A REVIEW OF THE CANADIAN AND INTERNATIONAL

DATABASE, SOFTWARE AND ENHANCED SERVICES (VANs) INDUSTRIES

PROGRAM EVALUATION DIVISION/DPE

(DOC)
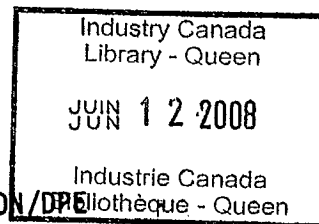
SEPTEMBER 23, 1986

A REVIEW OF THE CANADIAN AND INTERNATIONAL

DATABASE, SOFTWARE AND ENHANCED SERVICES (VANs) INDUSTRIES

PROGRAM EVALUATION DIVISION/DPE

(DOC)

SEPTEMBER 23, 1986

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

SECTION THREE - ENHANCED SERVICES (VAN'S)

EXECUTIVE SUMMARY

This report reviews developments in the areas of databases, software and value added networks. The purpose of the review is to identify what is currently known (readily available) about these industries, to identify information gaps and if possible identify in a preliminary way those measures the Government of Canada can and should take to assist Canadian companies operating in these fields.

Growth

All these areas are expected to grow, although at different rates over the next five years. Software market revenues are expected to increase by 20% a year from 1984 to 1987 and perhaps more rapidly after that (29% a year to 1990 in Europe).

Database revenues will increase, but less rapidly than software revenues. It should also be noted that database revenues are a fraction of software revenues (1983 database market for North America is estimated to be $1.5 billion while software revenues for the same period were on the order of $10 billion).

Less is known about the revenues for value-added networks (1985 estimate for the United States $300M) in part because they are a more recent development and growth is highly influenced by levels of regulation (eg. in Germany there is virtually no growth in VANs because of the regulatory framework surrounding the Bundespost).

In general, software will continue to expand at a substantial rate (approximately 20% a year to 1990) followed by rapid growth in VANs and slow but steady growth in the database market.

Barriers to Entry

The factors preventing Canadian companies from entering the market are similar in the three areas: a small market (hence the need to export), a lack of marketing expertise and difficult access to financial markets. While these factors characterize all three areas it should be noted that growth in VANs is highly dependent on the regulatory framework while enhanced Canadian participation in database revenues is limited by the foreign control of large reference databases.

Direction for Government Involvement

Given the different problems facing each of these areas, government support needs to operate on a number of dimensions. The most fundamental are to assist the financial and marketing requirements of the firms. In addition, Canada needs to ensure that the regulatory framework is as favorable as possible for the development of VANs. Finally, Canada should assist Canadian companies to acquire the critical mass to operate in the database market.

Requirements for Additional Research

Only two of the three areas reviewed in this paper would appear to warrant further research. For both Databases and VANs there is a need for more up to date information on the structure and size of the Canadian industry. In addition, there is a need to examine the regulatory framework for telecommunications to ensure that it enhances the ability of Canadian firms to compete in the development and sale of VANs. Finally DOC should examine the options available to assist the Canadian database industry to acquire the critical mass to compete in North America and Europe.

SECTION ONE

DATABASES

SUMMARY

Centralized databases systems deliver information from a host computer over a communication network to the user. Generally these systems are interactive and allow the users to seek out the information derived through iterative procedures either via a menu or search and retrieval systems.

There are three types of online databases which are bibliographic databases, source databases (statistical information) and full text databases (complete article of scientific journal as opposed to an abstract, full legal documents).

The world market for databases was estimated at $2.6 billion U.S. in 1983. The North American market segment is the largest with approximately 60% of the world market. Canada's market was valued at around $75 million which is about 5% of the N.A. market. In the early 80's the growth of these industries was expected to be high because of the rapid proliferation of micro-computers among consumers. It was expected that the demand for database services would expand with that market. It turned out that the consumer market was not attracted by those services. The medium term growth is forcasted at 3 to 5%.

This industry evolves in a market which is not a competitive one yet. It is an industry at its infancy trying to develop a demand for the services it offers. The number of potential users is still very limited. Furthermore, the cost of developing and maintaining such databases is enormous and the short and medium term expected rate of return on investment is negative. Only larger corporations addressing large audiences can afford such a venture.

Source database developed by large organizations such as governments and licensed for distribution through private companies have a future. Full-text and bibliographic databases unless subsidized directly or cross-subsidized will not survive because of market size.

Canadian companies face a number of barriers in this field: market size will not allow them to recover an investment within a reasonable period of time; due to the high cost of developing and maintaining a large database it is virtually impossible to obtain any economies of sale; access to data sources is limited for Canadians.

The best opportunities for Canadians are found in these fields. At this stage it is not possible to identify precisely which areas present the best growth potential. This will have to be identified with industry experts.

1.0 STRUCTURE OF THE INDUSTRY

1.1 Definition of the Industry

We will examine two types of databases:

* Centralized databases; and
* Stand-alone databases.

For definition purposes, the following covers all aspects of databases and describes what they are. The rest of the paper will deal precisely with large databases even though other types of databases are described in this section. The purpose is to inform the reader about the whole array of databases.

1.1.1 Centralized Database Publishing

Centralized database systems deliver information from a host computer over a communications network to the user. Generally these systems are interactive and allow the users to seek out the information derived through iterative procedures, either via a menu or search and retrieval systems.

We shall divide centralized databases into two categories: online databases and videotex and teletext type databases. We define online databases as those which use ASCII or an equivalent standard and videotex as those which use NAPLPS or other similar standard. Although many consider videotex to include online databases and others consider online to include videotex, we find this distinction useful for our analysis since the two types of services have well defined separate economics and histories of their development.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.1 Definition of the Industry (Cont'd)

1.1.1 Centralized Database Publishing (Cont'd)

a) Online Databases

Online databases can be classified into three different
types or combinations thereof: bibliographic databases,
source databases and full text databases.

Bibliographic Databases

Most of today's bibliographic database publishers have come
from the ranks of traditional reference publishers who
automated their print products for computerized typesetting
and transferred their machine readable files to online
retrieval systems. Dialog, started by Lockheed in 1972,
was the first such service.

Source Databases

Source databases are largely numeric data, like the
econometric time series from Data Resources Inc. and
statistical data from Statistics Canada offered, on its
behalf, by service suppliers such as I.P. Sharp. These
databases are directed largely at the business and
commercial sector. Source databases constitute the largest
online sector accounting for most of the online industry
revenues. These database services evolved gradually over
the years as a logical application of computer timesharing
services which started in the late sixties and early
seventies.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.1 Definition of the Industry (Cont'd)

1.1.1 Centralized Database Publishing (Cont'd)

a) Online Databases (Cont'd)

Full Text Databases

For any user engaged in research, the most significant current drawback is the gap between the number of sources covered by abstracts or citations and the online availability of the information to which they refer. Currently, once a bibliographic database search has helped identify a number of documents, one must still order them for delivery by mail unless they are available in the local library. As database publishers recognize the demand for instant accessibility of documents, the trend towards full-text information online is accelerating, though subject to three powerful constraints: the cost of converting existing print text to electronic form, the cost of online storage and the cost of computer power to search more data faster. All three of these costs are steadily declining, and they are expected to eventually drop to low enough levels to remove most of the economic constraints. Full-text databases is a by-product of other publishing or research activities such as the digitalization of newspaper content for the purpose of remote printing. For instance, the Globe and Mail sends, electronically, the content of its paper to several remote printers for simultaneous printing. Having all the content in digital format, there is only one small step to offer a full text service accessible by computer instead of the usual microfilm or microfiche. Infogloble is the name of the organization servicing the Globe and Mail information.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.1 Definition of the Industry (Cont'd)

1.1.1 Centralized Database Publishing (Cont'd)

b) Videotex and Teletext Type Services

Advances in computer and communication technology have led today to the development and production of a whole set of hybridized systems for the delivery of information services to the home and office. The principal feature of these services is that various elements such as information data banks, indexing structures, computers, communication networks, and software are being integrated together to produce totally new products or services. Two such products, are videotex and teletext.

Videotex

Videotex has a multitude of capabilities and characteristics, and in its most general terms can be viewed as a computer technology that enhances the way in which textual and graphic information can be displayed and handled. It simplifies the process necessary to accomplish remote access, retrieval and exchange of computer-stored information.

Videotex represents a new way of packaging computerized data and enables the widespread dissemination of textual and graphic information. By way of wholly electronic means, display can be provided on low-cost terminals which are under the selective control of the recipient, using control procedures easily understood by untrained users. There are two generic forms of videotex broadcast videotex or teletext and interactive videotext.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.1 Definition of the Industry (Cont'd)

1.1.1 Centralized Database Publishing (Cont'd)

a) Videotex and Teletext Type Services (Cont'd)

In Canada, Telidon is the name that identified the
particular configuration of videotex. Since its
development in the 1970's, changes have been made to the
Telidon protocol, leading to the current configuration
referred to as NAPLPS (North American Protocol Level
Presentation System). This is a protocol level enhancement
of the basic Telidon system.

The databases are generally designed to permit the
accessing and rapid retrieval of specific items of
information on the system. Transmission between the user
and the computer can be accomplish on the public telephone
network, through cable setting, or hardwire. Most popular
display devices are generally micro-computers. As opposed
to teletext, videotext databases are not routinely cycled
but rather set up with search procedures for access to
individual pieces of information on database or specific
pages.

b) Teletext

Teletext refers to a system where information, consisting
of alphanumeric characters or graphic images, is edited on
a keyboard or generated from computer-stored database. It
is encoded in a bit stream of digital data at transmission
rate that is compatible with colour TV systems. One form
for teletext use is encoded data which is multiplexed onto
a video signal and transmitted over the TV signal using the
unused portion of the vertical blanking interval (vbi). In
another configuration a full channel can be used and in
that case, the number of pages can be increased
considerably.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.1 Definition of the Industry (Cont'd)

1.1.1 Centralized Database Publishing (Cont'd)

b) Teletext (Cont'd)

Various transmission mediums can be utilized for teletext services including Cable TV, cellular radio, low-powered TV, direct broadcast satellite or FM radio. Point to point or multiple point distribution systems are possible features of teletext broadcasting.

