AN OVERVIEW OF THE CANADIAN SOFTWARE INDUSTRY

EVANS RESEARCH CORPORATION

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[a synopsis]

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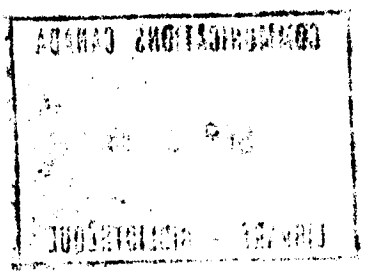

AN OVERVIEW OF THE CANADIAN SOFTWARE INDUSTRY

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1. The Canadian software industry was worth $970 million in 1984, up 25% from $775 million the year before. Included in these figures are revenues from the rental, lease, sale, and royalties of systems, systems development, and applications software. These figures also include revenues from exporting software.

By 1989, the Canadian software industry revenues are forecasted to reach $2.7 billion and the average annual growth rate between 1981 and 1989 will be 26%.

2. The fastest growing segment of the market is the applications software segment. Applications software revenues were $370 million in 1984, up 42% from $260 million in 1983. By 1989 the applications market will reach $1.3 billion and constitute 46% of the total software market. The average annual growth rate between 1981 and 1989 will be 39%.

Systems software revenues were $375 million in 1984, up 27% over 1983. The average annual growth rate this decade will be 27%. Systems development software revenues were $225 million in 1984, up 3% from 1983. Growth rates in this

segment will increase dramatically by the end of the decade, and the average annual growth rate between 1981 and 1989 will be 9%.

3. The microcomputer software segment is showing faster growth between 1983 and 1986 than both the minicomputer and mainframe software segments. In 1984, microcomputer software was worth $75 million and accounted for 8% of the total market. By 1986 it will grow to $152 million and 10% of the market.

Though mainframe software contributes more to total revenues than do the other two segments, it is decreasing in proportion to the total market. In 1984, mainframe software revenues were $647 million or 67% of the total market. By 1986 it will be $993 million and 62% of the total market.

4. In 1984, $100 million in revenues were generated from software exports, which was 10% of total revenues. By 1989, $300 million in revenues will be generated from exporting software. The average annual growth rate of software exporting revenues will be 21% for the 1980's as compared to 26% for total software revenues during the same period. As many as 95% of software exporting companies export to the United States. The next most popular destination is the British Isles with 36% of companies exporting there.

5. There were approximately 2,207 companies in the software industry by the end of 1984, and at least 64% or 1,409 companies are primarily involved in design, development and publishing, or distribution and retailing of software in Canada. The remaining 36% are primarily involved in other activities such as hardware manufacturing, consulting, and providing processing services, but these companies also compete for software dollars. The number of companies in the industry is expected to level off and even decline by the end of the decade as competition mounts.

6. There are an estimated 8,221 people presently employed in software development in Canada. This means that software development personnel account for approximately 14% of the total employment in EDP companies in Canada. More than 75% of the establishments in the software industry employ ten or less people.

7. A number of trends currently characterize the Canadian software industry:

a) Because software is quickly becoming a critical factor in the buyer's decision to purchase a particular computer system and because exorbitant commercialization costs are prohibitive to small software vendors, more cooperative marketing agreements are being established between hardware vendors and software suppliers.

b) The use of prepackaged applications and systems software is increasing while the use of custom developed software is diminishing due to the growing shortage of programmers and analysts, and because the use of computers by less sophisticated end users is expanding rapidly.

c) Marketing considerations like product service and support, distribution, advertising, and promotion are becoming more important factors to the success of software products. The quality of performance of the product is still important in determining success in the software industry, but the industry is shifting from a product orientation to a market orientation.

d) As the market becomes flooded with thousands of software products there are increasing amounts of vertical market software appearing. Vendors are targeting narrowly defined markets in an attempt to differentiate their products and gain a competitive edge.

e) A number of hardware and software vendors are responding to an industry-wide push toward operating system standardization and application program portability, although progress in this area has been slow and inconsistent.

f) There are divergent views regarding the role that Canadian Federal and Provincial governments should play in fostering the growth of the software industry. The Federal and Provincial governments offer a wide variety of programs directed toward high technology industries in general, however, very few programs exist that are specifically designed to aid the software industry.

g) Canadian owned software suppliers encounter three major obstacles to success in the Canadian software industry: a small and crowded Canadian market, fierce competition from larger, well established American firms, and Canadian's prejudices toward domestic products.

2.0 INTRODUCTION

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2.1 Objective Of The Study

The purpose of this study is to provide an overview of the Canadian software industry by offering background information regarding the current state of the industry, industry growth rates, important trends in the market, and to provide some projections regarding the future.

Specifically, the report focuses on the following:

1. A profile of the structure of the industry.
2. Revenue forecasts for the total industry and various market segments.
3. Issues and trends, problems and opportunities now and in the future.

2.2 Methodology

The information contained in this report was obtained using primary and secondary research methods. A mail survey of the top computer companies in Canada, as determined by Evans Research Corporation's report entitled "Top Computer Companies in Canada", was conducted in order to obtain

information regarding software revenues and employment figures. Follow-up telephone interviews were conducted when necessary.

Additional information was gathered from personal interviews with various industry watchers and from literature available in trade journals, newpapers, articles, and from companies in the software industry.

2.3 Scope And Limitations

The response rate of the mail survey was over 27%, but many of the companies refrained from providing all of the requested information due to company policies. Information gathered through primary research was tabulated and analyzed in aggregate to keep individual company's responses confidential. The study is intended to provide an overview of the industry, not to provide data on the thousands of individual companies and products within the industry. Ranking of the top software companies in the industry by revenues will be covered in Evans Research Corporation's report, "Annual Revenue Survey of the Top Computer Companies in Canada: 1984", to be published in July of 1985.

2.4 GLOSSARY OF KEY TERMS

Application Software: Programs that instruct the processor on how to perform end user tasks. They are designed to perform specific tasks such as word processing, electronic mail and graphics.

Artificial Intelligence: The field of study that includes the performance of human intelligence functions, such as deduction, inference and language comprehension by computers. Applications include robotics, expert systems, natural language interfaces, machine vision, and computer aided teaching.

Computer Services: These include processing services, input preparation, software and systems services, systems development and maintenance, other software and systems services, consulting, and other computer services including computer-related education services, computer facility management, feasibility studies, and so on.

Consulting Company: One that gives expert or professional advice, usually for a fee. In the computer service industry consulting may involve giving advice on computer systems selection, evaluation of hardware and software packages, conducting market research, etc.

Fourth Generation Language(4GL): A non-procedural data base language that is action driven, not logic driven. They commonly produce applications in one-tenth of the time required by third generation programming languages such as Cobal or Basic.

Hardware Vendors: Companies which manufacture, market and distribute computer hardware.

Horizontal Software Marketing: The marketing of software packages that are suitable for use in more than one industry sector as opposed to software that is suitable only for specific market segments. For example, word processing, general purpose accounting or payroll software packages may be used in manufacturing, retailing, banking, and other sectors, but OHIP billing software packages may only be appropriate to the medical or health care sector.

Independent Software Vendors: These are companies that develop and/or market software, but are not involved in the manufacturing of hardware. Any company in the computer service industry that develops or markets software is included in this category.

Integrated Software: Software which performs a variety of functions such as spreadsheet, data base management, and word processing, without the data having to be transformed for use in the different functions.

Maintenance Companies: Companies that repair computer equipment when there is a malfunction and also perform preventative work to reduce the risk of malfunction.

Mainframe Computer: Large scale computers with processors that have at least a 32-bit word size. The price of configured mainframes are generally $500,000 or more for low end systems and increase to more than $5 million for high end systems.

Microcomputer: Small computer systems whose main processing units are usually 8 to 16-bit microprocessors, store data on a diskette, are single or multi-user systems, and are usually priced at $25,000 or less.

Minicomputer: This class of stored program computers are positioned between microcomputers and mainframe computers in size. A typical mini has 16 or 32-bit word length, 256KB to 4MB of main memory and costs between $25,000 and $500,000.

Multi-user Microcomputers: Microcomputer systems which can handle more than one user simultaneously, typically by time-sharing. These are typically 16-bit machines running Unix or Unix-like operating systems.

Operating System: Software which manages the basic functioning of the system, by providing for input/ output, allocation of memory space, translation of programs, etc.

OEM (Original Equipment Manufacturer or Value Added Reseller): Companies whose business it is to purchase processors and peripherals as components and package them together as complete computer systems, usually involving agreements with the component manufacturers. See also systems integrators.

Peripheral Vendor: Companies whose business involves the sale or marketing of peripheral equipment including terminals, disk drives, modems, video and printer terminals, etc.

Portable Software: Software which can be executed on more than one system without major modifications.

Service Bureaus: Companies which supply data processing services to other companies for a fee.

Software: Programs which solve application problems, control the operation of devices, or provide for the efficient management of computer system resources.

Software Distributor: Companies whose business it is to market computer software products and sell them to other resellers or to large end users.

Software House: Companies whose business is to design and develop software programs.

Software Maintenance: The correction of program malfunctions or bugs as they become apparent in the course of using the software.

Software Publisher: Companies whose business it is to physically manufacture or duplicate and market software products.

Software Retailer: Companies which sell and market software products, usually directly to the end user.

Systems Development Software: Software which includes the customized development of both applications and systems packages for specific customers or groups of customers. Software which aids in the analyzing, designing and implementation of software systems.

Systems Integrators: Companies whose business it is to combine various components of a computer system including the CPU, peripherals and software, designed to perform specific functions. They sell the complete systems to end users and are similar to OEMs and VARs. Systems integrators do not manufacture the hardware components.

Systems Software: A general term referring to software which directs the fundamental operation of the computer and includes operating systems, language compilers and development tools, data base management systems, and other utilities which make the hardware capable of performing instructions.

Third Party Software Developers: See independent software vendors.

Turnkey Systems Operators: Companies whose business it is to combine hardware and software which are designed to serve specific applications, and deliver to customers in a ready state. Similar to systems integrators.

VARs (Value Added Resellers): See OEM and systems integrator.

Vertical Software Marketing: The marketing of software that is used by one or very few industries or trade groups. This software is designed specifically for use by a particular industry sector or market niche. A software package that aids in the design of car bodies would be targeted specifically to the auto industry.

Windowing: The process of placing a window around sections of the display screen by means of software. This allows the simultaneous display of data from several different sources. Relates to integrated software.

3.0 STRUCTURE OF THE CANADIAN SOFTWARE INDUSTRY

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3.1 Introduction

The Canadian software industry exhibits the characteristics of a relatively young cottage industry that is just beginning to show signs of maturation and consolidation.

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.

3.2 Classification Of Companies In The Software Industry

Companies in the software industry are not easily distinguishable from those in the larger computer service industry because the vast majority are also involved in other computer service activities. There were 2,207 companies in the software industry by the end of 1984.

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.

Exhibit 3.2.A shows the 2,207 companies classified by their primary business activity. Each company is only listed once. Exhibit 3.2.B shows the 2,207 companies classified into categories by their primary and other business activities, so they may be included in one or more categories.

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 2,207 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% (Exhibit 3.2.A), but as many as 59% or 1,306 of the companies receive significant revenues from these activities (Exhibit 3.2.B). 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.

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.

This classification exercise reveals some interesting patterns within the different categories. For instance, hardware vendors are most likely to be in software development or software distribution, bundled with hardware, as a secondary business activity. Hardware vendors are increasingly becoming aware of the importance of complimentary software products in the sale, lease or rental of hardware equipment. Many rely heavily on third party software developers to produce software to compliment their equipment, but some, notably IBM, which introduced its own application software for the PC family, are decreasing their reliance on third party developers.

Companies primarily involved in design and development of software are also heavily involved in the distribution and marketing of software. This pattern indicates that a substantial number of developers are still attempting to take the product all the way to the market themselves, rather than rely on specialists in marketing to carry out the commercialization process.

