primarily responsible for the industrial impact analysis and developing recommendations with respect to R&D, has an extensive and varied background in the analysis of industrial and R&D impact and policies. Recently, Dr. Voyer led Nordicity Group's activities in the feasibility study for the establishment of a Canadian communications, informatics and space R&D centre. Currently, he is engaged in a study of future TV technologies and their impact on Canada in which his responsibilities include assessing the course of development of TV technologies and their potential economic and industrial impact. Dr. Voyer has also managed several multi-disciplinary studies in high-technology areas and has been a Member and Secretary to the Communications Research Advisory Board to the Department of Communications. He specializes in developing strategies for the commercialization of emerging information technologies and has participated in the development of business plans in areas such as artificial intelligence and optical disk data storage technology. He has also been involved in developing forecasts of technological development in a number of areas.

Carol Darling (BSc, P.Eng), brings a wide range of technical, economic modelling and marketing expertise to the project team. Ms. Darling will contribute to the development of task 2 (forecast services or applications and system technologies) and task 3, the formulation of service models. Since joining Nordicity Group, Ms. Darling has contributed to several projects

including an evaluation of the technical feasibility of a proposal for a satellite-based broadcasting, videotape distribution and communications service, preparation of a cable franchise bid in Chicago (for Joyce Cable), and is presently commencing work in future demand for satellite services by both broadcast and telecommunications users.

Michael D'Avella (BA (Hons), Economics), has, since joining Nordicity Group, undertaken the principal research for over 40 broadcasting and cable, pay television and satellite projects. Mr. D'Avella will conduct the literature search activities for task 1. He has had considerable experience in researching and analyzing socio-economic, market and business information and data specifically pertaining to the communications industry. Over the past five years, Mr. D'Avella has developed an extensive network of research contacts and information and data sources throughout Canada and the US. He is also constantly tracking developments in the communications and computer industries including electronic and home video, cable and pay-TV.

PEAT MARWICK AND PARTNERS

Peat Marwick Managing Partner, David Zalinger (MA, PhD, Statistics) will be primarily responsible for the methodology development with regard to demand forecasting. Dr. Zalinger brings considerable expertise in forecasting and market research techniques to the project. A Peat Marwick analyst will assist in the computer analysis of the QCF study. Dr. Zalinger will be responsible for the development of the forecasting techniques

and assumptions to be employed in the forecast development. Dr. Zalinger is responsible for Peat Marwick and Partners' national practice in program evaluation and social research, and directs the Ottawa practice in quantitative methods and marketing research. He has extensive market research experience and is one of the founding members of the International Institute of Forecasters. Dr. Zalinger has developed forecasting models related to communications services, consumer products, tourism and transportation demand. Some examples of projects in this area include: developing market demand forecasting models (including conjoint measurement) for a large-scale survey conducted by the Office of Tourism, designing conjoint analyses of various attributes of a food product and forecasting market share under future scenarios for several private firms, developing econometric models for forecasting mail flows for Canada Post, and evaluating marketing strategies of Canadian electronic and aerospace firms participating in the Defence Industry Productivity Program. Dr. Zalinger has managed a large number of survey research projects, such as the time-use study for the Department of communications, and the energy consumption survey for EMR to estimate the amount of oil and propane consumed in areas of Canada not served by natural gas. Dr. Zalinger has also played a key role in studies involving statistical modelling and quantitative analysis, such as incremental modelling for evaluation of the Canadian Home Insulation Program, and the evaluation of the Defence Industry Productivity Program.

AREGON INTERNATIONAL

Hilary Thomas (BSc, Geography), Managing Director of the consulting division of Aregon International, will be principally involved at the definitional stage of the project, as well as review responsibilities for some of the outputs. She has participated in videotex projects throughout the world, including interactive home banking, shopping, etc., as well as information application. She has led a major UK multi-client study of cable television's potential interactive and business services, and is currently involved in a major assignment with AT&T, which is installing the world's first multiple standard videotex - NAPLPS, Prestel, ASCII. Her Canadian experience includes the initial feasibility study of Bell's VISTA trial, as well as being a participant in the development of iNet.

ADVISORS

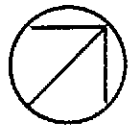
Two outside consultants have also been enlisted to serve in an advisory capacity. They are:

- Tora Bikson, Senior Scientist in the Behavioural Sciences Department of the Rand Corporation. Tora Bikson has led and participated in research projects investigating two-way cable television technologies. Currently, Dr. Bikson is principal investigator for an NSF-sponsored field research project aimed at describing and explaining alternative approaches to implementation of computerized procedures in office settings and assessing their outcomes. At the same time, she directs behavioral aspects of an internal office automation pilot project aimed at providing Rand's executive management with an interactive information environment.

- Peter Bowers, President, Search Mart Inc. and former Executive Director of TVOntario. At TVO, Peter Bowers initiated a program to exploit videotex for educational applications and initiated the creation of videotex software particularly for graphics. Recently he founded Search Mart, an enterprise which permits PCs to access some 3,000 programs.