Teletext and mainly videotext will find their place in the development of numerous services. These are referred to as **Value Added Networks.**

1.1.2 Stand-alone Database Publishing (Optical Disks, CD-ROMS)

Once a user unhooks from a telecommunication channel, the ability to take the pulse of constantly changing information is removed. But most information is relatively static, and the costs and complexities of telecommunications and mainframe computers provide a strong rationale for delivering information that is relatively infrequently updated via media that can be used locally with a personal computer or any other intelligent workstation. The following describes briefly various storage media which can be used in this technology.

a) Floppy Disks

Floppies are the primary means of distributing software for today's micro-computers. They are also still the primary storage medium for these systems. Despite their popularity, floppy disks have not been used extensively to distribute information packages (as opposed to software packages such as Lotus 1 2 3, D BASE etc.). In terms of

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.1 Definition of the Industry (Cont'd)

1.1.2 Standalone Database Publishing (Cont'd)

a) Floppy Disks (Cont'd)
   storage capacity, floppy disk are still small for most
   online databases. However, floppies can be useful in
   distributing subsets of larger databases and in delivering
   updates of databases; their relatively low cost and ease of
   use are factors in their favour. As an example, Value Line
   of New York offers a product called Value Screen, an
   investment database on disk that is bundled with
   applications for further analysis. Users pay $495 annually
   for the service, in which they receive updated disks 12
   times a year.

b) Removal Hard Disk and Streamer Tape
   Since most databases won't fit on a floppy disk, high
   capacity systems are available to store large databases at
   the user's micro or to send data through the mail in excess
   of what can be provided on a floppy disk. Two forms of
   transportable magnetic mass storage exist for this purpose:
   removable hard disks and streamer tape cartridges.
   Portable disk have a low storage capacity but a rapid
   random access. Streamer tapes have storage capacity but
   very low random access.

c) Optical Disks
   One of the most promising developments in electronic
   publishing media is the optical disk. Because of their
   huge storage capacity (Gigabytes) and ability to mix
   various media such as text, graphics, sound, and (in the
   case of videodisc) still and motion video as well, optical
   disks represent an opportunity for software and database
   producers to become primary providers of the personal
   multimedia libraries of the future.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.1 Definition of the Industry (Cont'd)

1.1.2 Stand-alone Database Publishing (Cont'd)

c) Optical Disks (Cont'd)

Currently two types of optical disks exist - read only and write once and read many times (WORM, also known as DRAW - Direct Read After Write). The inherent advantage in the applications of read-only media such as videodiscs and compact discs read-only memories (CD-ROMs) is that they can be quickly and cheaply reproduced. Because of its advantageous form factor (similar to floppy disks), low-cost characteristics, portability, potential office-home compatibility and a stable and rapidly expanding disk manufacturing infrastructure (based on the success of the compact audio disc), CD-ROM is expected to have the greatest impact on electronic publishing of any technology over the next decade.

To a certain extent, stand-alone databases are related to the software domain. In the present context stand-alone databases belong to the software segment of the high technology fields and teletext and videotext are more related to the Value Added Networks.

1.2 Product Definition

There are a number of ways in which one can classify databases. Databases vary by subject, scope, type of information, geographic and chronological coverage, frequency of updating and also by record/file structures, types of systems with which they can be used, intended uses and intended users. A primary distinction is made between

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.2 Product Definition (Cont'd)

(1) Reference databases (i.e. those that refer users to a primary source for complete information), and (2) source databases (i.e. those that themselves contain the source of primary information). Within each of the two primary types, there are sub-categories.

1.2.1 Reference Databases

These databases refer or "point" users to another source (e.g. a document or an organization) for additional information or the complete text of a citation or abstract. All Reference databases are textual in nature. They are further sub-divided into:

a) Bibliographic

These databases contain citations and, sometimes abstracts of the printed literature, e.g. journal articles, reports, books, newspaper items, conference proceedings, dissertations. Most of the databases offerred by the search services (Diolog, SDC, BRS, CAN/OLE) fall into this category.

b) Referral

These contain references and, sometimes, abstracts or summaries of non-published information. They generally refer users to organizations, individuals, audio-visual materials and other non-print media for further information.

1.2.2 Source Databases

These databases contain complete data or the full text of the original source information. They can be alphanumeric or textual in nature. Source databases are further sub-divided into 4 categories:

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.2 Product Definition (Cont'd)

1.2.2 Source Databases (Cont'd)

a) Numeric

These databases contain original census or survey type data and/or statistically manipulated representations of data. The data are often in the form of time series. The database can also contain headings, titles and explanatory notes. The best known Canadian example is CANSIM (Canadian Socio-Economic Information Management System).

b) Textual-Numeric (or Alphanumeric)

The databases consist of records that contain a number of data elements or fields with a combination of textual information and numeric data. Census or survey data are often in this form.

c) Properties

Such databases contain dictionary or handbook type data, typically chemical and physical properties.

d) Full-Text

These databases contain records of the complete text of some primary source, such as a newspaper item, a specification or a court decision. Such databases are becoming particularly important in the fields of legal research/documentation and news/information services.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.3 The Database Producers

1.3.1 Reference Databases

Reference database producers are primarily publishers of printed index and abstract journals such as Chemical Abstracts. These organizations, which can be in either the private or public sector, acquire, screen, select, index and often abstract or summarize the primary literature. To produce printed publications efficiently, these organizations have adopted computerized systems for photocomposition and phototypesetting. This operation generates magnetic tapes that can be reformated and used as direct inputs to computerized storage and retrieval systems.

1.3.2 Source databases

Producers of source databases are represented by a number of different types of organizations. Some are government agencies that have a responsibility for the dissemination of the information collected or generated in their particular area; examples would include Statistics Canada and the U.S. Bureau of Labour Statistics for source numeric databases. Some producers are also publishers of printed reports, books, journals and newspapers, who have turned to electronic publishing to protect their revenues or increase their market share; examples would include newspapers (Globe and Mail, New York Times) and legal publishing firms (QL Systems Ltd. and West Publishing Co.) for source full text databases. Some producers process and package data that were collected by some other source, often a government agency. In their packaging, these producers frequently bring together data from a number of sources, and sometimes increase the value of a collection by including additional derived data, such as summary totals, forecasts, etc. that they generate form the source data.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.3 The Database Producers (Cont'd)

1.3.2 Source databases (Cont'd)

Most producers make their databases available to database
distributors or vendors, under a variety of contractual
arrangements. Some, however, distribute their own databases.
Organizations, combining database production and distribution
functions, are sometimes referred to as integrated services.

1.4 The Market

1.4.1 The North American Market

The North American market was estimated at $1.5 billion in 1983
for information retrieval and anciliary services. The world
market can be estimated at $2.6 billion. It represents around
1% of the global electronic market and less than 5% of the
computer market. Canada's demand for online database services
is estimated at 5% of the U.S. market which represents a value
of approximately $75 million a year.

Sixty per cent of the suppliers, producers and vendors, are
located in the U.S. and 10% are found in Canada. Non U.S.
database producers are government agencies or non-profit
organizations.

In North America, 96% of total online databases revenues, in
1983, were derived from the business sector and only 4% came
form the consumer sector.

a) Bibliographic Databases

Most of today's bibliographic database publishers have come
from the ranks of traditional reference publishers who
automated their print products for computerized typesetting

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.4 The Market (Cont'd)

1.4.1 The North American Market (Cont'd)

a) Bibliographic Databases (Cont'd)

and transferred their machine readable files to online
retrieval systems. Dialog, started by Lockheed in 1972,
was the first such service.

The North American market for bibliographic databases which
mainly consists of scientific, technical and scholarly
journal abstracts accounted for $50 million in 1983 and is
expected to reach $127 million by 1988. Most of the
revenues in this market are shared by the "big three"
bibliographic services: Lockheed's Dialog Information
Services, the market leader, serving close to 35,000
organizations; SDC, search services of Systems Development
Corporation, a subsidiary of Burroughs Corporation; and
BRS, Bibliographic Retrieval Services of New York which
serves 15,000 customers. CISTI, the Canadian Institute for
Scientific and Technical Information is the largest
supplier of such services in Canada. Users of these
services are located in academic institutions, research
centres, and corporate libraries. In addition to the above
market, there exists a market for library support and
general bibliographic tools ($20 million in 1983). This
includes online services which provide libraries with tools
for cataloging, interlibrary loan and acquisitions. OCLS,
Online Computer Library Centre, is the leader in this area.
UTLAS, University of Toronto Library Automation System is a
Canadian supplier of such services.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.4 The Market (Cont'd)

1.4.1 The North American Market (Cont'd)

b) Source Databases

Source databases are largely numeric data, like the econometric time series from Data Resources Inc. and statistical data from Statistics Canada offered, on its behalf, by service suppliers such as I.P. Sharp. These databases are directed largely at the business and commercial sectors. Source databases constitute the largest online sector accounting for most of the online industry revenues. These database services evolved gradually over the years as a logical application of computer timesharing services which started in the late sixties and early seventies.

c) Full Text Databases

As database publishers recognize the demand for instant accessibility of documents, the trend towards full-text information online is accelerating, though subject to three powerful constraints: the cost of converting existing print text to electronic form, the cost of online storage and the cost of computer power to search more data faster.

All three of these costs are steadily declining, and they are expected to eventually drop to low enough levels to remove most of the economic constraints. In the meantime, full text is likely to become available when the cost of converting printed text into electronic form can be avoided, for example, in the case of publishers that have already created computer tapes for phototypesetting (Infoglobe with Globe and Mail). There are few areas,

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.4 The Market (Cont'd)

1.4.1 The North American Market (Cont'd)

c) Full Text Databases (Cont'd)

however, in which a large focussed market will justify the cost of creating full text database from "hard copy" as is the case for example, with full text of court decisions, which is provided by Lexis (Mead Data Central) and its competitor Westlaw (West Publishing, St. Paul, Minn).