Service bureaus have been affected by the reduction in computer system prices. Companies that once relied on service bureaus for processing services now have computers that can do this work in-house. Consequently, service bureaus are restructuring their businesses to provide new services and reach new markets. They are moving into consulting, or software development and marketing, as a means of further growth.

3.3 Number And Geographical Distribution Of Companies In The Software Industry

The annual growth rate in the number of companies in the software industry has averaged about 21% over the last seven years, but the growth rate is rapidly tapering off (Exhibit 3.3.A). Although the market does provide entrepreneurs with opportunities, barriers to entry are intensifying. As competition mounts and the industry matures, a consolidation will occur, resulting in fewer and larger companies. Mergers and acquisitions are now happening frequently in the 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 (Exhibit 3.3.B).

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 in the last seven years (Exhibit 3.3.C).

3.4 Employment In The Software Industry

It is estimated that there were 25,800 people employed in the software industry in 1984, excluding those employed by hardware manufacturers (Exhibit 3.4.A). Almost 80% of the companies employ 10 or less people (Exhibit 3.4.B). This is an indication that there still appears to be room for the one or two man software operation to be successful. While, there are more small shops in Canada, the larger shops still account for the bulk of the employment.

Approximately 26% or 6,656 of these employees are employed directly in software development and design activities. If hardware companies are included, the total number employed in the industry is above 57,100. Only about 14% of this number are employed in software development.

Concerns are mounting because of the growing shortage of technically skilled people. Programming and systems analysts' jobs are some of the hardest to fill in the

information processing industry because there is a lack of specific applications experience. For this reason, there will be a growing need for more user friendly programs tailored to technically unsophisticated end users and there will be more demand for application development tools and programming aids.

Ontario and Quebec employ over 75% of the 57,100 employees in the industry (Exhibit 3.4.C) though these provinces have about 66% of the establishments (Exhibit 3.3.C). Most of the larger companies employing over 100 people are located in these two provinces.

3.5 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.

EXHIBIT 3.2.A

The Canadian Software Industry By Primary Business Involvement

Primary Business Activity	Number of Companies	Percent of Companies
Hardware Vendor	59	2.7
EDP Consultant	341	15.4
Service Bureau	205	9.3
Software Designer, Developer and Publisher	634	28.7
Software Distributor, and Retailer	775	35.1
Systems Integrator, OEM, and Turnkey Operator	125	5.7
Maintenance and Peripheral Vendor	28	1.3
Other	40	1.8
Total	2207	100.0

SOURCE: Evans Research Corporation

EXHIBIT 3.2.B

The Canadian Software Industry
By Other Business Activities

Other Business Activity	Number of Companies	Percent of Companies
Hardware Vendor	70	3.2
EDP Consultant	602	27.3
Service Bureau	453	20.5
Software Designer, Developer and Publisher	1488	67.4
Software Distributor, and Retailer	1306	59.2
Systems Integrator, OEM, and Turnkey Operator	470	21.3
Maintenance and Peripheral Vendor	268	12.1
Other	56	2.5

NOTE: The number of companies and percentage of companies add up to more than 2,207 and 100% because of involvement in more than one business area.

SOURCE: Evans Research Corporation

EXHIBIT 3.3.A

Number Of Establishments In The Canadian Software Industry

	1984	1983	1982	1981	1980	1979	1978
Canada	2149	2020	1852	1492	1136	789	698
Annual Growth (%)	6.4	9.1	24.1	31.3	44.0	13.0	17.1

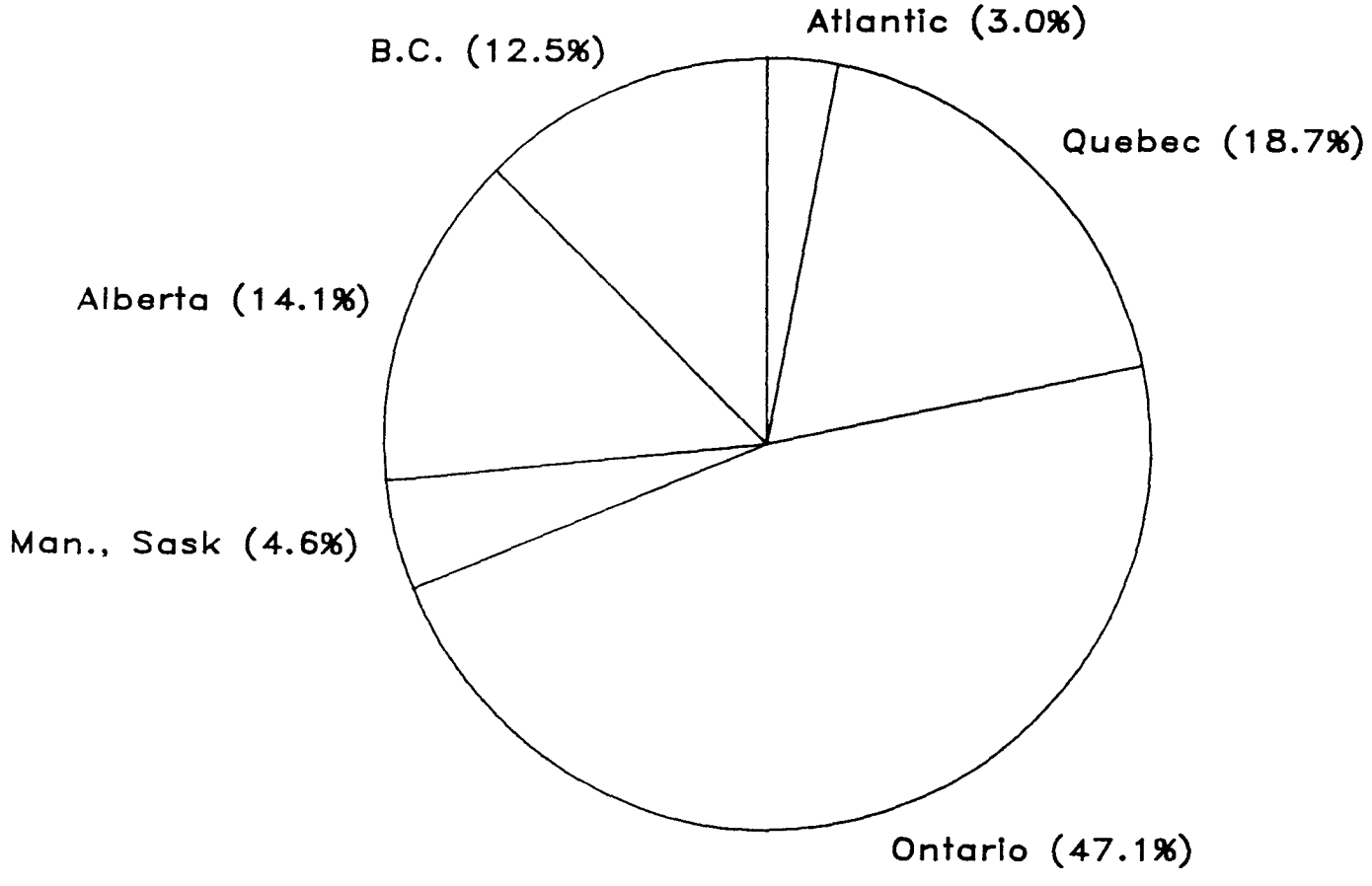
Average Annual Growth Rate (1978 - 1984) = 20.7%

NOTE: These figures exclude companies classified as primarily engaged in the lease or rental of EDP hardware by Statistics Canada (63-222).

SOURCE: Statistics Canada.
1983 and 1984 ERC estimates.

EXHIBIT 3.3.B

Canadian Software Industry Establishments
By Geographical Distribution



SOURCE: Evans Research Corporation

EXHIBIT 3.3.C

Number And Growth Of Companies
By Province

Region	1984	1983	1982	1981	1980	1979	1978
Atlantic	64	60	55	49	34	25	23
Annual Growth (%)	6.7	9.1	12.2	44.1	36.0	8.7	21.0
Quebec	403	390	364	294	224	139	127
Annual Growth (%)	3.3	7.1	23.8	31.3	61.2	9.4	5.0
Ontario	1012	941	840	675	538	387	342
Annual Growth (%)	7.5	12.0	24.4	25.5	39.0	13.2	16.3
Man., Sask.	99	93	77	62	55	39	29
Annual Growth (%)	6.5	20.8	24.2	12.7	41.0	34.5	31.8
Alberta	303	275	261	197	150	103	93
Annual Growth (%)	10.2	5.4	32.5	31.3	45.6	10.8	38.8
B.C.	268	261	255	215	135	96	84
Annual Growth (%)	2.7	2.4	18.6	59.3	40.6	14.3	15.1
Canada	2149	2020	1852	1492	1136	789	698

NOTE: These figures exclude companies classified as primarily engaged in the lease or rental of EDP hardware by Statistics Canada (63-222).

SOURCE: Statistics Canada.

EXHIBIT 3.4.A

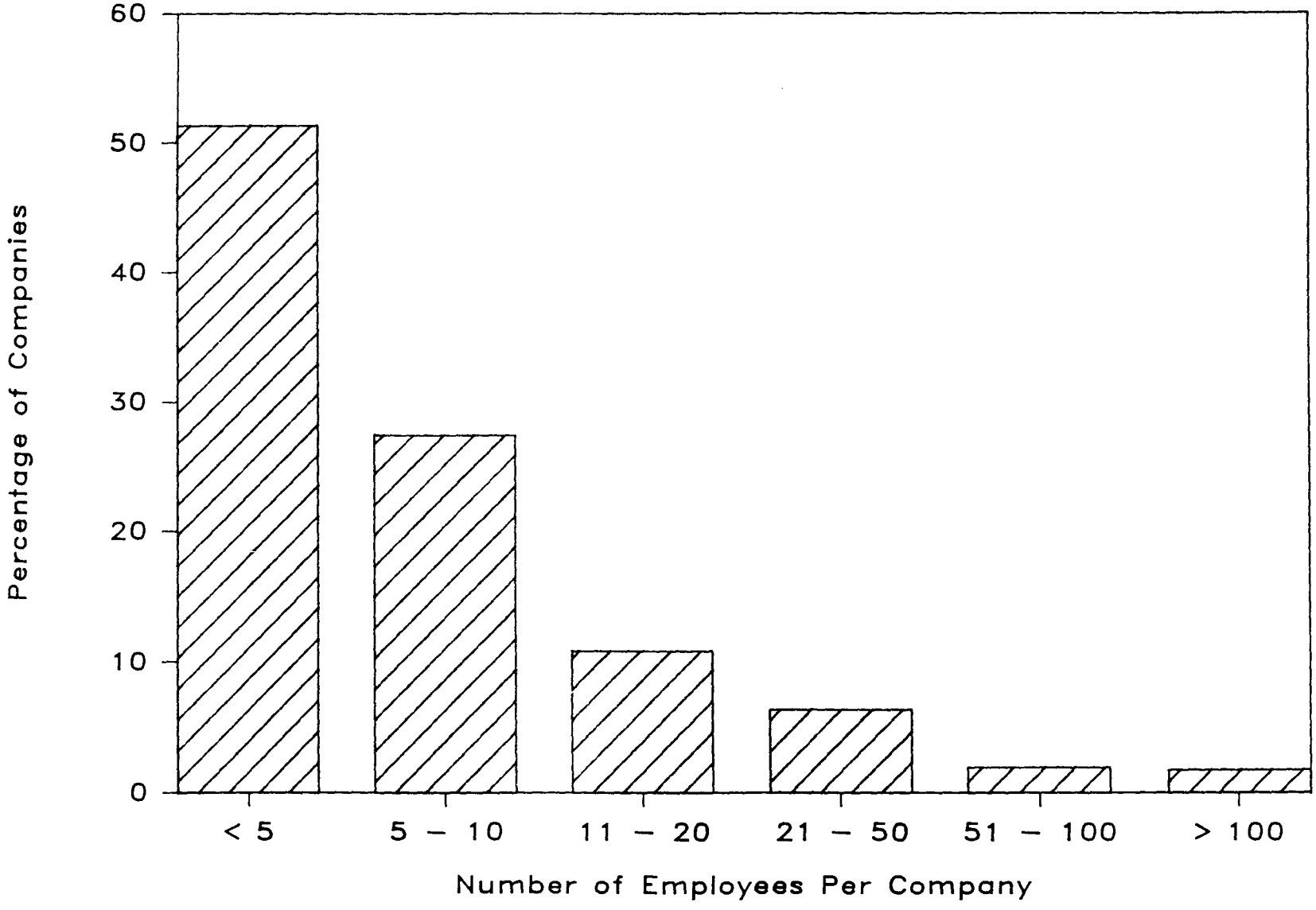
Estimated Employment In Software Development
In 1984

	Total Number of Employees	Number of Employees in Software Development	Percent of Employees in Software Development
Independent Software Companies	25800	6656	25.8%
Hardware Vendors	31300	1565	5.0%
Total	57100	8221	14.4%

SOURCE: Evans Research Corporation

EXHIBIT 3.4.B

EMPLOYMENT IN THE SOFTWARE INDUSTRY - 1984
(2049 COMPANIES)



NOTE: Figures exclude hardware manufacturing firms.