# APPENDIX A

# NORDICITY GROUP LTD.

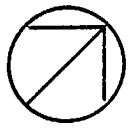


**Stephen Moss,** Associate, Nordicity Group Ltd., and Principal, Moss, Roberts and Associates Inc., has extensive professional consulting and project management experience, specializing in the areas of cable, broadcasting and the development of new communications services. He has been extensively involved in the conceptual development and financial planning for state-of-the-art cable development in the United States where he was the architect and principal author of many successful major market franchise applications. Related consulting projects which Mr. Moss has directed include the development of cable-based institutional network proposals for the cities of Portland, Oregon; Chicago, Illinois and Pasadena, California. He has also participated in a variety of new services development projects embracing broadcasting and specialty service networks, cellular mobile radio services, satellite networks distribution and pay television. He is currently directing a study of the potential for providing integrated voice and data communications via cable television in the U.K.

Specific projects which Mr. Moss has directed include the financial planning for the successful application of The Sports Channel to the CRTC, involving preparation of feasibility studies, CRTC financial forecasts and business plans. He has also participated in several business assessments for new CBC services, including evaluation of second network and satellite programming opportunities, and in the development of the Northstar interim DBS service. He was the author of several studies on pay television in the United States, for the CRTC and the Department of Communications. More recently he has participated in financial forecasting and market analysis for Cantel's mobile cellular radio service.

Prior to forming his own communications consulting company, Mr. Moss held staff positions with Home Box Office and the CRTC, and was a visiting lecturer in communications for the University of Ottawa and St. Paul University.

Mr. Moss holds a BSc in Economics from the London School of Economics and an MBA from Harvard Business School.



**Peter Lyman,** Managing Partner, Nordicity Group Ltd., has participated in and directed many analytical studies and consulting assignments in the broadcasting, telecommunications, cable and pay television sectors including, for example, an extensive, multi-disciplinary telecommunications policy study for the Manitoba Government, a demand analysis for direct-to-home television services, a multi-client study of voice and data opportunities in British cable systems, a review of the future impact of new communications technologies on the Canada Post Corpora tion's traditional business, and an evaluation of establishing a broadcasting and telecommunications network for the Native Economic Development Fund.

Mr. Lyman's communications experience also spans areas including the economics of film and television production, broadcasting and cultural industries policy development, particularly with respect to the impact of new communications technologies and technology assessment and market forecasting in the communications sectors. His book, Canada's Video Revolution, was published in 1983.

Mr. Lyman is presently directing a major international study of the development and impact of future television technologies in Canada to the year 2000.

Mr. Lyman's professional career in management consulting began in 1969 at Peat Marwick & Partners where he was involved as senior consultant and project manager for over 25 government and private sector clients, in areas spanning urban development, economics, transportation planning and project management, technological innovation, and economic policy.

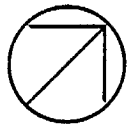
In 1975, he was appointed Executive Assistant to the Honourable J. Hugh Faulkner, then Secretary of State. Mr. Lyman remained as his chief of staff when Mr. Faulkner became Minister of State for Science and Technology, and then Minister of Indian and Northern Affairs. He holds a BA (1964) from McGill University, an MBA from Harvard Business School (1968); Mr. Lyman served as Asst. Director of the Institute for Environmental Studies at the University of Pennsylvania (1968-69). Presently, he is on the board of Television de l'Est du Canada (TVEC), a joint venture partner of a French language pay-TV network.

**Roger Voyer**, Partner, Nordicity Group Ltd., has directed many major multi-disciplinary studies, firstly as Research Director at the Science Council of Canada and later as Executive Director of the Canadian Institute for Economic Policy on assignment from Nordicity Group Ltd. He is presently Secretary of the Communications Research Advisory Board and has been a member of the Long Range Planning Advisory Council of TVOntario. Dr. Voyer has extensive experience in analysis of industrial policies and impact. He has authored reports on technology assessment of frontier petroleum development and has been project director on a Saskatchewan Economic Development Corporation assignment to develop industrial strategies based on the linkage of industrial development to basic resource strength. He has recently published a book Offshore Oil: Opportunities for Industrial Development and Job Creation which deals with industrial linkages from offshore petroleum exploration and development.

Internationally, he has served as an advisor to OECD and led a Nordicity Group Ltd. assignment to assist Atomic Energy of Canada Ltd. in structuring industrial benefits packages linked to its bid to sell Mexico 24 hundred megawatts of nuclear electric generating capability.

Dr. Voyer recently prepared the brief for the Canadian Oceans Industries Association on industrial benefits regarding the oil and gas Bill C-48, and is active on a range of assignments that touch on industrial policy with special emphasis on industrial benefits from energy projects in the North and off Canada's East coast. Recent clients in this area have been Petro-Canada, the Department of Indian Affairs and Northern Development, the Canadian Oceans Industries Association, the Office of Industrial and Regional Benefits (ITC), and the Science Council of Canada.

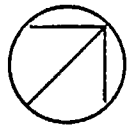
Dr. Voyer holds a B.Sc. and an M.Sc. from Queen's University, and a Ph.D. from the Universite de Grenoble, France in solid state physics.