1.4.2 The European Market

The European Market can be considered to be in its infancy compared to the North American Market. Experts estimate the market size at 10 to 20% of the U.S. market. It is relatively small if we consider the GNP level of EEC countries. It also contrasts with the total business generated by the data processing industries (hardware and software) which was estimated at almost $12 billion in 1982.

European countries are more heterogenous with different government policies and regulations with regard to telecommunications and also different languages. Available public data networks are less sophisticated and cost-effective. In addition, the state operated telephone and telegraph has always put more emphasis on developing and promoting mass consumer services. In general, online databases are not yet mass market services because of the nature of the content and access and usage costs.

The total market was estimated at approximately $190 million U.S. in 1982. Two American research organizations in data processing market trends predicted a compound growth of about 20% between 1982 and 1987.

1.0 STRUCTURE OF THE INDUSTRY (Cont'd)

1.3 The Market (Cont'd)

1.4.3 The Canadian Market

Very little data is available on the Canadian market size of
this type of data processing. Evans Research Corp. estimated
the market at $30 million back in 1981 and forcasted the
shipments to reach $100 million by 1985.

Reference databases are mainly controlled by U.S. firms. Most
Canadian online search services centres are located in
government and academic organizations (libraries or information
centres). Many Canadian online search service centres (about
50%) operate on a free basis for their customers. This market
was estimated at $5 to $6 million in 1982.

Source numeric databases includes socio-economic, financial,
credit, marketing demographic and statistical information.
CANSIM is a good example of source numeric database; and
I.P. Sharp is the largest private company which offers over 60
databases. This market is estimated to be $15 to $34 million.

Full text databases still have a very small market. The future
seems to be very promising especially in the legal fields.
Newspapers, periodicals and specialized journals (education and
scholarly) will also develop a certain business in that area
but it will be a slow growth on the medium term.

The mass market for databases is virtually non existent. Until
recently, American experts believed very strongly that the mass
market would grow at the pace that microcomputers are
penetrating the consumer market. Recent reports indicate that
there is consumer resistance for database services.

The Canadian market is relatively small for online databases
and most of the supply comes from the U.S.

2.0 COMPETITIVENESS

2.1 Barries to entry

The barriers to entry are important for Canadians. This industry
requires large initial investment that will be recovered in the long
term provided that the market base is large enough. The barriers to
entry include the capital requirements, the access to relevant data
sources and the economies of scale.

2.1.1 Capital Requirements

Although definitive information is not available, it seems
clear that entering the online information retrieval services
market require substantial initial investments relative to the
revenues likely to be achieved in the first 3-5 years. For
example, the New York Times invested about $10M in 1973 to put
its INFOBANK news database online; Mead Corporation's initial
investment in its LEXIS legal database, which opened for
service in 1973, was $20M; TRW's investment was of the order of
$70M.

Acquisition of an existing company (database vendor or
timesharing computer service bureau) is, of course, an
alternative form of entry investment. McGraw-Hill acquired DRI
for $103M, similarly, Dun and Bradstreet acquired National CSS
Inc., and Reader's Digest acquired Source Telecomputing
Corporation. Such acquisitions are not in the reach of most
Canadian companies.

An information system can be very expensive to set up.
Producers questioned by LINK, a U.S. research organization,
estimated that the investment needed to start from scratch
could range form $2M to $10M. For this reason many information
producers are government agencies who have a mandate to create,
collect or otherwise provide data; or print publishers who use
computerized techniques to create input data for hard copy
publications. Once the costs of information provision have
been absorbed, information production becomes a marginal cost.

2.0 COMPETITIVENESS

2.1 Barries to entry (Cont'd)

2.1.2 Lack of Access to Data

In addition to requiring large investments, access to relevant data for the purpose of producing an online database, producers of databases may be faced with other obstacles. The contractual permission of the creators/originators of the data is required if the data is not in the public domain. This permission may be withheld by authors and/or publishers for both economic and non-economic reasons. The definition of the property/economic rights of the information provided is still confused, to say the least. Agreements such as the Berne Convention and the Universal Copyright Convention have been made obsolete by the new information technologies.

2.1.3 Economies of Scale and Scope

Database distribution involves substantial overhead fixed costs but the reproduction cost of a given item of information, excluding the physical medium, is virtually nil; therefore, in an information retrieval system, the reproduction cost of an item should approach the marginal cost of accessing and retrieving it. Such a situation should give rise to important economies of scale.

One would also expect an inherent economy of scope between database distribution and the traditional activities of computer timesharing service bureaus. The computer facilities, support staff, telecommunications networks, user training and support are required for service bureau operations. The additional costs involved in database distribution are related to acquisition of databases and appropriate software, extra online storage, loading and updating the databases regularly and marketing/training costs. Source numeric databases present an additional attraction, because the information retrieved is

2.0 COMPETITIVENESS

2.1 Barriers to entry (Cont'd)

2.1.3 Economies of Scale and Scope (Cont'd)

usually manipulated or post-processed by the user, thus resulting in additional computer usage revenues. These characteristics are well demonstrated by the operations of I.P. Sharp Associates and DRI.

There could be further economies of scope between the activities of information providers and producers, and also between database production and distribution.

2.2 The Demand

The demand for online database services is relatively low even though it is expanding rapidly. This constitutes a major drawback for Canadian companies that are confined to the domestic market. The only way to achieve profitability in this area is mass distribution and use for producers, and multi-databases distribution for vendors.

2.3 Production costs

The main costs are for hardware and the acquisition and processing of the information. The cost of the equipment is continually decreasing and the efficiency increasing. This plays in favour of Canadian producers of databases. But in several areas of this industry online databases are a by-product derived from the main activities of the producer. For instance, the Globe and Mail has decentralized its printing and is now doing regional printing enabling all the newspaper content to be sent electronically to printing plants. Having all this information already computerized, it is simple to offer a full-text service to whoever wishes to consult one or several old issues of the paper. Consequently, unless producers have their own data, it could be prohibited to buy information form an outside source and economical to develop and maintain.

3.0 <u>TRENDS IN ONLINE DATABASES</u>

The overall industry trends, described below, show that large databases offer a great potential and offer some interesting opportunities for a number of industries. Opportunities from the on-line retrieval business lie in two areas -- <u>data base publishing and online service operations</u>. These are separate, quite different industries, although they necessarily interact closely.

3.1 <u>Database Publishing</u>

Rapid database publishing growth over the last decade has been fueled by conversion of the most obvious large opportunities into online offerings. With these opportunities now provided by established firms, some observers have said that the major opportunities are now gone. Such a conclusion is highly presumptuous and probably incorrect. What is eliminated <u>are the most obvious opportunities</u>, taken mostly by companies that were in preemptive positions. These were not opportunities open to many entrepreneurs. Changing conditions (new and better hardware and more sophisticated software) are likely to provide <u>many new business opportunities, most probably in the following areas:</u>

- <u>Full text information</u>: Full text data bases are still in their early stages of development and should offer many new opportunities. There is far more full text material to exploit than numeric or bibliographic data. Another form of information -- <u>graphic images -- is virtually untouched</u> in terms of commercial database offerings. In this area, especially, material not now normally thought of as database information may offer exceptional opportunities.

- <u>Smaller specialized niches</u>: Many less-than-gigantic database applications remain to be filled by smaller operators who can serve special audiences. A good example is <u>industrial market data.</u> Needs for more refined data exist in all areas of the economy: consumer sectors, research and development, academic, government, etc. Many of these opportunities should be within reach of traditional publishers of print media who already have a recognized franchise in the markets they serve.

3.0 TRENDS IN ONLINE DATABASES (Cont'd)

3.1 Database Publishing (Cont'd)

* Delivery of end results: Most database operators today do not deliver the final results of user desires. They merely provide material that can be used in reaching that end result. Online searching or bibliographic listings help in the initial broad search and the first preliminary stage of screening. Final choices require good abstracts or full text.

These are in limited supply via online facilities at present. The customer must be able to order the documents and have them delivered. Electronic facilities for such functions are barely in their infancy.

The transformation of published materials from a product-oriented package to a service-oriented package will probably be the most important thrust in database development in coming years. There are four major dimensions in which information-based services might be packaged:

* One-stop shopping: The fulfillment of many needs from one source. The customer does not have to spend time and effort looking for what he needs on a peicemeal basis.

* Information Selectivity: Providing ability for individual customers to efficiently isolate, identify and obtain just what they need and eliminate useless material.

* Transaction capability: Providing ability to negotiate and consumate commercial transactions between buyers and sellers.

* Analysis capability: Providing ability to manipulate retrieved data to develop customized analyses with added value beyond the retrieved data.

Of these, transactional and analystic services are the least developed areas conceptually, and will probably provide the most opportunities for imaginative new ideas.

3.0 TRENDS IN ONLINE DATABASES (Cont'd)

3.2 Online services

Over the past several years, growth of the online database industry has placed considerable pressure on the online services for rapid expansion.

Database producers have been dissatisfied with the service's response in meeting their demands for more market access and for more flexibility in product offerings. Of particular concern to database producers is the tendency of online services to come between them and the ultimate customers for their data, cutting them off from direct market control and intelligence.

A response by some database producers has been to establish "private file" relationships with online services, in which the publisher controls all marketing and customer relationships. The major "public" online firms now offer private file services in addition to their standard royalty arrangements. Some publishers have chosen to work with computer service bureaus that provide online access as an adjunct to their main business of processing and maintaining database material for their customers. The computer service bureau industry has ample motivation to seek new opportunities such as online database maintenance. Much of its traditional data processing activity is being lost to micro and minicomputers installed by customers.