SOURCE: Evans Research Corporation

EXHIBIT 3.4.C

Employment In The Software Industry
By Geographical Region
(Total Employees = 57100)

Region	Percent Of Total Number of Employees
Atlantic	2.2
Quebec	20.0
Ontario	55.1
Manitoba	3.0
Saskatchewan	3.3
Alberta	8.4
British Columbia	8.0
Total	100%

SOURCE: Evans Research Corporation

4.0 THE CANADIAN SOFTWARE MARKET FORECASTS AND TRENDS

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4.1 The Canadian Market Overview

Section 4.0 provides forecasts and trends of the Canadian software market. There are numerous ways of segmenting the market, but two in particular are useful in understanding current trends:

1. Software Markets By Hardware Size: Mainframe, minicomputer, and microcomputer software.
2. Software Markets By Software Type: Systems, systems development and application software.

Following a review of the market in aggregate are sections dealing with software from these two perspectives.

Figures regarding annual revenues and growth rates incorporate income from the rental, lease, and sale of unbundled software. As well, they include software royalties, revenues from other software and system services, and software exports. Revenues are measured at the manufacturers' level and therefore, do not include distributors' or retailers' margins.

4.1.1 Total Revenues:

Canadian software market revenues totaled $970 million in 1984 and are forecasted to grow 25% in 1985. The entire information processing industry is forecasted to grow, by contrast, at 16% during 1985 (Exhibit 4.1.A). 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 a compounded rate of 26% over the same period. 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 (Exhibit 4.1.B).

4.1.2 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 (Exhibits 4.1.C and 4.1.D). 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.

Exhibits 4.1.E and 4.1.F list Canada's leading software, EDP consulting, and service bureaus as reported in ERC's "Annual Revenue Survey Of The Top Computer Companies In Canada: 1983". Companies are ranked by 1983 EDP revenues.

4.1.3 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 (Exhibit 4.1.G). 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.

There is a proliferation of smaller, highly competitive companies outside Ontario and Quebec. Alberta has shown the fastest growth rate in the number of new companies over the last seven years. This situation may be explained by two observations. First, the large companies in Ontario and Quebec tend to crowd out the smaller players. Second, the unique market and the industrial base of certain other provinces make them an ideal breeding ground for small developers catering to the local market.

4.2 Software Markets According To Hardware Size

The nature of the software market in Canada is changing and the most significant change may relate to the market when segmented by computer size.

4.2.1 Hardware Considerations:

In assessing future software markets, it is important to consider some trends in the hardware market which affect software revenues. Software sales tend to lag behind trends in the hardware market because equipment purchasers gradually expand their use of new applications and because software manufacturers take time to assess the market potential and develop products in reaction to the introduction of new computer hardware.

Canadian microcomputer hardware revenues will grow rapidly between 1983 and 1986, overtaking revenues from minicomputers in 1985 (Exhibit 4.2.A). This high growth rate is attributed, in part, to the increased use of corporate data bases by end users, and the trend toward microcomputer networking and multi-user systems. Although IBM made a late entry into the microcomputer market in 1981, it emerged as the clear leader in just over three years.

In the microcomputer segment, the use of larger and more powerful single-user and multi-users microcomputers is growing. As the end user becomes more sophisticated and as applications become more complex, more microcomputer memory is required. A few years ago most desktop microcomputers used 8-bit microprocessor chips and were often limited to 64 Kbytes of memory. Now 16 or 32-bit microprocessors and 256 Kbytes of memory are standard. These enhancements make it possible to economically produce more complex and sophisticated software packages.

The minicomputer and mainframe market segments are more mature and this is reflected in lower growth rates. But sales of mainframes and minicomputers have not been negatively affected by the increasing popularity of personal computers as was originally expected. Growth in MIPS will be about 50% each year from 1984 to 1989, fueled in part, by microcomputer links, information centres and data base accesses.

The number one and two computer suppliers, IBM and DEC, will face-off against each other more often in the superminicomputer and small mainframe markets in 1985. IBM is aggressively pursuing the scientific and engineering superminicomputer market that DEC has long dominated with its VAX computers. DEC is simultaneously setting its sights on IBM's commercial data processing stronghold.

An increase in demand for large-scale systems was predicted for 1985 because of IBM's introduction of the 3090 series of mainframes, but this has not materialized. Shipments of the most advanced processor will not commence until 1987. Following IBM's announcement in February, Burroughs, NAS and Honeywell have announced new high end mainframes with comparable processing power.

4.2.2 Software Revenues By Size Of Hardware:

As in the hardware market, the microcomputer segment of the software market is experiencing the fastest growth rates (Exhibit 4.2.B). However, the microcomputer software segment is a very small portion of the total software market. The limited amounts of system software and lower utilization rates associated with microcomputers accounts for the lower proportion of software to hardware costs than with larger systems. In 1983, microcomputer software revenues were less than 6% of the total market, but by 1986 will be 10%.

The market share of minicomputer software will increase much more gradually, from 24% to 27% in the same period. Mainframe software revenues will decline in proportion to the total market from 70% to 62%, but will continue to account for the majority of revenues generated in Canada.

4.3 Software Markets By Software Type

Exhibits 4.3.A and 4.3.B show the Canadian software industry segmented by type of software into three broad markets. These are the applications software, systems software and systems development software markets.

4.3.1 Trends In Application Software

Applications software packages are programs that instruct the processor on how to perform tasks for the end user. Applications packages are designed to perform specific tasks such as word processing, electronic mail and inventory control.

In 1984, software revenues were $970 million. Applications software revenues were 38% of the total market, at $370 million (Exhibit 4.3.C). 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.

1. **Major Application Areas:**

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

Microcomputer applications software constituted approximately 23% of the total applications software revenues in Canada in 1984. Most of this would be classified as personal productivity software. In two ERC studies on microcomputer usage in small, medium, and large sized companies, spreadsheet packages were the most frequently used applications packages (Exhibit 4.3.D), followed by word processing packages and data base management packages. Two other frequently used applications are accounting and business graphics packages. The expanding memory for 16-bit machines and the availability of inexpensive plotters will promote the increased use of graphics software.

2. **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 has 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 data base management products. Numerous new software vendors have succeeded by producing a "hit" software program for a horizontal market. However, the microcomputer software market has become extremely competitive. It has been flooded with scores of "me too" products as more software vendors enter the market in an attempt to produce their big hit.

As a consequence, software vendors are more frequently specializing in industry specific software where they may gain a competitive edge. Vertical markets can be better served with products that incorporate features designed to meet industry specific needs. For this reason, a thorough knowledge of the industry by the software vendor, is essential and may be the strongest basis for competition.

Certain industry sectors have greater potential for vertical market software packages. Industries with large installed bases or unique needs offer the most opportunities. The manufacturing sector, which has the largest installed base of computers, according to Canadian Information Processing Society's (CIPS) 1985 Computer Census, has the greatest potential. Other large vertical markets include the retail market for point of sale systems, the agricultural market, and the educational market, although, sales in educational software were somewhat disappointing in 1984.

Real Time Datapro Ltd. is a prime example of one company which has achieved success in a vertical market. It has moved into a dominant position in the insurance industry with its Totally Automated Broker System (TABS), an on-line system for medium and large insurance brokers. TABS is a transaction-based system that enables brokers to compare rates offered by major underwriters, and tailors policies to the requirements of customers and regulators. Real Time has targeted a market beset by complex product offerings and regulatory considerations and has produced a "total solution" which meets user needs.

The availability of vertical market applications is expected to increase substantially by 1988 as microcomputer software vendors target particular industry niches like minicomputer and mainframe software vendors have done for some time.

3. **Integrated Software And Windowing:**

Although standalone solution packages are still popular, DP managers and end users are now demanding multifunctional packages to meet their growing productivity tool needs. 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 data bases into "one big program". Symphony, by Lotus Development Corporation and Framework, by Ashton-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.

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 in 1985, initiated by the introduction of TopView by IBM. Windows, by Microsoft Corp. and GEM, by Digital Research Corp. are also general purpose windowing programs which will be released on the market soon.

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, CEO 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.

4. 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 these applications and as more information is shared, it becomes important to ensure portability and standarization of software products.

Although not visible, when software is purchased by departments or individuals independently, the total expenditure can add up to a substantial corporate investment. Nevertheless, few companies have attempted to define and enforce application standards in order to combat rising costs and ensure compatability.

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.

5. **Applications Development:**

Users are also concerned about software development in-house. One issue is whether there should be greater MIS control in the development of applications throughout the organization or whether applications development should be in the hands of the user groups. The backlog of application needs will continue to swell if MIS departments carry the full responsibility for applications development for the growing user population. On the other hand, end user authors create applications with no systems development background, and little documentation, backup, recovery or support.

Standardization and control will be more important for applications which are used throughout the whole organization. MIS departments may garner limited control by offering some degree of support to the user groups in selecting hardware, evaluating software packages, and providing trouble-shooting during operations. With proper administration, this plan may result in effective and voluntary self-control by users. Application developing users may more often come to the MIS department if it is seen as a coach rather than a regulatory body.

6. **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.

4.3.2 Trends In Systems and Systems Development Software

System software directs the fundamental operations of the computer. These packages include operating systems, language compilers and development tools, data base management systems and other utilities which make the hardware capable of performing instructions. Systems software revenues grew 27% in 1984 (Exhibit 4.3.E). The average annual growth rate throughout the decade will also be 27%. The last year that systems software ranked as the largest segment of the software market was 1984. By 1985, it will be outgrown by the applications software segment.

Systems development software includes the customized development of both systems and applications packages for specific customers or groups of customers.

The systems development software market will experience a relatively flat growth rate until 1987, due to the abundance of applications software packages available (Exhibit 4.3.F). 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.

1. Operating Systems Standardization:

Operating systems are changing to meet technical and user interface demands for local area networks, real-time applications, file sharing, windowing, and multi-user computer systems. Although, there is considerable talk about 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 were created for single-user microcomputers. CP/M and MS-DOS have been adopted and supported by the major microcomputer vendors, Apple and IBM, and have become de facto standards. These operating systems are simple and can easily be ported to new hardware. It is expected that CP/M and MS-DOS will continue to battle it out in the single user market in 1985.

CP/M and MS-DOS are now evolving to resemble time-sharing systems that allow a number of processes to be executed concurrently, but it is commonly felt that they cannot be enhanced to become adequate operating systems for 16/32 bit, multi-user, multi-tasking microcomputers. Multi-user operating systems are designed to provide control and shared access to expensive computer resources such as the CPU, memory and disk devices. Also, multi-user operating systems originally designed for mainframe and minicomputers are being adapted for use on microcomputers.

There is modest agreement among manufacturers of large microprocessor-based systems and smaller mainframes, that Unix is a good operating system and should be adopted, but commitment to this product has been slow and cautious. Unix 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. Common complaints regarding Unix include: the very limited availability of applications software; lack of user friendliness due to Unix being based on "C" language; and slowness in commercial data processing applications.