**Laurie Edwards,** Partner, Nordicity Group Ltd., has extensive experience in communications policy research, strategic planning, and business and marketing consulting. He has directed over 30 major multi-disciplinary studies in the broadcasting and cable sectors in Canada, covering public broadcasting, marketing of Canadian programming to the U.S., marketing of pay television, home video market development, introduction of new communications technologies (eg, DBS), and pay television economics. Specifically, for the English Services Division of the CBC he managed and directed a series of studies (including prospects for a satellite delivered CBC in America service) leading to the development of CBC Enterprises, led a study on how to strengthen Canadian content in the Canadian broadcasting system, and managed the CBC's planning effort toward the preparation of a pay-tv strategy. Mr. Edwards has more recently coordinated the filing of the national pay-tv application of PERFORMANCE and the specialty service application of Chinavision.

He also recently completed a major study for the Department of Communications on the potential impact of U.S. DBS services on the Canadian broadcasting environment, and a model marketing plan for the introduction of pay television for the Canadian Cable Television Association.

Prior to becoming a partner in Nordicity Group he served as Project Director with the British Association for the Advancement of Science, Associate Editor of Science Forum magazine, Secretary of the Science Council of Canada and Director of Broadcast and Business Relations for TVOntario. Mr. Edwards has a BSc. (1967) and an M.A. (1971) from the University of Calgary.



**Carol Darling**, Senior Consultant, Nordicity Group Ltd., has recently joined Nordicity Group bringing over six years of experience in the telecommunications industry to the firm. Ms. Darling has an extensive understanding of telecommunications issues from technical design, construction and economic perspectives.

As an engineer with the Outside Plant Engineering Department at Bell Canada she was responsible for the design and construction of local cable and structure facilities for both voice and video services. Responsibilities included development of construction schedules and budgeting, feeder network design for both voice and video services, aerial and underground structure design, and the management of technical and construction staff for telco facility placement as well as cable placement for a local cablevision company on a contract basis.

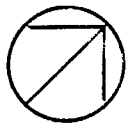
As the manager of Economic Studies at Bell Canada, she conducted economic evaluations for the filing of several large Telecom Canada network services with the Canadian Radio-television and Telecommunications Commission (CRTC) for several voice, data and video network services. Her analytical experience includes analysis of financial impact of telcos, costing of long distance network components, analysis of the impact of new services, development of specialized costing methodologies and development of sophisticated EDP models.

Carol Darling holds a BSc in civil engineering from Queen's University.

**Michael D'Avella**, Research Manager, Nordicity Group Ltd., has undertaken the principal research and analysis in over 40 of Nordicity Group's communications and high technology projects, including the preparation of the successful Chinavision specialty service application to the CRTC, the PERFORMANCE pay-television application, in-depth analysis of the economic impact of broadcasting, cable and pay television, the impact of technological change on cultural industries, business opportunities presented by new technologies and alternative regulatory regimes for Canadian content in television programming. Mr. D'Avella was heavily involved in the study of the cable television industry and it's suppliers for the Department of Communications. He has also led a study of the United States domestic satellite industry, has participated in a study of the impact of new communications technologies on the traditional activities of the Canada Post Corporation, and has researched and analyzed the impact of alternative Canadian content requirements for the Director of Investigation, Combines Investigation Act. Mr. D'Avella also contributed to the extensive, multi-disciplinary telecommunications policy study for the Manitoba Government.

Mr. D'Avella has recently completed an extensive analysis of the implications of implementing performance-based Canadian content regulations for television. He is presently working on a study of the economic impact of the CBC in Ontario and a study of future television technologies.

Mr. D'Avella holds a B.A. (Hons. 1980), from the University of Toronto, with an honours thesis on research and development capabilities in the Canadian computer industry.



# NORDICITY GROUP LTD.

Nordicity Group Ltd. (NGL) is a Canadian research and management consulting firm specializing in business and market analysis in broadcasting communications, telecommunications, information technologies, high technology and cultural industries. The professional staff of NGL bring to bear a wide range of skills - policy, economic analysis and assessment, marketing and opportunity assessment, and technological transfer and assessment.

Since its inception, the firm has conducted many projects for government and private sector clients encompassing:

- **satellites and telecommunications**
  - telecommunications policy and technology
  - telephony
  - the demand for and the impact of direct broadcast satellites
  - the demand for communications satellite facilities (eg, the transponder loading) and services (eg, teleconferencing, voice, data and video)
  - institutional arrangements for DBS services
  - cellular mobile radio
  - demand for direct-to-home services
- **broadcasting and program production**
  - analysis of broadcasting policy
  - export sales of CBC programming
  - impact of new services on conventional broadcasting (eg, audience share analysis)
  - the economics of program production
  - program production capabilities of the CBC and private broadcasters
  - analysis of radio broadcasting

- **cable, pay television and new services**
  - new opportunities for the cable industry (eg, downloading)
  - structure of the cable supplier industry
  - cable pay-TV marketing and economics
  - applications to the CRTC for specialty services (eg, music and ethnic channels)

- **electronic mail and micro-computers**
  - e-mail, micro-computer, vidoetex and teletext market analysis
  - teledelivery of games, software and information

- **cultural industries**
  - public broadcasting and the creative community
  - audio recording
  - publishing

- **high technology**
  - fibre optics and optical disc technology
  - artificial intelligence and machine translation
  - robotics
  - information intensive industries
  - office of the future
  - the impact of personal and home computers

A list of selected projects conducted by Nordicity Group Ltd. can be found in the following pages.