Most of the newer opportunities for database development appear to lie in specialized markets. Producers-controlled projects can be expected to grow substantially in the future. On the other hand, an unknown for online services is the threat of so-called super-services from potential providers AT&T, IBM, or a broad-based communications service from an international communications carrier. Such organizations could provide major one-stop retrieval facilities built into their other basic communications services. On the other hand, it is doubtful that universal super-services could provide the depth of specialized capabilities needed for every needs. If such

3.0 TRENDS IN ONLINE DATABASES (Cont'd)

3.2 Online services (Cont'd)

super-services do materialize, it will most probably be in
co-existence with niche services that provide for the narrower
supplemental needs of database users beyond basic searching and
retrieval.

In that perspective, Canada has few opportunities in that field except
for specialized areas. Given the size of the market, the investment
required to start and maintain a system, only the government or large
institutions with an exportable service can afford the venture.
Niches for Canadians are the service vendors areas.

4.0 CONCLUSIONS

There is a lack of up to date data that enables us to develop a good
profile of the online database industry in Canada.

The primary clients of online databases remains businesses and
institutions. Mass market presents an interesting potential but it is not
very well defined at the moment.

The equipment is becoming more and more sophisticated and cheaper. It is
believed that by 1990 microcomputers will be as powerful as today's
mainframe. This new technology will enable users to better handle all the
available information.

The major suppliers of information and producers of databases are the
government or large non-profit organizations. Grants and subsidies have
played a major role in the development and maintenance of large public
databases.

In Canada online database services is offered through vendors that also
supply other services such as consulting and software development for
customers etc.

4.0 <u>CONCLUSIONS</u> (Cont'd)

Numeric databases are by far the largest sub-market in terms of revenues and one of the fastest growing.

No sub-market, either geographical or functional, is monopolized by a single company. Both databases production and distribution appears to be characterized by at least some economies of scale. On the other hand, barriers to entry exist.

The major areas of opportunities for Canada are in Source alphanumeric and Source full-text databases - these are likely to be the major growth areas during the next 5 years.

The Reference/bibliographic databases are mainly produced in the U.S. and imported into Canada. Canadians could not get the economies of scales based on the domestic content to justify the entrance into that field. Opportunities are limited.

SECTION TWO

SOFTWARE

SUMMARY

The software industry includes: processing services, input preparation, software and systems services, systems development and maintenance, and other software and supply services. It is estimated that as much as 65% of Canadian software revenues go to American owned companies and approximately 37% of the top 150 software vendors in Canada are American owned.

Data processing software can be classified within three broad groups: systems software, applications software and integrated software systems. Systems software refers to the combination of programs required to make optimum use of the computer and is peripherals. Applications software covers all programs whose purpose is to solve the computer user's own problems. (e.g. accounting, banking etc.). Integrated software systems represent the most important technological trend for the 1980's. They permit different systems and application software to match and interact with one another.

It is estimated that there are about 2,200 firms in the software industry, employing 28,000 people. About 35% of the companies are classified into the software distribution and retailer group. Twenty-nine per cent of the companies are in software, the development, design and publishing category. Fifteen per cent of the companies are computer consulting firms.

Ontario is home to the largest percentage of companies, with 47%. It is followed by Quebec, Alberta and B.C. which together have 45% of·the companies.

Canadian software market revenues totalled between $753 and $970 million in 1984. Software revenues are forcasted to be more than $1.4 billion in 1987. The software industry will grow at an average annual rate of about 20%.

Sales of software in the United States are expected to be more than $24 billion in 1987. The Western Europe market is expected to reach $33.2 billion in 1990.

In 1984 applications software revenues were about $370 million the total software revenues. The growth rate in this area will be about 39% through to 1989. This segment promises to have the best growth rate. The same is expected for the U.S and Western Europe industries with an expected average annual growth rates of 31.2% and 42% respectively.

Artificial Intelligence (AI) may form the next wave of technology in the software industry. There is significant potential for Canadian firms to become at least viable suppliers of AI products and services. Actions-driven fourth generation languages, too, are expected to predominate in the 1990's and provide opportunities for Canadian firms.

The lack of government assistance in marketing software prevents effective Canadian participation in foreign markets. Too, the competitiveness of Canadian firms is hampered by their lack of differentiation, difficulty in financing endeavours, shortage of technical programmers and analysts, and an industry attitude that Canadian products cannot make it in the international marketplace.

A need has been identified by the industry for all levels of government to coordinate their efforts to enable firms in the industry to exploit growth opportunities.

1.0 STRUCTURE OF THE CANADIAN SOFTWARE INDUSTRY

1.1 Definition of the Industry

The software industry is an integral part of the larger computer service industry and can not be viewed in isolation from the whole. As defined by Statistics Canada, computer services include; processing services, input preparation, software and systems services, systems development and maintenance, and other software and supply services (computer related education services, computer facility management, feasibility studies, etc.). Companies that participate in the software industry usually are active in other computer related activities.

The industry is not identical to the American software industry, though there are many similarities. National borders are not as significant in the software industry as they may be in other industries. It is estimated that as much as 65% of Canadian software revenues go to American owned companies and approximately 37% of the top 150 software vendors in Canada are American owned. For these reasons, technological trends evident in the United States are usually mirrored in Canada.

1.2 Definition of the Products

Data processing software can be classified within three broad groups: systems software, applications software and integrated software systems. The first two were already used in conventional data processing, but have evolved considerably in their technology recently. The third category is more directly associated with the emergence of distributed computing though it also includes various special combinations of the first groups and represents state of the art in software technology.

1.0 STRUCTURE OF THE CANADIAN SOFTWARE INDUSTRY (Cont'd)

1.2 Definition of the Products (Cont'd)

Systems Software

This refers to the combination of programs required to make optimum use of the computer and its peripherals. It includes operating systems (which control the relationship between the central processor, peripheral memories and user interfaces), compilers and interpreters (which translate computer languages into operational instructions) database management systems (which organize files and data stored), and utility programs and debugging aids, used for tasks such as copying files and program development testing.

"Programming environment," "programming generators," and "database query systems", are three new system software in the marketplace.

Applications Software

This term covers all programs, whose purpose is to solve the computer user's own problems. Included are a variety of software. The following classification by the International Software Directory (Computing Publications, 1983) classifies 107 groups, under five major headings:

1. Accounting, administration, production, distribution
2. Banking;
3. Design, modelling, simulation, statistics;
4. Insurance;
5. Others

Integrated Software Systems

This represents the most important technological trend for the 1980's. These are designed so that the different systems and application software components match one another, sharing data and transferring results among the various programs on a particular site or on a number of sites communicating with one another.

1.0 STRUCTURE OF THE CANADIAN SOFTWARE INDUSTRY (Cont'd)

1.3 Number of Firms Involved In Canada

Classification of Companies in the Software Industry

A 1986 Canadian Association of Data and Professional Service ·
Organization (CADAPSO) anounced that there are about 2,200 firms in
the software industry, employing 28,000 people.

Companies that compete for software dollars may be classified into a
number of different categories:

1. Software designers, Developers, and Publishers.
2. Software Distributors and Retailers.
3. EDP Consultants.
4. Service Bureaus.
5. Systems Integrators, OEMs, and Turnkey Operators.
6. Hardware Vendors.
7. Maintenance and Peripheral Vendors.
8. Others.

Sixty-four percent or 1,409 companies either design, develop and/or
publish software or distribute and retail software as their primary
business activity. The remaining 36% are primarily involved in other
business activities, but also participate in the software industry as
a secondary activity. Most of the 2,200 companies were involved to
some degree, in two or more of computer related business activities so
it is very difficult to classify companies into one particular group.

The largest percentage of companies are classified into the software
distributor and retailer group, at 35%. The second largest primary
business activity was in the software development, design and
publishing category. Twenty-nine per cent of the companies are in
this group, but 1,488 or 67% design, develop and/or publish software
though it may not be their primary business activity.

1.0 STRUCTURE OF THE CANADIAN SOFTWARE INDUSTRY (Cont'd)

1.3 Number of Firms Involved In Canada (Cont'd)

The next most popular business activity is computer consulting with 15% of the companies being cited in this category. Twenty-seven per cent of the companies in the software industry do consulting as a primary or secondary business activity.

Number and Geographical Distribution of Companies in the software Industry

Ontario is home to the largest percentage of companies, with 47%. It is followed by Quebec, Alberta and B.C. which together have 45% of the companies.

Traditionally, the industry has been concentrated in central Canada, although, Alberta, Saskatchewan, and Manitoba have shown the highest growth in the number of new establishments since 1978.

Ownership of Companies in the Software Industry

Due to mild domestic regulations Canadian companies are forced to compete at home with foreign owned firms. Although, approximately 12% of the 2,207 software firms are American owned, as much as 65% of software revenues generated in Canada go to American owned companies. Approximately 26 of the top 50 companies, ranked by Canadian software revenue, are American owned.

1.4 The Canadian Software market Forecasts and Trends

Total Revenue

Canadian software market revenues totaled between $753 and $970 million in 1984. The average annual growth rate for the total information processing industry is forecasted to be 17% in the 1980's, while the software industry will grow at an average annual rate of 20%

with revenues rising at a 29% per annum rate. Software revenues
(which are 41% of total operating revenues are forecast to be more
than $1.4 billion in 1987. The Canadian computer software and
services industry is growing twice as fast as the GNP and will
approach nearly $3 billion in size in 1987.

The importance of software as a source of revenues is exemplified by
the increasing proportion of software revenues relative to total EDP
industry revenues throughout the decade.

1.0 STRUCTURE OF THE CANADIAN SOFTWARE INDUSTRY (Cont'd)

1.4 The Canadian Software market Forecasts and Trends (Cont'd)

Source of Revenues by Vendor Type

Until 1983, hardware vendors dominated the software market. After
1983, independent software vendors (I.S.V.s), which include software
houses, service bureaus, and consultants, became the major
contributors to total software revenues due to their enormous gains in
the packaged applications segment. Hardware vendors, on the other
hand, will continue to dominate the systems software segment to the
end of the decade. Service bureaus, which are experiencing declining
revenue growth rates, and consultants, are diversifying into the area
of software development as a means of further growth and to take
advantage of promising business opportunities.