The single-user, self-contained microcomputer will probably remain divorced from the Unix environment due to the problems listed above and because most microcomputers have inadequate disk storage space to support Unix. Also, with Unix written in a high level language, it runs more slowly, an attribute which is exaggerated on slower microcomputer-based systems.

On the other hand, many of the disadvantages of Unix disappear in supermicrocomputer and minicomputer systems. For example, disk storage is less critical when using 20 to 80 megabyte machines and some commercial offerings are able to handle over 32 users. Unix is possibly the only near-standard for this class of machine.

Nonetheless, the growth of Unix is being vendor driven rather than user driven. As many as 110 hardware manufacturers produce Unix-based systems including IBM, AT&T, Radio Shack, DEC, and Hewlett-Packard. Sperry Corp. recently endorsed Unix for 18 of its hardware and software products. Many vendors are looking for systems that enable them to run both Unix and their own proprietary operating systems. This strategy allows vendors to meet an industry standard while still offering a proprietary operating system. Most vendors would still prefer to lock customers into their own operating system.

There are market areas with demonstrated potential for Unix, notably engineering workstations and turnkey systems for small businesses. There may also be opportunities for Unix in the office automation field and on mainframes as dedicated virtual machines. In order to remove some of the machine specific nature of application 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.

In the area of mainframe operating systems users are moving away from batch processing systems towards interactive languages, data bases and applications that access the operating system continuously. IBM has been slow to react to this change, and continues to pursue a centralized operating system strategy for mainframes emphasizing SNA/VM/MVS host systems.

2. **Development Tools And Fourth Generation Languages:**
There is as much as a two year backlog of requests for software programs in the DP departments of large organizations. Due to the shortage of programmers and analysts and their decreased productivity in relation to the number of computer systems installed, DP managers can not possibly keep abreast of all the requests for programs that they receive.

The most popular and immediate solution to this problem is the use of packaged software. But, packaged software does not adequately meet each organization's specific needs. Another obvious solution is to increase programmer productivity through special tools and techniques. Software development tools include fourth generation languages like Focus and Powerhouse, other data base 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 a non-procedural data base 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.

The benefits of fourth generation languages are quite obvious, but organizations acceptance of them has been slow. A major impediment is the availability of programmers with experience in a language. Also companies tend to wait and see which offerings become most popular. These are reasons why the introduction of third generation languages took almost ten years. 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.

3. **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 signifying the importance of networks in upcoming years.

The introduction of DBMS technology to the information centre and the demand for original data by the end user have spawned the implementation of micro-to-mainframe links in 1984. These links allow larger computers to support decision support applications on personal computers. The implementation of micro-to-mainframe links was slow, prior to 1984, due to maintenance, security, and cost considerations.

4. Data Base Management Systems:

Data base 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.

Relational techniques for mainframe DBMS users will not be popular for some time due to high conversion costs and performance problems. Growth among minicomputer DBMS will be relatively flat as most users are turning to either mainframe-based corporate data bases or micro-based personal data bases. With the increasing complexity and sophistication of DBMS, security and backup are becoming important issues.

4.4 Other Market Trends

1. 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.

Hardware vendors are turning to third party software developers to provide software for their equipment. Apple Computers Inc. counts on third party vendors for as much as 90% of the Macintosh's software. Software vendors, who can not afford to market their products independently, are also looking to hardware manufacturers to aid in advertising, support, and distribution.

The years 1984 and 1985 have seen some prominent vendors join forces to create joint marketing agreements. For instance, Cognos Inc. has joined forces with DEC, Data General, and other major hardware vendors to offer Powerhouse, a fourth generation language program, on

minicomputer systems via the hardware vendors' national salesforce network. Another cooperative agreement has been formed between Zanthe Information Inc., Spectrix Microsystems, and NorthStar Software to market "The Canadian Application Development Solution". Zanthe is to provide the application development software, Spectrix the multi-user hardware, and NorthStar the systems development expertise.

There are roadblocks to developing these relationships. Some hardware vendors are reluctant to make deals for vertical market software that promises little potential and with small software developers that have unsophisticated approaches to software development. Also, as software becomes the driving force of the EDP industry, software vendors are reluctant to bundle software with hardware at reduced prices because this can stifle demand at the end user level. Nonetheless, software bundling will continue to grow, especially in the minicomputer sector of the market.

2. **IBM's Entry Into The Microcomputer 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. IBM introduced 31 integrated packages which can be used alone or together on its line of PC hardware. IBM also introduced TopView which requires applications to conform to DOS 3.0. As well, PC Network ties all IBM microcomputer hardware together providing portability and flexibility, but results in greater dependence by the user, on IBM.

Originally IBM had more than 200 third party cooperative agreements with software developers, but now it is threatening to compete directly with the independent software companies that it used to court. The companies which specialized in IBM PC compatible software will be affected the most by this strategic move.

3. **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. This is especially true in the microcomputer software segment. Development costs can easily exceed $1 million, but this may represent only 20% of the full commercialization costs. Other costs include advertising, sales promotion, direct sales, distribution, support and maintenance.

It is expected that over time software development will divorce itself from software marketing. Publishers which focus exclusively on the marketing function will emerge to sponsor independent "authors" in much the same way as now occurs in the recording or publishing industries.

EXHIBIT 4.1.A

The Canadian Software Industry Revenue Forecasts
(Including Exports)

($ Millions)

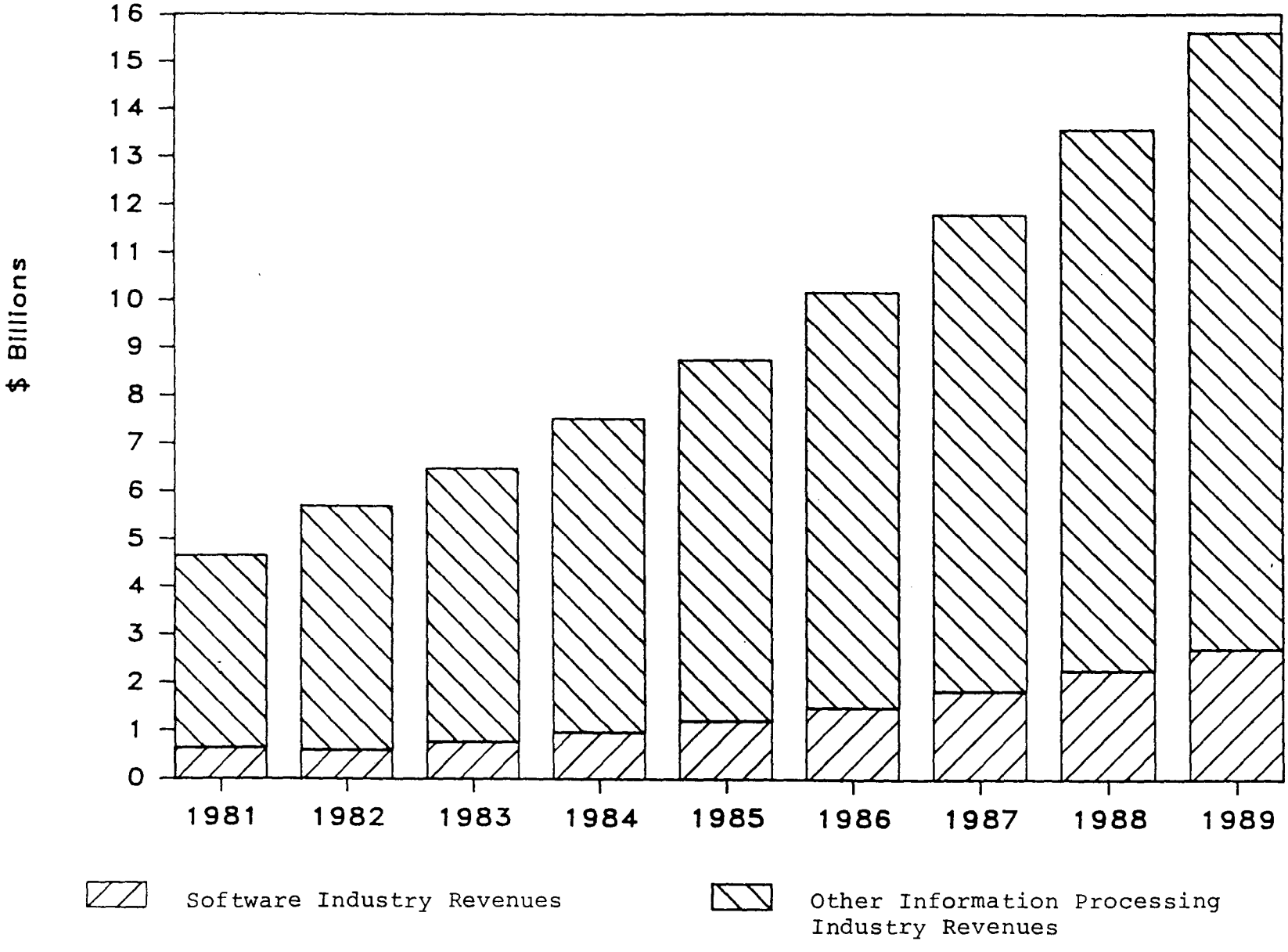
	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total Information Processing Industry Revenues	4760	5708	6495	7530	8770	10180	11810	13595	15610
Annual Growth (%)	27	22	14	16	16	16	16	15	15
Total Software Industry Revenues	464	606	775	970	1215	1495	1845	2275	2720
Annual Growth (%)	37	31	28	25	25	25	23	23	20
Software Revenues as % of Information Processing Revenues	9.7	10.6	11.9	12.9	13.9	14.7	15.6	16.7	17.4

NOTE: The average annual growth rate of the total information processing industry revenues from 1981 to 1989 is 17.4%. The average annual growth rate of the total software industry revenues from 1981 to 1989 is 26.3%.

SOURCE: Evans Research Corporation

EXHIBIT 4.1.B

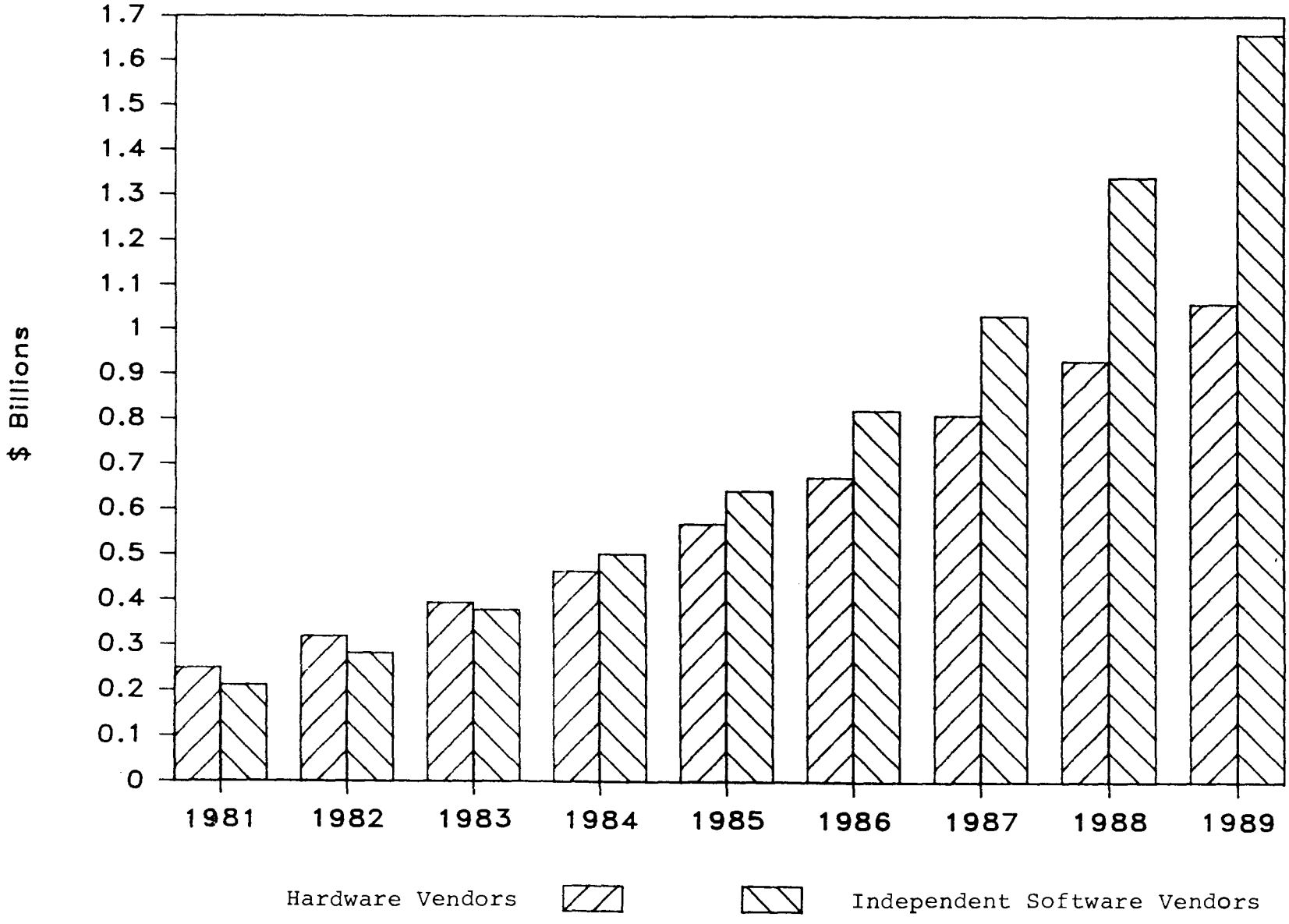
Software Revenues As A Portion Of Total Information Processing Industry Revenues