## SELECTED RESEARCH AND CONSULTING PROJECTS OF NORDICITY GROUP LTD.

$170K

- An Assessment of Current and Future TV Technology and Its Impact on Canada: In August 1984 the Canadian federal Department of Communications (DOC) retained the consulting firm Nordicity Group Ltd. in association with the Engineering Headquarters (EHQ) of the Canadian Broadcasting Corporation and Kalba Bowen Associates (KBA) of Cambridge, Mass. to undertake a comprehensive study of current and future television technology and its impact on Canada. The objectives of the study are essentially threefold: (i) conduct an assessment, both nationally and internationally, of the present status of development of television technologies including enhanced definition television (EDTV) and high definition television (HDTV); (ii) determine the future requirements for these specific technologies and project their potential products and services markets to the year 2000; and (iii) analyze and evaluate the industrial, economic, societal, cultural and institutional impacts of these new television technologies on Canada.

- Demand Analysis for a Subscription-based Direct-to-Home Television Service: For Telesat, NGL developed the likely market scenarios, procured and managed a market research survey, and modelled long term demand forecasts, including price sensitivity. The study forecast the demand for a package of tv services to be available on a subscription basis on 1.2 meter, 1.8 meter and 3 meter satellite dish options.

- Evaluation of SENECA Communications Network Proposal: For the Native Economic Development Fund, NGL evaluated Seneca's proposal for a broadcast, videotape library distribution centre, and communications network via satellite. Feasibility analysis of the proposal from a technical, regulatory, business and financial perspective was performed.

- Economic Review and Assessment of Radarsat: In cooperation with Price Waterhouse Associates, NGL carried out an economic review and financial assessment of the cost and credible returns and benefits of the Radarsat project for the Department of Energy, Mines and Resources. Nordicity's assignment included examining foreign industrial development prospects and R&D spin-offs.

- Satellite Strategy for the CBC: In this assignment Nordicity Group assisted the CBC's vice-president of planning in evaluating the Corporation's satellite options (Anik C & D) relative to its renegotiation with Telesat.

- Preparation of Chinavision's Successful Application to CRTC: This work involved the development and documentation of a business plan for a specialty service for the Chinese community. Key aspects of the work included definition of the service concept, program sources, market research, definition of studio requirements, analysis of costs and revenues, documentation of ownership and financial capability and preparation of the final application. NGL prepared the application submitted to the CRTC in response to the call for specialty television services. NGL also represented the client at the specialty service hearings through elaborating the application's market analysis and programming plans.

- Satellite Strategy for the CBC: In this assignment Nordicity Group assisted the CBC's vice-president of planning in evaluating the Corporation's satellite options (Anik C & D) relative to its renegotiation with Telesat.

- Strategic Plan for the Canadian Cable Industry: For the Canadian Cable Television Association (CCTA), NGL is developing a strategic plan for the Canadian cable industry. In this assignment NGL projects the impact of new services in cable television and assesses new opportunities for the industry viz programming and non-programming services. The study is conducted from the point of view of what the consumer wil bear and, thus, examines changes in consumer expenditure patterns on entertainment goods and services.

- Film and Video Retail Study: For the Department of Communications, NGL is conducting a detailed study of the structure and operation of the film and video retail industry. The study will involve a survey of video retail business and an analysis of the consumer demand for video products.

- Voice/Data Opportunity for Cable in the UK: Nordicity is co-director of a UK-Canada project team in a multi-client study on the opportunities for voice and data services on cable in the UK. A fundamental part of this study is an analysis of the current UK telecommunications policies, new legislative instruments, and how the licensed carriers will respond to them. While the institutional context differs substantially from Canada, the policy issues are quite similar in the face of common technological developments.

- The Electronic Future: Prospects and Importance for Canada Post: Nordicity Group was commissioned by Canada Post to provide a strategic assessment of market opportunities arising from technological advances in new communications/information technologies. This assessment was rooted in an analysis of the evolving marketplace and regulatory environment in telecommunications, telematics and office automation. In this confidential study, Nordicity provided Canada Post with the basis for assessing the future direction of telecommunications policy and the likely behaviour of the carriers in facing the more competitive environment.

- BC Attorney General: Preparation of a background paper on business arrangements of the pay-TV industry in comparison with videocassette and theatrical film distribution.

- Use of Canadian Technology in Cellular Mobile Radio Services Demand: For a consortium of radio common carriers and other industrial partners regarding applications for cellular mobile licenses, NGL prepared the market analysis for several selected cities across Canada. Advice on the application process and equipment procurement strategy was also provided to the client.

- The Potential Impact of US DBS Services in Canada: A study undertaken for the Department of Communications, of the potential impact of American direct broadcast satellite (DBS) services on the Canadian broadcasting environment. First, the report examined the impact of increasing cable penetration on audience fragmentation for the advertising revenues and Canadian programming expenditures of commercial and public broadcasters. And second, on the basis of conclusions drawn from the first part, the report assessed the impact of US DBS services, under different penetration scenarios, on the viability of conventional broadcasters and existing and proposed new services including Cancom, pay-television and Canadian satellite-to-cable services.