Source of Revenues by Province

Ontario and Quebec are home to 66% of the software companies in
Canada, by head office location and these companies generate 77% of
total software revenues. Alberta and B.C. are home to 14% and 13% of
the software firms respectively, and these companies generate 8% and
9% of total software revenues.

1.0 STRUCTURE OF THE CANADIAN SOFTWARE INDUSTRY (Cont'd)

1.5 Exporting Opportunities

Software firms are finding opportunities for growth in the larger American market right next door or in untapped overseas markets. The Canadian software market is estimated to be no more than 5% of the world potential and it is flooded with thousands of similar products supplied by highly competitive companies. It is argued that export markets are within the reach of even the smallest Canadian software firm. The industry currently exports $256 million or fourteen per cent of its revenues.

In spite of export opportunities, the CADAPSO report challenges the belief that Canadian software companies must export to survive with so many opportunities here.

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS

Software Markets By Software Type

In 1984, software revenues were about $970 million. Applications software revenu were 38% of the total market, at $370 million. This segment had by far the strongest showing in the software market with a growth rate of 42%. The average annual growth rate of applications software will be approximately 39% between 1982 and 1989. The advancement in microcomputer technology and the acceptance of the microcomputer into the workplace have been major factors in this growth; some systems software suppliers, such as Microsoft Corp., are recognizing the opportunities in this segment and are moving into the applications area.

Major Application Areas:

In the minicomputer and mainframe segments, some of the most heavily used general purpose programs include payroll, accounting, inventory control, an corporate database applications for the commercial market and CAD/CAM for scientific/engineering market.

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS (Cont'd)

In the microcomputer applications software segment the most heavily used programs are personal productivity software, including spreadsheet packages, word processing packages and database management packages. Two other frequently used applications are accounting and business graphics packages.

Vertical and Horizontal Marketing

Software development efforts have generally focused on the markets with the largest installed base of computers and therefore, the greatest market potential. Development of "horizontal" software tools have predominated in the microcomputer segment because these tools can be used by customers in any industry sector. General accounting packages were among the first horizontal applications offered, followed by word processing, spreadsheets, and database management products.

Integrated Software and Windowing

Some software vendors are beginning to position their products as total solution packages in order to differentiate themselves and gain a competitive edge. As a result, integrated business software and software environments are appearing frequently in the personal computer software industry and are also becoming part of a pivotal strategy of some large system software houses.

One approach to integrating software is to put together two or more functions, including word processing, spreadsheets, communications, graphics, and databases into "one big program". Symphony, by Lotus Development Corporation and Framework, by Aston-Tate are two well known examples of this type and are among the best-selling personal computer packages in North America. The main criticism of these packages is that they tend to be strong in one or two of the application modules, while offering moderate to poor capabilities in the remainder. A second criticism levelled at all integrated packages, is that the added functionality gained through integration is offset by increased complexity and difficulty in training users.

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS (Cont'd)

Integrated Software and Windowing (Cont'd)

Integration with external data is also important. Goldengate, by Cullinet
Software Inc. and CA-Executive, by Computer Associates are also integrated
productivity tools for personal computer users. Their primary marketing
leverage comes from their ability to link to mainframe software products
and provide access to corporate information. A recent announcement by
Cullinet and Lotus introduced the Cullinet Symphony link, which will also
enable users of Symphony to gain easy access to appropriate mainframe
data.

Another approach to integrating software is to use software environments
and windowing which permit the exchange of information between independent
programs. These packages, which display parts of several programs at once
in frames on the computer screen, are very complex and had shown weak sales
in 1984. Nonetheless, these types of packages are expected to proliferate.
Initiated by the introduction of Top View by IBM. Windows, by Microsoft
Corp. and GEM, by Digital Research Corp. are also general purpose
windowing programs.

These packages are the microcomputer equivalent of the office automation
operating environments of major minicomputer manufacturers. Numerous
packages such as All-in-One from DEC, DEO from Data General, and Wang
Office from Wang offer the user a common interface to multiple
applications. There are currently 200 installations of these mini-based
environments in Canada.

Applications Software Acquisitions For Microcomputers

The proliferation of microcomputers in the workplace and the desire by
managers to control their own microcomputer workstations has led to an
uncontrolled growth in software acquisitions. But, as more users come to
use and depend on theses applications and as more information is shared, it
becomes important to ensure portability and standardization of software
products.

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS (Cont'd)

Applications Software Acquisitions for Microcomputers (Cont'd)

While many organizations have made efforts to standardize their hardware acquisitions, software has received less attention. Some managers have taken preliminary steps to improve utilization of software in their organizations by attempting to negotiate volume discount purchases, avoiding duplicate software evaluation exercises, and limiting the range of different software systems that must be supported.

Applications Development

Users are also concerned about software development in-house. One issue is whether there should be greater Management Information System (MIS) control in the development of applications throughout the organization or whether applications development should be in the hands of the user groups.

Artificial Intelligence

Artificial intelligence (AI) is at the leading edge of computer applications. It may form the next wave of technology in the software industry. Interest among would-be users is growing, but volume sales have not yet materialized because costs of hardware and software in this field are still high. There is significant potential for Canadian firms to become at least viable suppliers of AI products and services, if not market leaders in their area of specialization.

Research is currently being conducted on AI applications in at least ten Canadian universities. Several federal departments and national institutions sponsor AI research and in the private sector there are several Canadian firms that market AI products. The most notable is Logicware Inc. whose major product is MPROLOG, an easy-to-use version of PROLOG. It currently has more than 400 packages installed in 50 companies throughout North America.

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS (Cont'd)

Trends in Systems and Systems Development Software

The systems development software market will experience a relatively flat growth rate until 1987, due to the abundance of applications software packages available. But by 1987, the need for systems development software will accelerate as companies begin to network their computers and integrate their software, and as end users demand more sophisticated applications.

Operating Systems Standardization

An industry-wide push toward standardization, progress in this area has been slow and inconsistent.

Operating systems like Digital Research's CP/M and Microsoft's MS-DOS have been adopted and supported by the major microcomputer vendors, Apple and IBM, and have become de facto standards.

Still these operating systems are seen to be inadequate for the needs of the 16/232 bit multiuser, multitasking microcomputers. Unix is a powerful operating system that has wide applications and solves some of the problems of standardization posed by CP/M and MS-DOS. It has established a base among academics and technical users because of its outstanding program development environment, but its use in the commercial field has been somewhat limited. Among the complaints are: the very limited availability of applications software; lack of user friendliness due to its difficult "C" language; and slowness in commercial data processing applications. In spite of the drawbacks, Unix is possibly the only near-standard for the supermicrocomputer and minicomputer systems.

In order to remove some to the machine specific nature of applications programs, the concept of "virtual machine" operating systems has evolved. This is a host operating system for several other operating systems, thus allowing software packages written for one operating system to run under another. The interface that one operating system presents to another operating system is also a target for standardization.

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS (Cont'd)

Development Tools and Fourth Generation Languages

Software development tools include fourth generation languages like Focus and Powerhouse, other database management tools for querying and debugging, application generators, screen painters, and interactive program editors. These software products will become more popular by 1987, as end users demand more sophisticated software programs to meet their needs.

Fourth generation languages are non-procedural database languages that are action driven, not logic driven. They can drastically decrease the time needed for applications development, and may result in less maintenance, and more user friendly programs with better documentation and menus. Fourth generation languages like Ideal and Mantis, that were introduced in the 1980's are expected to predominate in the 1990's as acceptance accelerates.

Communication Software

Network software usage is projected to continue to grow with the installed base of microcomputers and as users increasingly need to exchange information and communicate with each other. IBM has introduced PC Network to tie its machines together in order to provide portability of information and applications to users. Also, IBM's acquisition of Rolm Corporation with PBX strengths indicates that IBM is seeking communications expertise and signifies the importance of networks in upcoming years.

Data Base Management Systems

Database management systems are becoming better integrated with applications and are becoming easier to use, relying more on fourth generation languages. The personal computer DBMS market will grow rapidly as products offer more than just file handling. Relational DBMS are expected to catch on more quickly in the microcomputer market than in the mainframe market.

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS (Cont'd)

2.1 Other Market Trends

Vendor Relationships

Software continues to grow in importance as a factor in hardware sales. Data processing professionals and end users are finding system selection confusing due to the enormous number of options in terms of hardware, software, and service offerings. Vendors that are able to provide a total solution, including hardware, software and service are best able to serve customers' needs. As a result hardware and software vendor relationships are changing. More companies are forming cooperative agreements in order to provide the customer with a total solution. Software bundling will continue to grow, especially in the minicomputer sector of the market.

IBM's Entry into the Microcumputer Software Market

As in the hardware industry, IBM has become the single most influential force that sets trends in the software industry. The biggest event in 1984 to impact on the microcomputer software industry was IBM's announcement to introduce its own PC software. Like its hardware strategy, IBM waited until others broke the ground in the microcomputer software field before it made a major move into the market.

Marketing of Software

The largest factor attributed to the failure of software firms is their lack of understanding of marketing and its importance.

Software developers can no longer rely solely on the technical superiority of their product to succeed in the North American market. Once the product reaches the market there is no guarantee that it will sell. Today a successful product launch is equally dependent on attractive packaging, documentation, distribution, service and maintenance, and the market's familiarity with the product or brand name. Software development and the marketing function will be separate activities over time.

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS (Cont'd)

2.2 Market and Trends in the U.S.A.

Actual Size

The production of software has become a major industry in the United States, with estimated expenditures of $40 billion in 1982 for software products and for in-house development of programs. Sales of software in the United States doubled between 1982 and 1983 from $5 billion to more than $10 billion, and are expected to increase to more than $24 billion in 1987 (see Table 1).