SOURCE: Evans Research Corporation

EXHIBIT 4.1.C

Canadian Software Revenues By Vendor Type



SOURCE: Evans Research Corporation

EXHIBIT 4.1.D

Estimated Percent Of Software Revenues
Generated By Vendor Type

Vendor Type	1981	1982	1983	1984	1985	1986	1987	1988	1989
Hardware Vendor (%)	54	53	51	48	47	45	44	41	39
Software Designer and Developer (%)	26	28	28	30	30	30	32	34	35
Service Bureau (%)	8	8	9	10	10	11	11	12	13
Consultant (%)	6	6	7	8	9	10	10	10	10
Other (%)	6	5	5	4	4	4	3	3	3
Total (%)	100	100	100	100	100	100	100	100	100
Total $ Millions	464	606	775	970	1215	1495	1845	2275	2720

SOURCE: Evans Research Corporation

EXHIBIT 4.1.E

CANADA'S LEADING SOFTWARE AND EDP CONSULTING COMPANIES*1

	COMPANY NAME	% OF TOTAL 1983	% OF TOTAL 1982	EDP REVENUES *2 1983	EDP REVENUES *2 1982	% CHANGE '82 TO '83	SOURCE CODE
1	SYSTEMHOUSE LTD.	24.5	25.5	49.6	39.2	27	A
2	DMR & ASSOCIATES	22.7	22.4	46.0	34.4	34	B
3	SYDNEY DEVELOPMENT CORPORATION	9.4	7.6	19.1	11.6	65	C
4	COGNOS INCORPORATED	9.2	8.6	18.6	13.2	41	A
5	CULLINET CANADA INC.	4.5	3.8	9.2	5.8	59	B
6	CINCOM SYSTEMS OF CANADA LTD.	3.5	3.3	7.0	5.0	40	B
7	SYNERLOGIC INC.	3.3	4.7	6.6	7.2	-8	A
8	MANAGEMENT SCIENCE AMERICA (CANADA) LTD.	3.2	3.3	6.5	5.1	27	B
9	LGS DATA PROCESSING CONSULTANTS INC.	2.9	2.5	5.9	3.9	51	B
10	COMPUTECH CONSULTING CANADA LTD.	2.2	3.1	4.4	4.8	-8	A
11	LE GROUPE BST INC.	2.0	2.1	4.1	3.2	28	A
12	POLARIS TECHNOLOGY CORPORATION	2.0	1.4	4.1	2.1	95	B
13	PANSOPHIC SYSTEMS OF CANADA, LTD.	1.4	1.6	2.8	2.4	17	C
14	BASIC SOFTWARE GROUP, INC.	1.3	.5	2.6	.8	225	B
15	DYAD COMPUTER SYSTEMS INC.	1.3	1.4	2.6	2.1	24	B
16	UNIVERSITY COMPUTING COMPANY (CANADA) LTD.	1.3	1.4	2.6	2.2	18	C
17	APPLIED DATA RESEARCH CANADA LTD.	1.2	1.3	2.5	2.0	25	B
18	HUMAN COMPUTING RESOURCES CORP. (HCR)	1.1	.8	2.2	1.3	69	B
19	EXECUCOM SYSTEMS CANADA INC.	.9	1.0	1.8	1.5	20	B
20	ISS INFORMATION SYSTEM SERVICES LTD.	.8	2.1	1.6	3.3	-52	B
21	JONAS & ERICKSON SOFTWARE TECHNOLOGY INC.	.8	1.0	1.6	1.5	7	C
22	PRISM	.6	.7	1.2	1.0	20	A
	TOTAL			202.6	153.6	32	

Notes:

*1 Includes those firms who derive the majority of their revenues from EDP-related consulting and/or sale/licensing of custom and/or packaged software.
*2 Figures are in $ Canadian millions, and include domestic and export revenues.

Source Code:

A = Published by Company
B = Confirmed by Company Officer
C = Estimated by Evans Research Corporation

SOURCE: Evans Research Corporation

THE TOP SERVICE BUREAUS IN CANADA

	COMPANY NAME	% OF TOTAL 1983	% OF TOTAL 1982	EDP SERVICES REVENUES *1 1983	EDP SERVICES REVENUES *1 1982	% CHANGE '82 TO '83	SOURCE CODE
1	CANADA SYSTEMS GROUP LIMITED	20.3	19.3	140.1	127.6	10	A
2	DATACROWN INC.	12.2	13.3	84.3	88.0	-4	A
3	BRITISH COLUMBIA SYSTEMS CORPORATION	9.4	9.8	65.0	65.0	0	C
4	I.P. SHARP ASSOCIATES LIMITED	6.9	7.8	47.5	51.6	-8	A
5	IBM CANADA LTD.	6.4	6.7	44.0	44.0	0	C
6	L'INDUSTRIELLE-SERVICES TECHNIQUES INC. (IST INC.)	4.7	4.3	32.3	28.4	14	A
7	CONTROL DATA CANADA, LTD.	3.6	3.8	24.8	25.0	-1	C
8	SASKATCHEWAN COMPUTER UTILITY CORPORATION (SASKCOMP)	3.2	3.1	22.2	20.8	7	A
9	MANITOBA DATA SERVICES	2.6	2.4	17.8	15.7	13	C
10	ADP CANADA	2.5	1.5	17.2	9.9	74	C
11	CANADIAN GENERAL ELECTRIC COMPANY LIMITED	2.3	2.4	16.0	16.0	0	C
12	DATALINE INC.	2.0	1.6	13.8	10.3	34	B
13	REAL TIME DATAPRO LTD.	1.8	1.4	12.3	9.5	29	B
14	REYNOLDS & REYNOLDS (CANADA) LTD.	1.7	1.4	11.6	9.5	22	B
15	CABLESHARE INC.	1.6	1.1	11.3	7.2	57	A
16	COMPUTER SCIENCES CANADA, LTD.	1.6	1.8	11.3	12.0	-6	C
17	NEWFOUNDLAND & LABRADOR COMPUTER SERVICES LTD.	1.5	1.4	10.4	9.2	13	C
18	ALPHATEXT	1.4	1.2	10.0	7.8	28	A
19	COMSHARE LIMITED	1.3	1.6	9.2	10.3	-11	B
20	THORNE RIDDELL	1.3	1.3	8.9	8.5	5	C
21	NCR CANADA LTD	1.2	1.2	8.0	8.0	0	C
22	ACT COMPUTER SERVICES LTD.	1.1	1.2	7.8	7.8	0	B
23	DIGITECH LTD.	1.1	1.5	7.6	9.7	-22	C
24	COMCHEQ SERVICES LIMITED	.9	.8	6.4	5.4	19	B
25	ACO GROUP LTD.	.9	.6	6.2	3.8	63	B
26	M.I.C.R. SYSTEMS LTD.	.9	.8	5.9	5.1	16	A
27	COMTECH GROUP INTERNATIONAL LTD.	.8	.9	5.7	5.9	-3	A
28	RILEY'S DATASHARE INTERNATIONAL LTD.	.8	1.1	5.3	7.0	-24	A
29	POLYCOM SYSTEMS LIMITED	.7	.6	4.8	4.1	17	A
30	IST-HEALTHCOMP INC.	.7	1.0	4.7	6.6	-29	B
31	CYBERSHARE LTD.	.6	.7	4.4	4.4	0	B
32	NDC COMPUTER SERVICES LTD.	.6	.9	4.0	6.0	-33	C
33	BOEING COMPUTER SERVICES CANADA LTD.	.4	.5	3.0	3.0	0	C
34	COMPUTREX CENTRES LTD.	.4	.6	3.0	3.7	-19	B
35	UNITED INFORMATION SERVICES OF CANADA, LTD.	.3	.3	2.3	1.9	21	C
36	BDP BUSINESS DATA PROCESSING LTD.	.3	.3	2.1	2.0	5	B
	TOTAL			691.2	660.7	5	

Notes:

*1 Figures are in $ Canadian millions, and include domestic and export revenues.

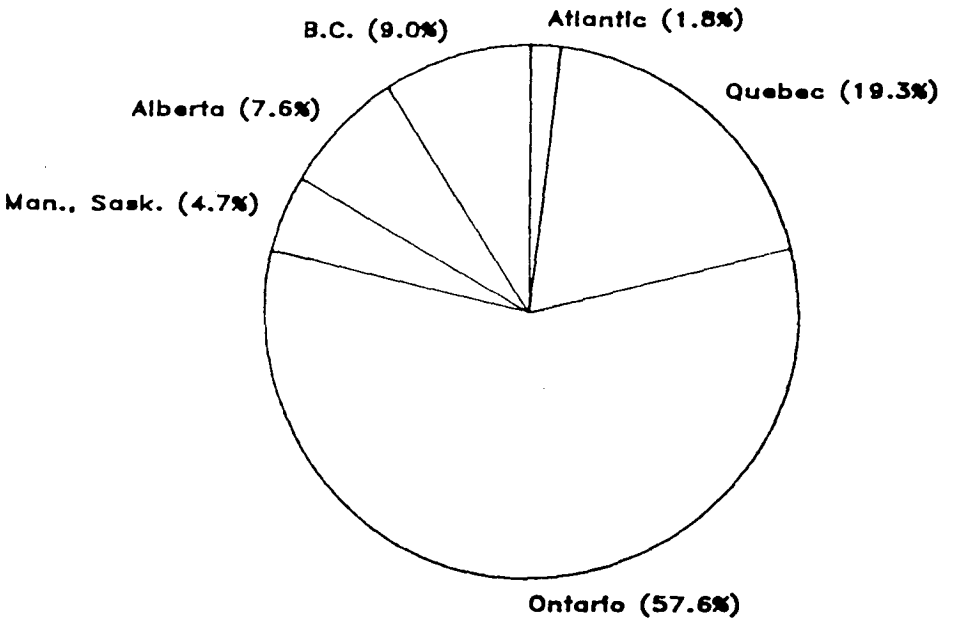
Source Code:

A = Published by Company
B = Confirmed by Company Officer
C = Estimated by Evans Research Corporation