- Study of the United States Domestic Satellite Industry: This work, undertaken for the Ontario Ministry of Transportation and Communications was a detailed study of the use of US domestic satellites for broadcasting and telecommunications purposes. The work involved investigating transponder loading, availability and use, the behaviour of transponder "brokers" (ie, buyers and sellers of transponder services), and the impact of market forces on transponder rates.

- Analysis of CBC's Economic Impact: For CBC Headquarters, NGL studied the economic impact of CBC expenditures on Canada's technological, regional and cultural communities. The institutional implications of this impact were highlighted.

- CBC and its Communities: A detailed report on the CBC's socio-economic impact and institutional role as the flagship of Canada's cultural industries. The report examined the CBC's activities in terms of their impact on three interrelated communities: the technological community, the regional community and the creative community. The study showed that CBC's activities and presence in each of these communities generated employment and economic wealth. The study involved interviews with key members of each of the communities.

- PERFORMANCE, The Canadian Entertainment Network Ltd.: As consultants to and promoter of PERFORMANCE, a national pay-TV network, NGL learned first hand about the economics of pay-TV and the interests of most of the national and regional elements of Canadian broadcasting. This included the economic and strategic interests of non-affiliated consortium investors, financial institutions, cable operators, public and private broadcasters, as well as the complex policy considerations and regulatory process of the CRTC. PERFORMANCE provided NGL with an invaluable "front line" experience in new service development and market survey analysis, including projecting and modelling future broadcasting scenarios related to the pay-TV environment. PERFORMANCE also represented a $600,000 project management responsibility for NGL, undertaken within stringent deadlines.

- Pay-TV Discussion Paper for the National Arts Centre: The purpose of the discussion paper was to provide the NAC a status report with respect to the CRTC's pay-tv hearings and suggest implications from the perspective of the NAC and the performing arts. The paper introduced pay-TV, described policy issues for the CRTC and the Federal government, and assessed the major applicants and the role of the CBC. It also suggested how the NAC might consider positioning itself vis-a-vis the hearings process.

- CBC Ventures (Enterprises): NGL conducted a series of studies in support of the concept of a separate CBC ventures organization. They included exploring the revenue potential and implementation plan for a CBC cable-satellite service to the US, the union constraints to the exploitation of new services market, and the benefits for Canadian cultural industries.

- Competitive Canadian Programming: An interdisciplinary study for the CBC on the development of an industrial strategy approach to the strengthening of Canadian content.

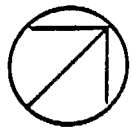
- Projection of Pay Television Revenues: For the CRTC, NGL in association with Timothy Denton, Consultant, developed a series of pay television penetration scenarios to establish the amount of revenue accruing to pay television operators and cable exhibitors. NGL developed a series of assumptions about the rate of penetration growth, the number of households taking more than one service, and the number of disconnections.

- Pay Television Marketing: For TVEC, the French language regional licensee, NGL assisted in the development marketing plans for the launch and first year of pay television. This on-line assignment included close examination of cable affiliate relations, negotiations with the Quebec cable industry, and an appreciation of their equipment purchasing decisions.

- The Design and Development of an Operational Plan for the Export Sales of CBC Programming: For this project NGL assisted senior management of the English Services Division (ESD) to design and develop a three year operational plan for the export sales of CBC programming. The project involved defining the CBC's goals vis-a-vis export sales, assessing and examing new and potential international markets (eg, US pay-cable and satellite-to-cable markets and European and Latin American videocassette markets) for CBC's extensive programming inventory.

- The Economics of Program Production: For the Economics Branch of DOC, NGL conducted an analysis of the demand for and supply of Canadian programming, including export opportunities and policy recommendations for strengthening the independent production sector (a separate French version of this report was prepared to review the unique French language production situation).

- Analysis of Broadcasting Strategy: For the Economics and Broadcasting Policy Branches of DOC, NGL followed up its program production report to provide further policy and economic analysis as a contribution to a draft Broadcasting Strategy cabinet document.



- Strategic Analysis of "Downloading" Opportunity: A study for the Cable Telecommunications Research Institute on the opportunities for exploiting cable's existing distribution system to download video games, computer software and information to home consumers. The study identified and projected the market for key non-programming services, examined the ways in which these services could be delivered to consumers, assessed cable's potential role in the delivery of these services and estimated the investments required, the returns expected and the revenues per household over the next ten years.

- Review and Analysis of CBC Program Production Capabilities: A comprehensive study of the production capabilities of the CBC and the institutional mechanisms that determine what CBC programming is done and how. The study was undertaken for the Toronto Producers and Directors Association and the Canadian Association of Television Producers. Based on intensive seminars with groups of producers across the country, the study examined how production is done (eg, facilities management, resources, budget), how funds are allocated to specific program areas and the decision-making process that determines which program ideas are accepted and which are abandoned. For this project, NGL developed an organizational model, based on the success of R&D units within high technology firms, that would serve as a blueprint for the organization of production units within specific program areas.