Forecast

Many observers expect the market share of system development to decline rapidly during the 1980's with an anticipated market decrease of 57% in 1979 to 29% in 1990. This decline can be attributed to the same reasons sales of this software will decline in Canada: growing cost of in-house or custom contract software development; increasing availability of less-expensive, more sophisticated off the shelf applications and systems packages; aggressive thrust by hardware manufacturers and independent software houses to provide pre-packaged total hardware/software solutions for users.

Sales of systems software will experience an average annual growth of 27% in the U.S., with revenues increasing from $1.1 billion in 1979 to $15.1 billion in 1990. The share of the market, in terms of revenues, is expected to increase from 23% in 1979 to 34% in 1990. This increase can be attributed to the growth of fourth generation languages, the higher cost of systems packages vis-a-vis applications packages, and the increased user base to further use of the computer by non-programmers.

As in the Canadian software industry, the greatest growth in the U.S. software industry will be in sales of applications packages. With an expected average annual growth of 31.2% and increased sales of $900 million to $17.4 billion from 1979 to 1990, this group's market share

2.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS (Cont'd)

2.2 Market and Trends in the U.S.A. (Cont'd)

Forecast (Cont'd)

will increase from 19% to 39% during this same time period. The reasons, while paralleling those given for Canadian growth, are threefold: they are less expensive than custom software while able to provide the same level of functionality; they are able to address a larger number of vertical markets; the increasing use of the microcomputer which is more applications software intensive.

TABLE 1 - SOFTWARE SALES BY USE

	1982	1983	1984	1985
	(millions of dollars U.S.)			
Software, total	5,001	10,309	15,017	24,677
Application programs, total	1,997	3,448	5,455	11,100
Computer-aided design, manufacturing and engineering	776	1,126	2,636	3,200
Other applications	1,221	2,320	3,819	7,900
Systems software, total	3,004	6,861	9,562	13,577
Compilers, interpreters, and assemblers	541	610	700	932
Database management systems	1,100	1,430	1,888	3,500
Diagnostic and performance monitoring	493	645	710	945
Operating system	870	4,176	6,264	8,200

3.0 INTERNATIONAL COMPARISONS

Western Europe

The software industry in Western Europe is growing by an estimated 29% each year. In 1980, the total software market was $2.6 billion according to "Input". In 1990, the size of the market is estimated to reach $33.2 billion.

3.0 INTERNATIONAL COMPARISONS (Cont'd)

Western Europe (Cont'd)

Sales of applications packages will experience the most dramatic growth, with an estimated average annual sales rate of 42% from $400 million in 1980 to $13.3 billion in 1990. Consequently, sales of applications packages will account for 40% of the total market in 1990 which will be a 24% increase in market share from 1980.

It is estimated that sales of systems software in 1990 will increase to 10.6 billion and will account for 32% of the total market. From 1980 to 1990, sales of systems packages will experience an average growth of 31%.

The largest portion of the total software market in 1980 and 1981 was system development. In 1980, system development revenues were $1.5 billion, or 57.7% of the total market. In 1990, it is estimated that system development revenues will reach $9.3 billion but will account for only 36.5% of the total market. System development revenues will experience an average annual growth of 20%.

4.0 GOVERNMENT ROLE IN THE SOFTWARE INDUSTRY

4.1 Government Involvement

The amount of government involvement in the industry continues to be a point of debate. So far, government programs have been criticized for helping specifically the "high tech" or small business rather than the software industry. On the other hand, some software developers feel that heavy government involvement could be detrimental to the industry because protectionism would effectively force more reliance on the Canadian market and reduce access to foreign markets. There is general belief in the industry that assistance should be directed to marketing software rather than developing it.

Although at least seven provinces have initiated programs to aid the software industry, the lack of coordination by all levels of government might prove detrimental to a national software industry.

4.0 GOVERNMENT ROLE IN THE SOFTWARE INDUSTRY (Cont'd)

4.2 Summary of Programs (Cont'd)

IRDP (Industrial and Regional Development Program) administered by DRIE and IRAP (Industrial Regional Assistance Program) administered by NRC are two programs geared toward technology development.

Seven provinces specifically gear assistance programs toward software development:

1. B.C.'s Discovery Enterprise
2. Quebec through its Trade and Commerce, and Communications departments.
3. Newfoundland and Nova Scotia in support of oceans industries.
4. P.E.I. through its pre-venture fund.
5. New Brunswick through its Venture Capital Fund.
6. Manitoba: Infotech Program

5.0 COMPETITIVENESS

5.1 Barriers to Entry

The software industry still has relatively few barriers to entry and as a result is crowded and highly competitive. In order to be competitive and grow, software vendors must differentiate themselves by providing leading edge or innovative products. The market is already swamped with "me too" products.

5.2 Financing

Canadian software developers continually experience difficulty in financing their endeavours. Bankers do not consider information products like software as satisfactory collateral for loans in the development and marketing phase, before revenue flow begins. There is a general lack of investor confidence in the software industry because it is mostly composed of small, new companies and because of its turbulent and unpredictable nature.

5.0 COMPETITIVENESS (Cont'd)

5.3 Access to Human Resources

With less than 5% of software products that go beyond the idea stage ever reaching the market, Canadian software firms lack adequate marketing knowledge and skills. Small software firms are often comprised of highly technical people that are product oriented.

A shortage of technical programmers and analysts is being experienced among Canadian software companies and in the MIS departments of other business organizations. Programmer and systems analysts jobs are reported to be hard to fill. The backlog of applications in the data processing departments of organizations is an average of three to four years. Many well financed MIS departments are competing with software developers for experienced programmers.

5.4 Barriers to Exporting Software

Canadian software vendors are timid about exporting their products. There is a prevalent attitude that a product has no chance to make it in international markets if it does not have a proven track record at home first. Also, there is the attitude that small software companies do not have the resources to export. These attitudes prevent software firms from taking advantage of opportunities in foreign markets.

6.0 CONCLUSIONS

The Canadian computer software and services industry is growing twice as fast as the GNP and will approach nearly $3 billion in size in 1987. In 1984 the applications software segment proved to have the highest growth area, with a growth rate of 42%. This segment is forecasted to grow approximately 39% between 1982 and 1989. Systems and systems development software experienced the next highest growth rate, growing 27% in 1984. This area should average an annual growth rate of 27% throughout the decade.

6.0 <u>CONCLUSIONS</u> (Cont'd)

Systems software have been the highest growth area in the United States,
however, market observers expect the market share of system development to
decline rapidly during the 1980's, from 57% in 1979 to 29% in 1990. As in
the Canadian industry, the greatest growth area in the United States will
be application software, increasing from 19% to 39% in the period 1979 to
1990.

In Western Europe too, applications software will experience the most
growth. Sales of applications packages will account for 40% of the total
market in 1990 which will be a 24% increase in market share from 1980.

Most of the discussions about government involvement in the Canadian
software industry has centred on the need for all levels of government to
coordinate their efforts to enable the Canadian firms in the industry to
exploit the opportunities provided by the growth areas. The government's
best role in the industry might be as facilitators of marketing assistance
to the software firms.

SECTION THREE

ENHANCED SERVICES (VANs)

SUMMARY

Following the 1980 Federal Communications Commission (FCC) "Computer Inquiry II" which defined enhanced services in the United States, the Canadian Radio-Television and Telecommunications (CRTC) held public hearings -discussing enhanced services - in 1983.

Enhanced services industry include what started out in 1973 as the Value Added Network or VAN services (i.e. code and speed conversion in addition to the transport and routing through the network to interconnect otherwise incompatible terminals and hosts) and application processing such as transaction services and in-network storage, customer network reconfiguration and others, all under customer control. The product are those services offered over telecommunications transmission facilities employing computer applications such as Electronic Funds Transfer (EFT), electronic mailboxes, and remote databases. Tariffs for enhanced services are volume rather than distance sensitive.

DATAPAC is the public packet network that dominates the Canadian enhanced services industry. In 1983 there were thirteen firms supplying enhanced services.

The market size for the Canadian industry is difficult to estimate given the shortage of comprehensive studies. Proxies for measuring the size of the market are such areas as personal computer (PC), databases, modems, local area networks (LANs), intelligent processors, word processors, electronic mail, facsimile, and voice message services. All these areas are expected to show considerable growth which leads one to conclude that enhanced services in general will enjoy considerable growth.

Most major foreign markets including the U.S., Japan, Britain and France have or are deregulating their telecommunications industries thus opening the way for enhanced services.

There are many opportunities in the enhanced services industry primarily because the area is so new. The interconection of telecommunication lines among countries provide natural export markets, where those markets are sufficiently deregulated. The growth potential for this market is between 25 and 50%.

The dominance of firms such as AT&T and IBM currently represent the greatest barriers to Canadian participation in the industry. Although the CRTC has taken a "light handed" regulatory approach to enhanced services, regulation in the industry might keep us far behind the U.S., Japan, Britain and France.

It is important that steps be taken in Canada to place us among the leaders in the "information economy" that will undoubtedly prove to be a major economic force in the near future.

1.0 BACKGROUND

The topic of enhanced services was first discussed in the late seventies in the USA during the Second computer Inquiry before the Federal Communications Commission (FCC). This inquiry was in response to the rapid evolution of data processing technology as well as to an increasingly competitive market place in which regulatory policies were no longer relevant. The final decision was rendered on May 2, 1980.

Common carriers were permitted to provide enhanced services through a separate corporate entity thus avoiding the possibility of pricing enhanced services below cost (predatory pricing).

In Canada, the enhanced services debate is much more recent. Public hearings on the subject were held by the Canadian Radio-Television and Telecommunications (CRTC) at the end of 1983.