SOURCE: Evans Research Corporation

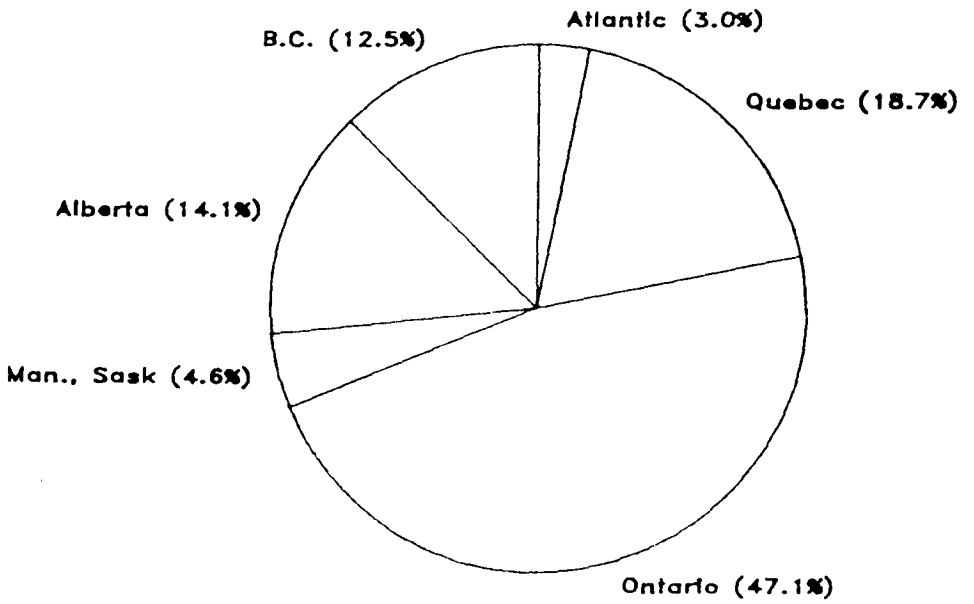
SOFTWARE REVENUES BY PROVINCE

Based On Location Of Company Head Office



SOFTWARE ESTABLISHMENTS BY PROVINCE

Based On Location Of Company Head Office
(2207 Companies)



SOURCE: EVANS RESEARCH CORPORATION

EXHIBIT 4.2.A

Canadian Hardware Revenues
1983 - 1986
($ Millions)

	1983		1984		1985		1986	
	$	%	$	%	$	%	$	%
Microcomputer Hardware	509	18.1	620	19.7	740	21.2	874	22.9
Annual Growth(%)	--		21.8		19.4		18.1	
Minicomputer Hardware	592	21.1	645	20.4	690	19.8	735	19.2
Annual Growth(%)	--		9.0		7.0		6.5	
Mainframe Hardware	1711	60.8	1890	59.9	2060	59.0	2215	57.9
Annual Growth(%)	--		10.5		9.0		7.5	
Total	2812	100.0	3155	100.0	3490	100.0	3824	100.0

SOURCE: Evans Research Corporation

EXHIBIT 4.2.B

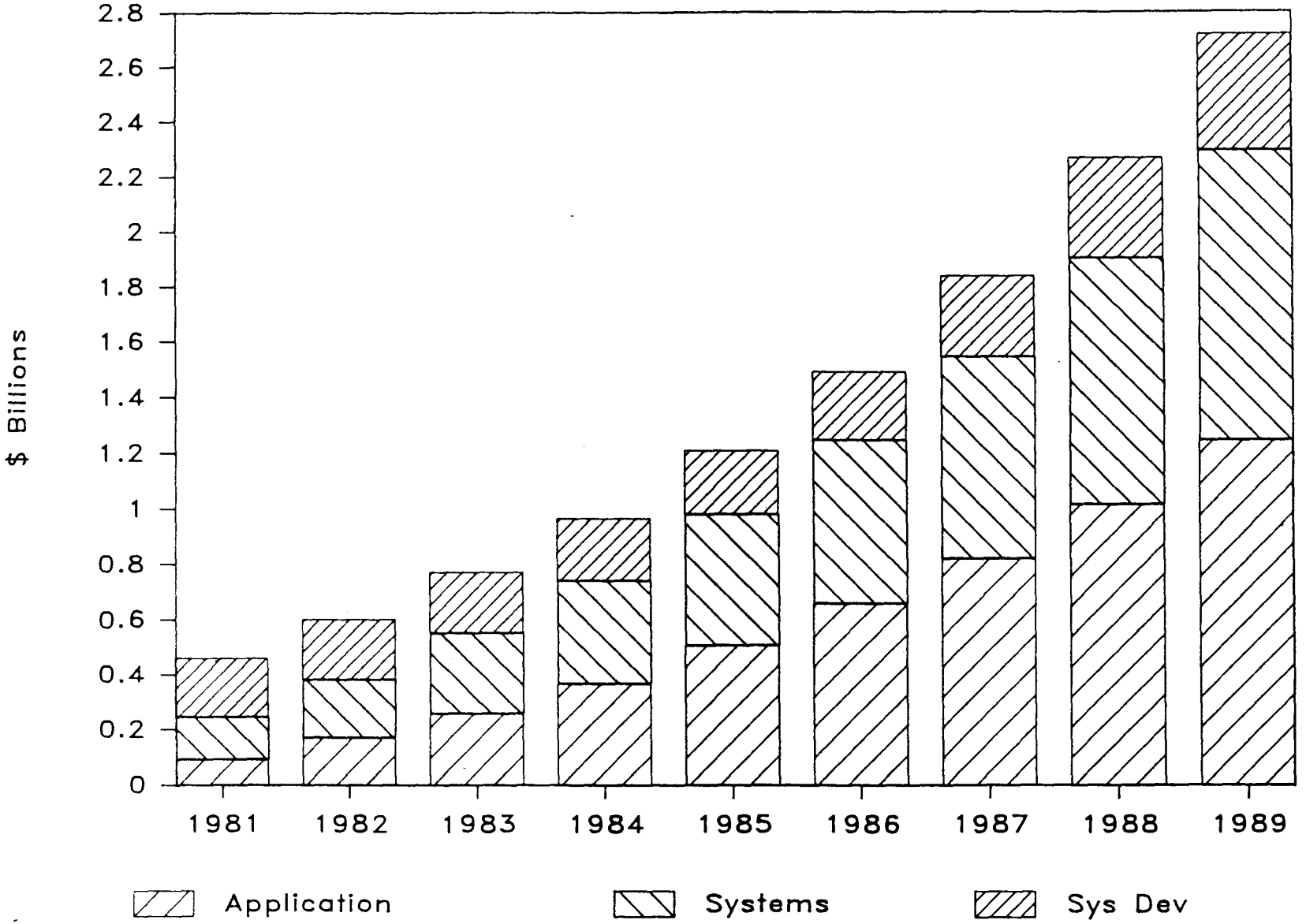
Canadian Software Revenues By
Size Of Hardware
1983 - 1986
($ Millions)

	1983		1984		1985		1986	
	$	%	$	%	$	%	$	%
Microcomputer Software	43	5.5	75	7.7	109	9.1	152	10.2
Annual Growth(%)	--		74.4		45.3		39.4	
Minicomputer Software	195	24.9	248	25.6	317	26.5	410	27.4
Annual Growth(%)	--		27.2		27.8		29.3	
Mainframe Software	544	69.6	647	66.7	769	64.4	933	62.4
Annual Growth(%)	--		18.9		18.9		21.3	
Total	782	100.0	970	100.0	1195	100.0	1495	100.0

SOURCE: Evans Research Corporation

EXHIBIT 4.3.A

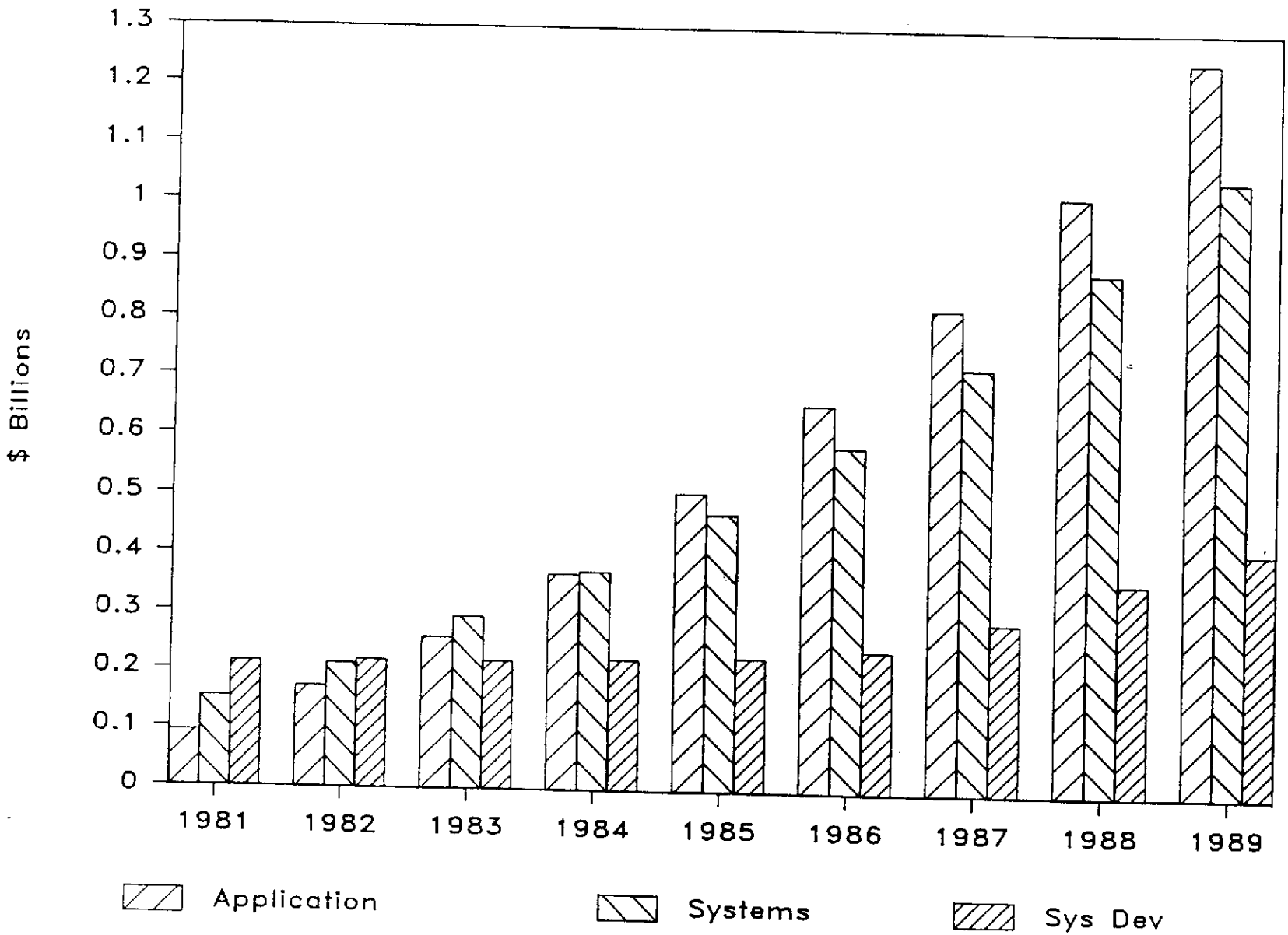
Canadian Software Revenue By Software Type



SOURCE: Evans Research Corporation

EXHIBIT 4.3.B

Software Revenue Forecasts By Type Of Software



SOURCE: Evans Research Corporation

EXHIBIT 4.3.C

Applications Software Revenue Forecasts
($ Millions)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
Applications Software Revenues ($)	95	173	260	370	510	660	825	1020	1250
Annual Growth (%)		82	50	42	38	29	25	24	23
Per Cent of Total Software Revenue (%)	20	29	34	38	42	44	44	45	46

Average Annual Growth Rate = 39.1%

SOURCE: Evans Research Corporation

EXHIBIT 4.3.D

Microcomputer Applications Software Usage
In 1984

Applications Package	Percent of Applications in Use
Spreadsheets	18.8
Word Processing	16.7
Data Base Functions	13.7
Accounting	11.8
Business Graphics	10.5
Distribution/Inventory	6.3
Project Management	4.9
Electronic Mail	3.9
Scientific/Engineering	3.3
Other	10.1
Total	100.0

SOURCE: Evans Research Corporation

EXHIBIT 4.3.E

Systems Software Revenue Forecasts
($ Millions)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
Systems Software Revenues ($)	154	213	295	375	475	590	725	890	1050
Annual Growth (%)		38	38	27	27	24	23	23	18
Per Cent of Total Software Revenues (%)	33	35	38	39	39	39	39	39	39

Average Annual Growth Rate = 27.3%

SOURCE: Evans Research Corporation

EXHIBIT 4.3.F

Systems Development Software Revenue Forecasts
($ Millions)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
Systems Development Software Revenues ($)	215	220	220	225	230	245	295	365	420
Annual Growth (%)		2	0	3	2	7	20	24	15
Per Cent of Total Software Revenues (%)	47	36	28	23	17	16	16	16	15

Average Annual Growth Rate = 9.1%

SOURCE: Evans Research Corporation

5.0 SOFTWARE EXPORTING

5.0 SOFTWARE EXPORTING

5.1 Software Export Revenues And Forecasts

Revenues generated from Canadian software exports will have an average annual growth rate of 21% between 1982 and 1989 (Exhibit 5.1.A). The average annual growth rate for total Canadian software revenues is 26% for the same period, indicating the slowness with which Canadian software vendors are moving into foreign markets. Canadian software vendors have consistently been reluctant to market their products and services internationally. They have relied heavily on the small and congested domestic market.