- A Study of the Cable Television Industry and its Suppliers in Canada: In this comprehensive assignment leading to two reports, NGL prepared (i) a profile of the CATV equipment manufacturing industry and (ii) identified domestic and international industrial development opportunities for Canadian suppliers. The latter was based on market forecasts for new services, an assessment of alternative delivery systems, financial capability of operators, economic viability and the impact of the Broadcasting Strategy on cable development.

- Telecommunications Policy for the Government of Manitoba: NGL, in association with Timothy Denton, undertook a five-part study of telecommunications issues (broadcasting, cable, the telephone industry, and cinema) for the government of Manitoba. The study involved a complete review of the evolution of telecommunications technology and policy in North America to date, a legal analysis of Manitoba's jurisdiction in the several areas concerned, an elaboration of policy options for the Province, an analysis of various industrial sectors that can be developed by provincial policy, and recommendations for statutory change or expenditure programs in consequence of NGL's analysis.

- The Music Channel Application to the CRTC: For Astral Bellevue Pathe and the Donald K. Donald Group, NGL assisted in the preparation of an application to the CRTC for a specialized tv service. Key aspects of this work included the development of a market projection from advertisers and subscribers and the integration of costs and revenues in a financial model.

- Cultural Development Plan: A study for the Canadian Conference of the Arts in the area of broadcasting. The issues included whether the CBC should continue to be relied on as the principal instrument of Canadian cultural aspirations within the broadcasting industry and whether Canada should make a greater investment in public broadcasting; whether the privately owned broadcasting industry could be persuaded to contribute more actively to the achievement of cultural objectives inherent in the Broadcasting Act; how the energy and wealth of the cable industry could be best turned to the achievement of Canadian programming objectives; how the CRTC can ensure its judgements contribute to the development of a broadcasting industry that is maximally positioned to produce and distribute television and radio programming that reflect and express Canadian culture.

- The Impact of New Communications Developments on Program Production Opportunities: For a group of Toronto-based producers and directors, NGL conducted a review and assessment of new communication developments and their potential impact on program production opportunities.

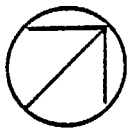
- Marketing Assessment of Recording Film/TV Studio Facilities: A report for a private sector client on the possible utilization of studio facilities for television and film production by Canadian and US network, pay-television, feature film, and syndicated television productions. A five year demand and break even analysis was projected.

- A Canadian Communications Centre in Toronto. A Preliminary Study of Feasibility: In this study, NGL collaborated with IBI Group of Toronto to examine the feasibility of establishing a Canadian communications centre in south-central Toronto. The concept of a communications centre developed by NGL envisaged the establishment of a centre of excellence for Canadian leading-edge communications expertise and technology. The study was jointly sponsored by the Ontario Ministries of Tranportation and Communication and Industry and Tourism and the Federal Department of Communications.

- Marketing Plan for the Introduction of Pay Television: For the Canadian Cable Television Association (CCTA), NGL designed a detailed marketing plan for the introduction of pay television. The plan was designed as a case study for Western Co-axial (16,500 subscribers) of Hamilton, Ontario. It detailed costs and projected returns of a variety of marketing campaigns (eg, direct mail, direct sales and newspaper advertising). And it developed a model to project pay television revenues and cash flow that could be applied to a system of any size. The case study was also used in pay-tv marketing training seminars sponsored by the CCTA.

- New Technology Opportunities in Communications: A business assessment for a major communications conglomerate (Power Corp.) of existing conventional broadcasting operations and identification of new opportunities to exploit satellite technology for new services development.

- Options for the Institutional Arrangements for Direct Broadcast Satellites: This study conducted for the Department of Communications examined the advantages and disadvantages of different institutional arrangements for Canadian DBS services. The study involved assessing the feasibility of and the anticipation of regulatory changes implied by a number of institutional arrangement options. Assisting NGL was Timothy Denton and Jacques de Courville Nicol (President, Turnelle Productions Inc.).



# APPENDIX B

## PEAT MARWICK AND PARTNERS

Peat, Marwick and Partners

DAVID A. ZALINGER
Partner

| | | |
|---|---|---|
| EDUCATION: | Stanford | B.A., Psychology |
| | Colorado | B.A., Mathematics |
| | Victoria | M.Sc., Mathematical Statistics |
| | London | Ph.D., Statistics |
| AFFILIATION: | American Statistical Association; International Institute of Forecasters | |
| EXPERIENCE: | Operations Research Society of America | |
| | Evaluation Research Society; Canadian Evaluation Society | |
| | 8 Years University Teaching | |
| | 4 Years Governmental Experience | |
| | 8 Years Consulting Experience | |

## AREAS OF PROFESSIONAL COMPETENCE

Dr. Zalinger has extensive experience in the areas of market research, forecasting, survey research, consumer decision making models, and social research. He is one of the founding members of the International Institute of Forecasters, and has developed forecasting models related to transportation demand, tourism, consumer products, and communication services. He directs our Ottawa marketing and survey research practice. Proper areas of competence include:

MARKETING:

- marketing research
- consumer models
- survey research
- conjoint measurement
- consumer testing (Delphi, Quantitative Controlled Feedback, focus groups)
- market segmentation studies

MANAGEMENT SCIENCE:

- management decision-making models
- sales forecasting models
- econometric modelling

STATISTICAL DESIGN AND ANALYSIS

- design, management, and analysis of national and local surveys
- multivariate statistical modelling

EXAMPLES OF
RELEVANT EXPERIENCE

DAVID A. ZALINGER

Canadian Home Insulation Program: Marketing Study, Incrementality Analysis, and Cost-Benefit Study

- As part of the evaluation of the Canadian Home Insulation Program, we developed national marketing models, developed forecasting/statitical models, and carried out analyses related to the incremental input and cost-benefit of the program.