2.0 STRUCTURE OF THE INDUSTRY

2.1 Definition of the Industry

As a result of the "Computer Inquiry II" by the FCC (Docket 20828), all network services are divided into "basic," services encompassing the movement or transport of information, and "enhanced" services, which includes basic service plus additional computer processing of some of its contents. The enhanced services include what started out in 1973 (Docket 16979) as the value added network or VAN services. In the beginning, VAN services were understood to encompass essentially code and speed conversion, in addition to the transport and routing through the network, for the purpose of interconnecting otherwise incompatible terminals and hosts. Today's enhanced services include all this but are going much further in the direction of application processing not related to incompatibility of terminals and hosts, such as transaction services and in-network storage, customer network

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

2.1 Definition of the Industry (Cont'd)

reconfiguration and others, all under the customer control. Since the definition of enhanced services described above is a brainchild of the FCC, it was created for use in conjunction with public network services provided by common carriers. The same functions could be provided in private networks either separately, alternately or in any combination with basic transport services.

2.2 Definition of the Product

For the purpose of this study, enhanced services will be defined as follows:

"Enhanced Services are defined as services, offered over Telecommunications Transmission facilities, regardless of transmission technologies used, which employ computer applications that act on the format, content, code, protocol or similar aspects of the user's transmitted information; provide the user additional, different, or restructured information; or involve user interaction with electronically stored information."

Differentiated from basic telecommunications services, tariffs for enhanced services are volume rather than distance sensitive. Electronic funds transfer (EFT), electronic mailboxes, and remote databases are examples of the services.

Excluded from this definition are circuit-switched and packet-switched digital networks in which code, protocol, or format conversion is not significant and the service provided is essentially telecommunications carriage between compatible terminals. Also excluded are services such as fire alarm, meter reading and most voice/video teleconferencing offered today.

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

2.2 Definition of the Product (Cont'd)

One could safely say that almost if not all telecommunication services that are not available today will be enhanced services (they will enhance the value to the user of the basic capabilities of the common-carrier telecommunication network). They will achieve this result through the use of computer technology combined with other technological advances such as digital switching and transmission, fibre optics, satellites and efficient video encoding.

The fact that the enhancement is achieved at the terminals, at the customer switch, or a local area network, by means of a central computer or at the local exchange as in the case of Centrex should not be allowed to confuse the issue. These options are all concerned with the how to of providing enhanced services, influenced by available technology, economic trade-offs, regulatory and institutional environments. But more fundamental to the purpose of our study is the identification of which enhanced services will develop over the medium to longer term, and at what rate they are likely to grow.

Because of the number of enhanced services suppliers, the fact that some are common carriers and thus subject to regulation while non-regulated organizations are offering almost identical competitive services freely under different names, analysis and projections for each specific identified service would be impractical, unreliable and of little value for this study. Moreover, no one could predict by name, features and rates enhanced services which have not yet been announced. Yet, a proliferation of them will emerge through to the 1990 time frame.

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

2.3 Number of Firms involved in Canada

The Trans-Canada Telephone System (TCTS) operates a public packet network, similar to the U.S. Telenet, called DATAPAC: Canadian National/Canadian Pacific Telecommunications (CN/CPT) has also developed a public data network, called Infoswitch. DATAPAC dominates the Canadian enhanced services industry with interconnections to the United States' Telenet network, as well as, to other countries.

In 1983, Douserv Telecom Inc. completed a study entitled "An Economic Analysis of Enhanced Telecommunications" for the Department of Communications. This report identified the following thirteen firms as being suppliers of enhanced services;

- Arbat
- Bell Canada
- CNCP
- Canada Post
- CGE
- Dialcom/Sage
- Faxtel

- Infomart
- I.P. Sharp
- MDS Canada
- Shell Canada
- Teleglobe
- TCTS

In general, these firms tend to be either service and software providers, manufacturers or common carriers. A survey, on which the Douserv study is based, found that major enhanced services carriers will be the telephone companies, cable companies (banking, shopping and video), and cellular and mobile radio companies along with many smaller value added carriers.

2.4 Market Size

It is difficult to assess the size of the enhanced services market in Canada since so little comprehensive information about it exists. One is much more apt to find information about the U.S., Japanese, or European VAN market. The Douserv study gives some idea of the market size of enhanced services in Canada measured in terms of the actual demand for such services.

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

Since the task of gathering data on enhanced services proved
formidable, actual demand was measured from the sparse data available
on enhanced services in USA and Canada and that of surrogates such as
the number of personal computers, databases, modems, local area
network (LAN), intelligent processors, word processors (WP) and
electronic mail systems.

Personal Computers (PC):

The personal or desktop computer (microcomputer) is the product
experiencing the highest growth in the data field. An IDC USA study
estimates that the 1982 base of approximately 2.5 million units will
grow to 20 million units by 1987. A substantial number of these are
likely to also employ facilities: to connect to centralized databases
like Source, Dow Jones, Dialog, etc, tie into local mainframe
computers, and talk to other computers. This will spur the need for
sophisticated networking and in turn hasten the development of
enhanced services.

Databases:

The degree of availability and attractiveness of databases will be the
major factor in the growth of enhanced transmission facilities to
handle the connection of microcomputers to databases.

In 1983 there were about 500 publicly available databases in Canada
and over 2,000 in USA. The predicted annual growth rate is about 20%
until 1990. In addition to the growth in numbers, the extent of
coverage and depth of the databases will also grow.

Modems:

Although now dated, one measure of the desire to connect to the
outside world is shown in a Frost and Sullivan study of Modem growth.
The market expectations show a tripling in growth from 1981 to 1986;
with the market in 1985 at $1 billion and principally driven by the
demand for 1200 b/s modems.

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

2.4 Market Size (Cont'd)

Local Area Networks (LANs):

The IDC figures also reveal that only 3% of the microcomputers in 1977 were purchased by corporations. By 1981 that figure was 15% and is expected to be 35% in 1987. The impact on Local Area Networks, LANs, is significant according to Venture Development Corporation (VDC) study which shows that 95.3% of the local area networks would have been used for data processing applications in 1983. The worldwide LANs market is expected to grow at a compound growth rate of 28.6% through to 1989 from an installed base of 8,160 in mid-1982. VDC predicts a market for 1.18 million nodes by 1990 up from 136,000 nodes in 1983. (A node is defined as a cluster of peripherals such as eight terminals, eight microprocessors or one computer). The VDC study also shows that the data processing application of LAN nodes represents approximately 2/3 of the total market, office automation applications approximately 1/3, and factory automation less than 5%. The LAN concept is considered to be the major breakthrough needed for the integration of various information processing functions. It is also considered to be the key to increasing the convergence between word processing and data processing.

Intelligent Processors:

A Frost & Sullivan study of the USA market for intelligent processors (front-end data switches, multiplexors and concentrators) shows a growth from $3 billion in 1982 to $11.7 billion in 1987. The report cites that the major application has been to cut communications costs but that the office automation market will be responsible for a substantial part of the growth in such areas as electronic mail, voice storage, and interconnected word processors.

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

2.4 Market Size (Cont'd)

Word Processors:

The VDC USA study showed a growth to 2.385 million units in 1986 from a base of 576K units in 1981. A Frost & Sullivan study indicates that in USA the number of communicating word processors (CWP) is to grow form 25,000 in 1978 to 1.9 million in 1982 and 2.1 million in 1985. Hough and Associates estimates that in Canada CWP units will grow from 1,000 in 1978 to 21,500 in 1985.

Electronic Mail:

At the end of 1981, there were approximately 49,000 mailboxes in use from six suppliers in the USA: Comet, Dialcom, OnTyme II, Infoplex, Quik-Comm and Telemail. According to CCMI, in Jan. 83, the number of companies in electronic mail was "in the hundreds". IT&T entered the race by acquiring Dialcom while ABI entered by adding features to its Dimension System 85. Also according to CCMI, the Post Office reported that the Electronic Mail system was carrying 20 million pieces anually (based on a one week test in March). The Post Office also indicated that it would not extend the system to include terminal to terminal delivery nor would it seek ownership of telecommunications facilities.

Facsimile:

R.W. Hough and Associates estimated that in Canada there were approximately 8,000 units of facsimile terminals in 1978 and that in 1985 their number would be about 28,000 units.

Voice Message Services:

In 1983 it was believed that the market should reach $1 billion in 1985 and $3 billion by 1990. Usage of this service was almost negligible then since Bell Canada discontinued its service, while VMX (Shell Canada) had market problems developing its sales.

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

2.5 Major Foreign Markets

U.S.A.

The VAN revenues in America reached about $300M during 1985. This figure (relatively small compared with other telecommunications revenues) perhaps reflects the restrictions placed on enhanced services offerings by the FCC Computer Inquiry II regulation. The FCC opened its Computer Inquiry III in the summer of 1985 which will in all likelihood open-up the market to more information processing tasks.

Japan

Revenues for current VAN activities in Japan are difficult to obtain; however, they are expected to be quite high.

Foreign companies trying to break into the Japanese telecoms market have been paying especially close attention to VANS. Nobody has the slightest idea how big the VANs market will prove to be: guesses for 1990 range from Y30 billion to Y200 billion. But VANs are already catching on in Japan faster than anywhere else.

Britain

Like America, Britain is proving that even imperfect deregulation is better than none. Britain's ever-so-careful opening of the market has already brought the country more than 600 VANs that are raising the productivity of all kinds of British businesses whose French and German competitors have to make do with VANs numbered in the ones and twos.

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

2.5 Major Foreign Markets (Cont'd)

France

Deregulation of the French Telecommunications industry is proceeding slowly relative to Britain or the U.S. As a result the VANs market is quite small. The only VANs permitted are single-enterprise ones or special exceptions such as the banks' VAN that will allow customers of one bank to get money out of the cash machines of any other.

West Germany

West Germany appears to have no plans for deregulation of their telecommunications industry; the Bundespost has complete constitutional control. A conservative policy has prevented the West Germans from making the kinds of telecommunications advances made in countries where deregulation has been pursued. For example, IBM proposed a voice-messaging service eight years ago. It was told to go away because the Bundespost was about to introduce its own. The Bundespost is now experimenting and Germans who want voice-messaging are buying a Luxembourg-based service.

West Germany's VAN market is very small with only one or two VAN's in operation.

2.6 Research and Development

Enhanced services are really the start of a new sector in the telecommunications industry dedicated entirely to the data processing/communication users. The main companies in this industry are AT&T and IBM.