From 1983 through 1989, applications software will constitute the largest proportion of software export revenues (Exhibit 5.1.B). As with domestic sales of systems development software, the export market will experience relatively flat growth throughout the 1980's. This is due, in part, to the impact that applications software packages are having on the whole market.

A study sponsored by Software Canada and Apple Canada, which surveyed 251 software vendors across Canada, revealed that 52% of these companies are exporting software, but the majority sampled received 25% or less of their software revenues from exports (Exhibit 5.1.C).

In the same study, 95% of the exporting companies reported that they export to the United States (Exhibit 5.1.D). Not surprisingly, the American market is the largest and easiest foreign market to reach. It is close to Canada, there are established distribution channels through American affiliated or parent companies, and the two countries have similar cultures and standards of living.

The next most popular export destinations are the British Isles, Asia and the Pacific Rim. In countries where cultural differences are pronounced, systems and communication software, as well as, application tools will be more readily exported than applications software. There are fewer cultural barriers to overcome with these products. As a result, these market segments should be positively affected as off-shore markets open up.

5.2 Opportunities For Exporting Software

The following is a list of just a few of the reasons for Canadian software vendors to export software:

1. In order to grow and exploit untapped opportunities, many Canadian software developers will have to export. The Canadian software market which accounts for less than 5% of the world potential, is already crowded and highly competitive. The estimated growth in offshore markets is

between 57% and 300% per year and many potential markets are not yet touched. In the software industry, early market dominance in untapped markets can be an important factor in success.

2. The American software market may provide enormous opportunities for Canadian developers to export. It is close to home, the American market is at least 11 times the size of the Canadian market, and there are relatively relaxed regulations for trade between the two countries. These factors make the United States, by far, the most accessible foreign market. Of course, proximity to the United States creates problems for software developers, as well. Mild domestic regulations have forced Canadian companies to compete at home with large foreign owned companies with great strength in the computer industry.

3. Canada is gaining a reputation as a world-class developer of software. A number of developers like Cognos Inc. and Simware Inc. have become known in the world market for their innovative products. Opportunities still exist in competitive foreign markets for leading edge or innovative products and Canadian software developers have the talent to produce them.

4. It can be argued that no producer is too small to export. The fact that the Canadian software industry is a cottage industry should have no bearing on the viability of exporting software. Small companies like Berrn Research Ltd. of Kingston, Ontario, (which had only 6 employees and $125,000 in revenues in 1983) are able to export to the United States, United Kingdom, and the Middle East. There is a growing number of publicly and privately funded trade missions to foreign markets. Trade shows and joint venture agreements are other instruments which allow small developers access to foreign markets.

5. Exporting of software requires careful planning and considerations, but this can yield valuable by-products, such as improved quality control, earlier exposure to new technologies, more market stability, longer production runs, and more competitive pricing.

5.3 Problems Encountered With Exporting Software

The following are just a few of the many obstacles that Canadian software vendors face when attempting to export their software products.

1. Many Canadian software developers have an adverse attitude toward exporting software. They feel there is too

much risk involved and that too much capital is required. Financiers are often skeptical about providing funding for an intangible product with no track record. Some still advise that a product must make it at home before it can be successful in international markets.

2. There are various government aid programs for the exporting, but few are geared specifically to the software industry. There is no really tangible action being taken toward improving the climate for software export. Government programs like the Program for Export Market Development (PEMD) provide aid for larger companies, but over 80% of the companies in the industry have less than ten employees.

3. Service and support is becoming very important in the sale of software products, but it may be very difficult to provide these in remote markets. Packaging and documentation are also becoming increasingly important in software sales. Software vendors wishing to export may find that they need different versions of their product with different documentation, terms and operating methodologies for the various markets they wish to reach.

4. Canadian software exporters experience difficulty in obtaining critical market research information for the remote markets they wish to reach. It should not be assumed

that even the American market is identical to the Canadian market. It too requires close study. Most Canadian developers want control of marketing their own products, but do not have the financing or expertise to carry it out successfully. There should be more reliance on software publishers, joint venture agreements, and trade missions to aid in marketing.

5. The estimated life cycle for software products can be as short as seven months. Products must reach the market very quickly before they become obsolete. When exporting, distribution channels must be established to provide quick access to foreign markets. Established software publishers and distributors, as well as hardware vendors may be in the best position to provide quick access to export markets. Tapping export markets can, however, significantly lengthen the life cycle of a product. While a product may become redundant in the domestic market, it may very well continue to satisfy needs in foreign markets.

5.4 Software Exporting Aid Programs

Export assistance to computer software companies takes several forms. These include:

* Trade fairs and trade missions abroad.

* Programs to help companies develop, sustain, and increase their exporting activities by sharing the costs of specific export marketing efforts.
* Publications and workshops designed to aid exporters.
* Insurance and financing services.

A. Federal Government Programs:

The Department of External Affairs and the Department of Regional and Industrial Expansion (DRIE) administers two export marketing programs.

1. Program For Export Market Development (PEMD)

This program provides incentives for Canadian firms to enter and expand in foreign markets by sharing the financial risk of entering new markets overseas. PEMD provides up to 50% of the costs incurred by a company in its penetration of new markets. These are repayable if sales are made to that market. Different sections of the program are designed to meet particular export marketing needs. These include: specific project bidding, market identification trips, participation in trade fairs abroad, incoming foreign buyers, export consortia assistance and sustained export market development.

2. **Promotional Projects Program (PPP)**

This program promotes the sales of Canadian goods and services abroad through sponsored projects such as: trade fairs abroad, incoming and outgoing trade missions, incoming trade delegates and buyers.

3. **Other Sources Of Federal Export Assistance:**

a) The Department of External Affairs' global network of trade offices and trade commissioners provides information on tariff and trade negotiations and on opportunities and competition in foreign markets.

b) The Export Development Corporation (EDC) provides insurance and guarantees that protect Canadian exporters and their banks against non-payment by foreign buyers.

c) The Canadian International Development Agency (CIDA) supports Canadian companies investigating industrial cooperation opportunities in developing countries.

d) The Canadian Commercial Corporation (CCC) acts as a prime contractor in government-to-government export sales, matching the requirements of foreign governments and international agencies with the supply capabilities of Canadian firms.

e) Statistics Canada prepares and publishes a variety of statistical data on exports and imports in Canada.

B. Provincial Government Programs

All provincial governments have trade promotional programs and a number have trade centres in the United States, Europe, and Asia. These programs include loans and insurance programs, and incentive programs for participating in overseas trade fairs.

C. Private Enterprise Programs

A number of private organizations exist that provide knowledge of foreign markets and exporting expertise, specifically to Canadian software firms. The National Software Workshop of Canada is one such organization. They offer seminars to educate software firms in exporting to Asia and the Pacific Rim. As well, these firms may sponsor trade missions to foreign markets, help facilitate the development of relationships with foreign buyers and governments, and publish trade catalogues and directories.

National and provincial associations, like the Software Developers Association and the Software Industry Development Association of B.C. (SIDA), exist which offer some exporting assistance. These organizations function primarily as lobby groups to the government. They also provide an environment for information exchange and education in areas including exporting activities.

EXHIBIT 5.1.A

Canadian Software Exporting Revenues 1981 - 1989
($ Millions)

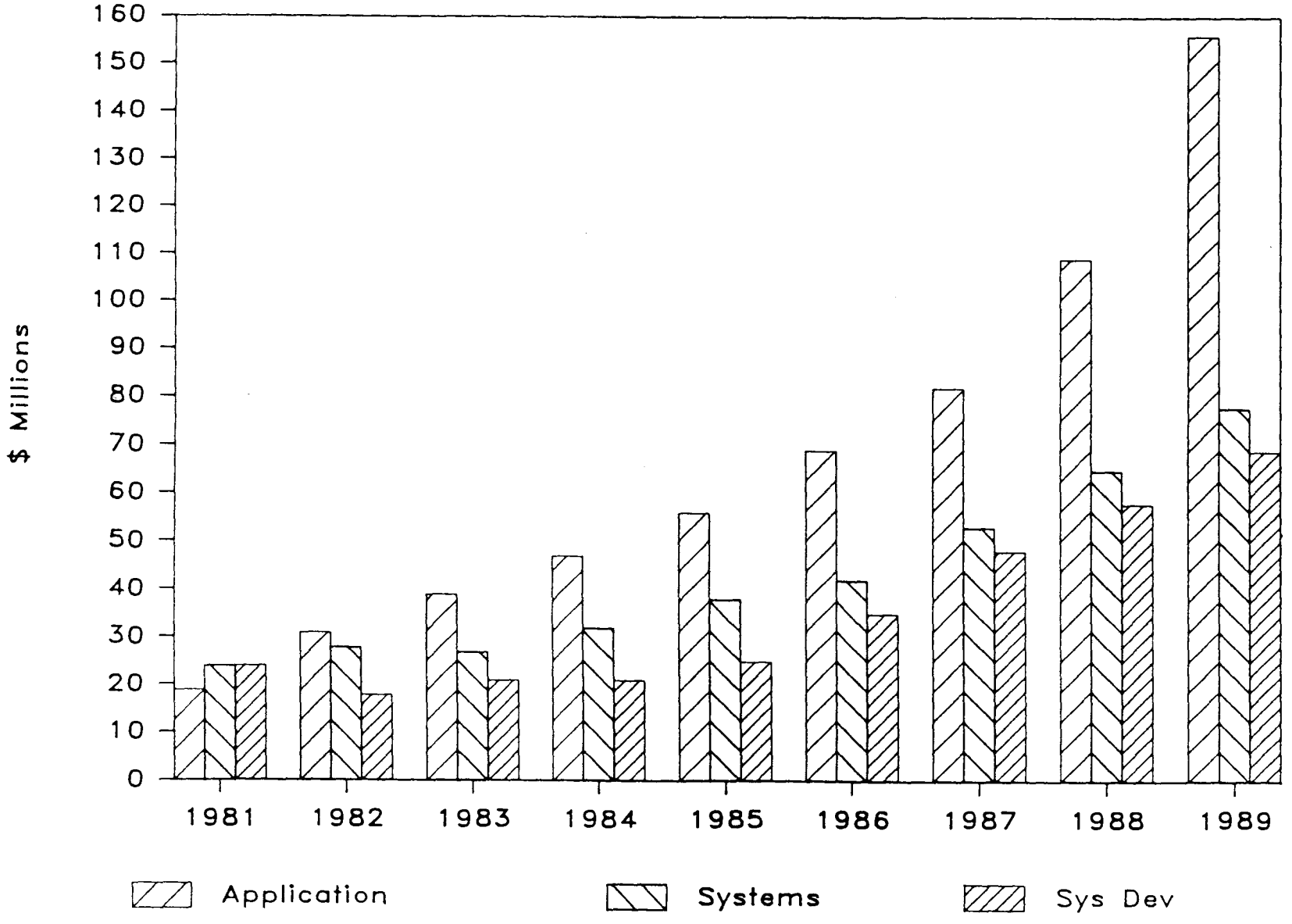
	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total Canadian Software Revenues ($)	464	606	775	970	1215	1495	1845	2275	2720
Annual Growth (%)	37	31	28	25	25	25	23	23	20
Total Exporting Software Revenues ($)	67	77	87	100	119	146	183	232	300
Annual Growth (%)	--	15	13	15	19	23	25	27	29
Exporting Revenues as % of Total Revenues	14.4	12.7	11.2	10.3	9.8	9.8	9.9	10.2	11.0