Evaluation of the Marketing Aspects of the Defence Industry the Defence Industry Productivity Program

- As part of the overall evaluation of the Defence Industry Productivity Program, we carried out an analysis of the marketing strategies of Canadian electronics and aerospace firms involved in the program and the actual optimal role for the Federal Government in these activities.

Estimating Demand for Transportation Services in the Ottawa-Montreal Corridor

- Developed modal split models, using logistic models, for predicting modal split in the Ottawa-Montreal Corridor under various scenarios.

Estimating Marketing Demand for Aircraft

- Applied conjoint analysis and econometric modelling to assess potential demand and market share for certain types of aircraft.

CONSULTING EXPERIENCE:

Developing Marketing and Data-collection Models for the Office of Tourism

- An experimental design and multivariate statistical models, including conjoint measurement, were developed as a basis for large-scale data collection related to Canadian tourism and for predicting tourism demand for various sites.

CONSULTING EXPERIENCE: (Cont'd)

Industrial Survey for the Department of Regional and Economic Expansion

- Was responsible for a personal survey of 100 recipients of grants from the Regional Development of the program, suggested ways of improving it and addressed project incrementality.

Canada Post Market Forecasting Models

- Developed econometric models for forecasting various mail flows, particularly long and short-term first class mail and investigated the price elasticity of these demands.

Canada Post Marketing Strategy

- Carried out a study to examine Canada Post's strategy for marketing their advertising mail (direct mail) service. This project involved a national mail-out survey (4,200 advertisers and advertising agencies), and interviewing nationwide.

Marketing Research in Consumer Products

- For several well-known marketing research firms, carried out conjoint analyses of various attributes of a food product, and forecast market share for the product under various future scenarios. Carried out multidimensional scaling work involving mixed drinks.

Evaluation and Survey for Supply and Services Canada

- Was responsible for the evaluation of the Telephone Referral Service for Supply and Services Canada. This involved two telephone surveys and included over 600 respondents.

## THE FIRM

Peat Marwick is one of the largest and foremost accounting firms providing a full range of services in accounting, auditing, tax, and management consulting. We serve clients in every area of business, government, and professional life. Operating worldwide through Peat Marwick International, the Firm has over 27,000 professionals and staff, located in 330 offices in 80 countries. The number of clients serviced exceeds 50,000 ranging from closely held family enterprises to large multi-national corporations. Peat Marwick's size among professional organizations allows us to meet the demands of a broad clientele and yet provide individualized services to clients of all sizes and complexities. The Firm's professionals are specialists in more than two dozen basic industries, including insurance, banking, education, health, public utilities, publishing, real estate, retailing, securities, and transportation. In addition, functional specialists in areas such as information systems form a major portion of our consulting practice.

To accomplish our goal of meeting the diverse needs of our clients, we continue to develop and enhance our skills in four major practice areas:

- Auditing and Accounting
- Tax Services
- Management Consulting
- Private Business Service.

The Firm is committed to excellence and the highest standards of integrity in all its work. We believe that our people and our experience place us in a

unique position to serve our clients. Our aim is total service - the best professional advice, efficiently delivered, in accordance with high standards of quality. The following is a more detailed description of our management consulting services.

## International

The integration and interrelation of our individual practices is handled by Peat Marwick International, an umbrella partnership comprising all of our partners around the world. It ensures that uniform procedures are employed, and, through a series of international committees, maintains a consistently high standard of service world-wide. The Canadian and U.S. firms are two of the founding members and its partners, as members of various committees, play important roles in the formulation of policy and in the execution of international engagements.

## North America

Since 1906, when we undertook our first consulting engagement, Peat Marwick's management consulting practice has become one of the largest in the world. The staff of over 1,400 full-time professional consultants possess extensive and varied business consulting experience in a wide range of disciplines; many of them hold advanced degress in accounting, engineering, business administration, computer science, marketing, economics, and industrial management.

Peat Marwick's management consulting services deal with a wide variety of problems in both the private and public sectors, and in virtually all major industries. Our professionals, because they are primarily recruited from

industry, know a client's industry and are both pragmatic and skilled in their disciplines. Because of changing business environments, it is unusual for any client company to have sufficient staff in all specialized functions and disciplines to satisfy increasingly complex business needs. When a client turns to Peat Marwick for assistance, the Firm can identify the qualified consultants, and the large nationwide and international staff allows us to promptly and effectively respond.

Peat Marwick's management consulting assistance includes organization studies, strategic planning, financial planning and control, economic analysis, human resources, manufacturing control, marketing studies, and a wide range of information systems services. Our professionals are engaged in technical studies, performance improvement, automated system development and implementation, project management, cost reduction, and operational audits. We have served a wide variety of industries and functional areas.