Only AT&T and IBM today combine the expertise in both hardware and software, the manufacturing capability and the marketing size to offer whole networks of this sort to customers world-wide.

2.0 STRUCTURE OF THE INDUSTRY (Cont'd)

2.6 Research and Development (Cont'd)

These two major companies are currently working in cooperation with firms such as: Merrill Lynch (U.S.); Mitsubishi (Japan); and Mitsui (Japan).

Other major players include, British Telecom (U.K.), McDonnell Douglas (U.S.).

It would appear that these are the main sources of innovation for enhanced services.

3.0 TRENDS

The growth of enhanced services or VANs is completely predicated on the level of competition and deregulation of the telecommunications industry.

In Canada, the CRTC has since July 1984, enunciated its position on the regulation of enhanced services. The findings were that:

* companies providing enhances services will not be regulated, other than telephone companies and other telecommunications carriers under CRTC jurisdiction;

* CRTC regulated carriers will be required to permit the resale of their telecommunications services by other companies wishing to provide enhanced services;

* a group costing approach will be applied, when technically feasible, in relation to enhanced services provided by CRTC regulated carriers in order to reduce the number of costing reports required; and

* regulatory safeguards have been established to ensure that the telephone companies do not misuse their monopoly position in the provision of enhanced services.

3.0 <u>TRENDS</u> (Cont'd)

In the U.S., as a result of increased competition and decreased regulation, the trend in communication service, particularly data communication, is toward more choices resulting in marked benefits for the user. Enhanced services, which started with value-added network (VAN) services, will be largely expanded in scope, quality and variety of service features at relatively low cost. Higher speed data links will become more afordable primarily because of the universally increased availability of wideband satellite facilities and on heavy traffic routes the additional appearance of fibre optic cables.

In the coming years there will also be new services available to users to be provided by a new category of carriers authorized by the FCC - the Digital Electronic Message Service (DEMS) carriers. These carriers will also be licensed to provide Digital Termination Systems (DTS) using microwave intracity distribution independently of and in competition to the telephone exchange carriers. The new services will use all digital facilities and thus be optimized for data communication. They are directed largely toward business application where they will interface with the so-called local area networks (LANs) on customer premises.

The proliferation of all types of data terminal equipment (DTE), including small business and personal computers, will continue and with it the need to modernize the office operations by what is generally referred to as Office Automation (OA). With a multiplicity of vendor products used in most offices, the trend is going to be toward multi-vendor office systems. The networks needed to implement OA systems are the LANs. Although there are now several competing technologies being offered, users are reluctant to commit themselves to a specific vendor and prefer to wait for more standards to be developed to avoid premature obsolescense. A stronger trend toward OA systems will develop in the future after such standards are generally accepted.

The Canadian industry can be expected to move along the expected lines of the American enhanced services industry, given that the CRTC has partially deregulated the telecommunications industry in this area.

4.0 INTERNATIONAL DEVELOPMENTS

Enhanced services are offered primarily through packet-switched public data networks. The developments of these packet-switched networks are a good indication of how much enhanced service activity exists or is probable.

There are now about 20 countries which have at least experimental operations of packet switched public data networks. These countries are in alphabetical order: Australia, Austria, Belgium, Canada, France, Ireland, West Germany, Hong Kong, Italy, Japan, Mexico, The Netherlands, Portugal, Singapore, South Africa, Spain, Switzerland, United Kingdom and the Soviet Union. The nordic countries of Europe, Denmark, Finland, Norway and Sweden have jointly developed and are operating since 1981 the Nordic Public Data Network (NPDN).

Canada's DATAPAC operated by TCTS and Infoswitch by CN/CPT mentioned earlier are the country's main efforts in enhanced services.

The most active foreign country in packet-switched data services was indisputably France. The French PTT has operated experimental systems in early 1970's and has its TRANSPAC system in operation since 1979. It is fully compatible with the European EURONET for which it served as a model.

West Germany with the highest TELEX population density of any country in the world, started out with a circuit switched Electronic Digital Switching (EDS) system not only to protect the TELEX base, but also to modernize and expand it. An outgrowth of this strategy was the introduction of a new and faster teletype exchange service in 1981 called TELETEX transmitting. The EDS system is using circuit switched technology. Under pressure from the other European countries and overseas, West Germany is lately getting more interested in enhanced services using packet-switched public networks, and also implemented a number of experimental packet-switched networks now and will certainly participate in the now emerging EURONET.

4.0 INTERNATIONAL DEVELOPMENTS (Cont'd)

In the United Kingdom, British TELECOM has operated an Experimental Packet Switched Service (EPSS) since 1975, started by its predecessor, the British Post Office. Now British TELECOM's offspring, TELECOM GOLD, together with other licensees, is preparing for the big rush toward public data networks in the mid-1980's. The U.K. will also participate in the EURONET system and will operate its control centre in London.

In 1975 the 9 countries of the Common Market agreed in principle to build a shared public data network called European On-Line Information Network (EURONET), mentioned above. Rather than each country building their own interconnectable systems, the plans call for a European system with four network nodes in London, Paris, Frankfurt and Rome and concentrators in Dublin, Amsterdam, Brussels, Luxembourg and Copenhagen. Presently, published rates vary appreciably from one country to another. Japan's administration, the NTT, has been operating a circuit-switched DDX public data network since 1979. Since 1980, NTT has also operated a packet-switched network.

All major public data networks outside the U.S. interconnect with the U.S. enhanced service carriers as a result of bilateral agreements between the operating entities.

5.0 COMPETITIVENESS

Both Canada and the United States have taken steps to open enhanced services provision to more competition. As mentioned earlier the CRTC announced in 1984 its "light-handed" regulatory approach in the Canadian market and the FCC moved to define and deregulate the U.S. enhanced services (VANs) industry via the FCC Computer Inquiry II and III.

The key competition concerns are: telecommunication monopolies such as AT&T, IBM, and Bell, and problems as a result of deregulation.

5.0 COMPETITIVENESS (Cont'd)

The main telecommunications carriers offset competition because they have been the only ones permitted to provide the necessary lines. It is only with the intervention of the regulatory bodies through deregulation that others have been able to enter the industry. Complete deregulation is extremely sensitive politically because of its effect on the overall rate structure. A possible barrier to entry created by deregulation is that large companies who previously enjoyed monopoly position have greater access to necessary capital. Another consideration is that these same companies possess intimate knowledge of the industry as a result of their previous activities.

Competition and Export Markets

Enhanced services have not proven terribly difficult to export; the interconnection of telecommunication lines through-out the world, the ease of exporting technology plus establishment of standards and the dominance of a few major telecommunications carriers all contribute to this.

The most significant barrier to entry in export markets is the amount of regulation that might exist in the target market. In an instance where the market is highly regulated and monopolized as exampled by the West German Telecommunications industry, even big multinationals such as IBM experience difficulty.

6.0 CONCLUSIONS

Increasingly, countries are being drawn to compete in the "information economy". Japan, for one, has made a commitment to becoming such an economy. In this context, enhanced services or VANs are at the forefront of this trend. Since computer use in industry, business, government and home is growing at a phenomenal rate, this is an expanding market with unusual growth potential between 25 and 50% revenue growth compounded annually.

6.0 CONCLUSIONS (Cont'd)

Between 1983 and 1986 their data traffic share was expected to increase from 7% to 16%. In general, users are predicting more use of alternative services to basic service by 1988.

Canada's involvement in enhanced services is not very extensive when compared to countries such as Japan, the United States, and Britain. The primary factor has tended to be the level of regulation in the telecommunications industry. It is significant that in commenting on the July 1984 decision, CRTC Vice-Chairman, Mr. John Lawrence stated: "The Commission believes that the market for enhanced services must be a competitive one and that regulatory intervention should be limited to the minimum necessary to ensure that all service providers are able to compete on an equitable basis. Today's decision should encourage the appropriate development of these new services."

The significance lies in the recognition by policy makers that the Canadian telecommunications industry will be led by enhanced services development and the CRTC has made a tacit statement of recognition and support.

The Canadian government should follow the lead of the American, Japanese, and the British governments in assisting to stimulate faster growth in the enhanced services industry where there has been a great emphasis on deregulation. The CRTC can continue to act as a policy instrument in this regard, to help place Canada amongst the leaders in the pending "information economy."

REFERENCES

Canadian Radio-Television and Telecommunications Commission., Press Release (Telecom Decision 84-18) July 1984.

Barbara Chance and Henry Overdium, A Cloud as Small as Man's Hand: The Emergence of Videotex journalism, for the Dept. of Communications, 1984.

Congress of the United States, Office of Technology Assessment, "Information Technology R&D, Critical Trends and Issues", Feb. 1985

Douserv Telecom Inc., Final Report, An Economic Analysis of Enhanced Telecommunications, 1983.

Institute for Graphic Communications, Opportunities in Electronic Publishing, June 1984.

Evans Research Corporation, "An Overview of the Canadian Software Industry", 1983.

Evans Research Corporation, "An Overview of the Canadian Software Industry", 1985

Frost & Sullivan, The Enhanced Data Network (VAN) Market, 1983

Dr. Jake V. Th. Knoppers and Dr. Probir Neogi, Report on Public Online Information Retrieval Services, Department of Communications, Dec., 1982.

Lesser, B., Vagianos L., "Computer Communications and the Mass Market in Canada", 1985.

Minister of State for Science and Technology, Task Force on Federal Policies and Programs for Technology Development, A Report to the Honourable Edward C. Lumley, July 1984.

Organization for Economic Cooperation and Development (OECD), Information Computer Communications Policy Software: An Emerging Industry, 1985.

Rosner, R.D., Satellites, Packets and Distributed Telecommunications, 1984

Software Canada., Volume 5 #8 Sept., 1986

The Economist May 3, 1986

The Economist July 12, 1986

The Economist November 23 1985

Wescom Communications Studies and Research Limited, The Market for Videotex Teletext and Related Services, Nov. 1985.