**Industry Specialization**

- Agribusiness
- Automotive
- Banking and Trust
- Chemicals
- Cosmetics
- Education
- Entertainment
- Energy
- Finance
- Government
- Health Care
- Insurance
- Lumber and Paper
- Manufacturing
- Mining
- Pharmaceuticals
- Publishing and Printing
- Public Utilities
- Retail/Distribution
- Securities/Brokerage
- Textiles
- Transportation

**Functional Areas of Specialization**

- Telecommunications
- Data management
- Business planning

- Financial management
- Industrial management and engineering
- Management science/Operations research
- Market and economic analysis
- Investment supervision
- Compensation and Personnel services
- Executive benefits
- Executive search

The collective problem solving efforts of a multi-disciplinary team of consultants, working closely with client personnel, frequently generate a unique solution to an industry-wide business problem. Carrying that solution from the conceptual design stage through to successful implementation requires: (1) our commitment to assuring the outcome of the consulting process through careful planning, staffing, and an ongoing system of engagement control and administrative procedures, and (2) our concerted effort to establish a productive working relationship with our clients, based on frequent and open communication.

Our telecommunications professionals are located in many of the major cities, e.g., Minneapolis, New York, Philadelphia, Rochester, and Short Hills in the U.S., and Montreal, Ottawa, Toronto, and Vancouver in Canada.

## TELECOMMUNICATIONS SECTOR

### Revenue Settlement Practices

A very significant engagement by the Firm was a study of the revenue settlement practices and procedures used by the members of the Trans-Canada Telephone System (now Telecom Canada) to divide the jointly-earned revenues from telecommunications services. The Canadian Radio-television and Telecommunications Commission (CRTC) engaged the Firm to carry out the study in order to provide a common base of information for the Commission and the intervenors in preparation for the public hearing into Telecom Canada rates.

The reports resulting from the three phases of the study were printed for public distribution and were entered as exhibits during the public hearing. Three of our staff provided expert testimony at the outset of the public hearing. This hearing represented the first in-depth regulatory inquiry into Canadian revenue settlement practices.

**Rates of Return Study**

The Firm was engaged to carry out a rate of return comparative analysis for a Canadian telecommunications carrier. The analysis covered representative telephone and electric utilities in both Canada and the United States over a ten-year period.

**Fixed Asset Valuation**

The Firm was engaged by a major telecommunications carrier to carry out and update a fixed asset valuation for inside plant, subscriber equipment, radio systems, cable systems and spare parts.

**Organizational Planning Study**

A large telecommunications carrier engaged Peat Marwick to assist in defining organizational structures and senior-level position responsibilities in order to prepare for an extensive reorganization of the company's operations. A second phase of this significant engagement focused on organization planning at the departmental level for all functional areas of the company.

**Compensation Surveys**

Peat, Marwick carried out a wide-ranging survey of compensation policies and practices for a major telecommunications carrier. This survey covered nineteen senior positions including those of the President and Vice-President.

**EDP Operational Review**

A large telecommunications carrier was facing major decisions regarding the upgrading of computer hardware and the development of information systems. The company engaged Peat Marwick to carry out an operational review of the effectiveness of MIS policies, the MIS organization, EDP applications, EDP standards, computer operations and systems software.

**Depreciation Practices**

Peat Marwick examined the depreciation practices of a provincial telephone company on behalf of the Board of Commissioners of Public Utilities in connection with the company's application for increased rates. The study described and evaluated the company's method of computing depreciation rates and the procedures used to determine average service life, gross salvage, cost of removal and net salvage for all classes of depreciable plant.

**Assistance to Public Utility Boards**

For several years, the Firm has acted as accounting advisors to the Board of Commissioners of Public Utilities of some provinces. In recent cases, an examination was made of the records of a provincial telephone company in order to submit, for the information of the Board, data relevant to the company's application for an order approving changes in the company's rates, charges, and regulations for exchange and long distance service and equipment.

**CRTC Cost Inquiry**

The Firm was engaged to assist a client in preparing evidence and in providing testimony before the CRTC Cost Inquiry, Phase III. This work involved an examination of Telecom Canada's Revenue Settlement Plan and the application of this methodology to more general issues of service costing.

**Major Software House and Service Bureau**

Peat Marwick was responsible for the development of a specialized communications software package for IBM PCs. In a pioneering effort, we interfaced the asynchronous communications protocol of the PC with a translation board to provide communication with the host computer via the 2780 protocol. Effective recovery procedures and line handling routines were developed. The project involved establishing task definitions and critical paths, frequent status meetings, and extensive testing. The project was completed within the required timeframe and our client achieved a major competitive edge in the marketplace.

HE 7814 A746 1984 AN ASSESSMENT OF THE MARKET FOR VIDEOTEX, TELETEXT AND RELATED SERVICES : A STUDY PROPOSAL

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Government of Canada Department of Communications
CIRCULATION RECORD

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AN ASSESSMENT OF THE MARKET FOR VIDEOTEX TELETEXT AND RELATED SERVICES : A STUDY PROPOSAL