Total Canadian Software Revenues Annual Growth Rate = 26.3%
Canadian Software Export Revenues Annual Growth Rate = 20.8%

SOURCE: Evans Research Corporation

EXHIBIT 5.1.B

Exporting Software Revenue Forecasts
By Software Type



SOURCE: Evans Research Corporation

EXHIBIT 5.1.C

Percent Of Software Revenues From Exports

Percent of Software Revenues Exported	Percent of Exporting Companies (130 Companies)	Percent of Companies Surveyed (251 Companies)
0 - 25	41.5	21.5
26 - 50	16.9	8.8
51 - 75	11.5	6.0
76 - 100	24.6	12.7
No Answer	5.7	2.8
Total	100.2	51.8

Percent of Companies which Export Software = 51.8%

SOURCE: Software Canada and Apple Canada

EXHIBIT 5.1.D

Destinations Of Canadian Software Exports

Countries Receiving Canadian Software	Percent of Exporting Companies (130 Companies)
United States	94.6
British Isles	36.2
France	16.9
Germany	15.4
Japan	9.2
Australia	6.9
Italy	5.4
Asia/Pacific Rim	17.7
Other	27.7

SOURCE: Software Canada and Apple Canada

6.0 GOVERNMENT ASSISTANCE PROGRAMS FOR THE CANADIAN SOFTWARE INDUSTRY

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6.1 Government Involvement

The debate continues as to what extent the Federal and Provincial governments should be involved in the advancement of the Canadian software industry. The recent change in the Federal government has added to the uncertainty of the government's role.

Canadian governments receive criticism because their programs are not designed specifically to help the software industry, but are geared to helping "high tech" or small business in general. There are inherent differences between the software industry and other manufacturing and service industries. For example, software is an intangible product with a relatively short and unpredictable life cycle. Also, the software industry is made up primarily of small companies with ten or less employees. The software industry operates under its own set of rules and therefore, these general programs are not as helpful as they could be to the software industry.

On the other hand, some software developers feel that heavy government involvement could be detrimental to the industry.

Protectionistic measures against American and other foreign corporations could lead to even more reliance on the small Canadian market and less access to the enormous potential in foreign markets. Certain developers feel that government involvement should remain at "arms length" and let the industry maturation process take its course. Large amounts of government funding is spent on "loser products". Government grants have a history of getting a company off the ground, but have not provided enough support to ensure survival. As a result, many sponsored companies have failed.

Another issue is whether assistance should be aimed at the development of software or at the marketing of software. More companies are attributing their failure in the market, not to the development of a good product, but to the inability to reach the market or stimulate demand for their product.

At least eight of the ten provinces have initiated programs which are specifically geared toward aiding the software industry. Although these efforts are commendable, the lack of coordination by all levels of government may be detrimental to the emergence of a strong national software industry that is competitive in both domestic and export markets.

6.2 Summary Of Programs

Appendix A provides a description of the Federal and Provincial government programs currently offered which attempt to help the software industry overcome some of the difficulties it faces.

There are four major assistance programs administered by assorted departments within the Federal government. While none of these are designed specifically to provide assistance for software development, two of these programs, IRDP (Industrial and Regional Development Program) administered by the Department of Regional Industrial Expansion, and IRAP (Industrial Research Assistance Program) administered by the National Research Council, are geared toward technology development.

Seven provinces specifically gear assistance programs toward software development:

1. B.C.'s Discovery Enterprise Program is directed toward high technology development, with software as a target sector.

2. Quebec provides assistance from two departments (Trade and Commerce, and Communications), and supports four programs.

3. Newfoundland and Nova Scotia offer support programs that target specific vertical markets: software products for oceans industries receive assistance.

4. Prince Edward Island offers a pre-venture fund designed to provide assistance to software developers.

5. New Brunswick has an assistance program in the form of a Venture Capital Fund. Investors in a software development firm may receive support.

6. Manitoba's government administers the Infotech Program that offers aid to software development with Canadian content.

Other provinces provide general assistance programs that may apply to software development.

7.0 SUMMARY OF PROBLEMS AND OPPORTUNITIES IN THE CANADIAN SOFTWARE INDUSTRY

7.0 SUMMARY OF PROBLEMS AND OPPORTUNITIES IN THE CANADIAN SOFTWARE INDUSTRY

The following section summarizes only a few of the more predominant opportunities and problems facing the Canadian software industry.

7.1 Opportunities In The Canadian Software Industry

1. **Cooperative Agreements:** Software firms are forming joint venture or licensing agreements with larger established hardware vendors and software publishers in order to overcome the prohibitive costs of marketing and distributing their products.

2. **Exporting Software:** 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.

3. **Software Support and Services:** Software services such as training programs, support, documentation and maintenance are becoming increasingly important determinants in software

sales. As computerization spreads, less sophisticated users are demanding more complex applications to improve their productivity. This has resulted in an increase in the need for software services. Software firms which may not be able to differentiate themselves by product may be able to do so by the support they provide.

4. **Vertical Markets:** Software vendors are able to find market niches by specializing in vertical market products. As horizontal market software products flood the market, vendors attempt to target specific industry sectors such as the insurance or health care industries and provide software tailored to these industries' specific needs.

5. **Portability and Standards:** Efforts are being made to improve portability and create standards in the software industry for both technical and economical reasons. Improved software portability and standards could result in increased productivity and efficiency of programmers. Less retraining would be required. The costs of software replacement and upgrading may be reduced for end users. Also, software vendors may have access to a larger installed base of hardware with which their software is compatible, resulting in greater market oppportunities.

6. **Market Orientation:** A technically superior software product is not a guarantee of success in the Canadian software industry. More likely, thorough and skillful marketing techniques will lead to commercial success. Companies are becoming more market oriented rather than product oriented in order to compete in this industry. Product awareness, image, promotion, advertising and support become very important purchase factors when there are many similar products on the market.

7. **Government Programs:** Very few federal or provincial government programs are specifically designed to aid the software industry (see Section 6.0). But, a number of more general programs for high technology, small business, and exporting can provide assistance to software vendors by sharing costs of research, development and marketing, by providing education, and by creating investment incentives and tax breaks.

8. **Innovative and Leading Edge Products:** The software industry still has relatively few barriers to entry and as a result is becoming overcrowded 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.

7.2 Problems In The Canadian Software Industry

1. **Competition from the United States:** Due to the proximity of the United States and the relatively relaxed regulations for trade between Canada and the U.S., Canadian software vendors find numerous strong American firms competing in the Canadian market. In 1983, 26 of the top 50 software firms in Canada, by revenues, were American owned and as much as 65% of Canadian software revenues went to American companies.

2. **Structure of the Industry:** The Canadian software industry is highly fragmented and is made up primarily of small companies with 10 employees or less. It is still a cottage industry, but many mergers and acquisitions are occurring. If this trend continues it will result in a more consolidated industry with fewer and larger firms.

3. **Attitudes and Perceptions of Canadians:** Canadian software firms often experience difficulty in selling their products domestically because Canadian consumers perceive Canadian products to be inferior unless they are tested and recognized in the United States. Contrary to this belief, Canadian firms do develop world-class software.

4. **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 are impeding software firms from taking advantage of opportunities in foreign markets.

5. **Cost Considerations:** The enormous costs of software development and marketing are prohibitive to small software vendors in the industry. The estimated cost of software development can be more than $1 million, which may add up to only 20% of the true commercialization costs and all of these costs may be realized even before any sales are made.

6. **Financing:** Canadian software developers continually experience difficulty in financing their endeavours. Bankers do not consider information products like software as satisfactory collateral for loans, while 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 composed of mostly small, new companies and because of its turbulent and unpredictable nature.

7. **Marketing Knowledge and Skills:** Canadian software firms lack adequate marketing knowledge and skills. Small software firms are often comprised of highly technical people that are product oriented. Enormous amounts of capital are invested in the development of a product without any consideration for market demand and steps to commercialization. It is estimated that less than 5% of software products that go beyond the idea stage ever reach the market.

8. **Programming Skills:** A shortage of technical programmers and analysts is being experienced among Canadian software companies and in the MIS departments of other business organizations. In a survey of international members of the Data Processing Management Association, more programmer positions will become available in 1985 than any other MIS positions. Programmer and systems analysts jobs are reported to be the hardest 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.

As well as being a problem for software firms it may also provide an opportunity. Software firms that can offer solutions to corporations may create more business for

themselves. Some of the solutions to the development bottleneck problem that have emerged include; the increased usage of prepackaged applications software, the use of powerful development tools, and the practice of using blueprints of reusable code. Increasing programmer productivity reduces the need for new or additional programming staff, which is an attractive option for many companies trying to control hiring.

9. **Software Protection:** Canadian software protection laws have been strongly criticized as being inadequate and outdated. Millions of dollars have been spent on studies and reports in the area of software protection, but nothing concrete has resulted to better protect software through copyright legislation. The federal government's white paper, which was introduced in May, 1984, deals with a general overhaul of the Copyright Act, but it does not adequately address software related issues and does little to satisfy software developer immediate needs. In the paper, suggested punishments for theft include fines, damages and imprisonment, but these recommendations have yet to be tried.

On the other hand, the Criminal Code has yielded several convictions for theft and fraud. Software piracy can result in a sentence of up to ten years in prison. The law courts

have been quite responsive to software protection needs in Canada, but few legislative changes have resulted. Obstacles still exist in formulating technical and precise rules which offer adequate software protection.

APPENDIX A

FEDERAL AND PROVINCIAL GOVERNMENT ASSISTANCE PROGRAMS FOR THE CANADIAN SOFTWARE INDUSTRY

A. FEDERAL GOVERNMENT PROGRAMS

Industrial and Regional Development Program (IRDP):
The largest program offered by the Federal Government for the development of computer software is the Industrial and Regional Development Program, which is administered through the Department of Regional and Industrial Expansion (DRIE).

Two assistance programs within the IRDP have been cancelled: the Enterprise Development Program (EDP) and the Support for Technology Enhanced Productivity (STEP).

The IRDP presently incorporates the Regional Development Incentive Program.

For the interest of software developers, the IRDP maintains a program element entitled, Innovation. The aim of this element is "To encourage the development of new products, new processes and to increase industrial productivity and international competitiveness through support of research and development projects which show promise of economic success or strategic importance to a region which would not be undertaken without support." (Government Financial Assistance Programs in Canada, 1984)

Support may be granted toward the eligible cost of developing a new or improved product, or a production process that involves significant technical risk; the cost of improving or expanding the technological capabilities of the applicant; the eligible cost of developing a new or improved product that has good commercial prospects; the eligible costs of research and development; and/or the cost of engaging the services of a qualified consultant for market research, capital venture searches, etc., in connection with a proposed activity or project.

This program is divided according to the "tier" into which the applicant falls. There are four designated tiers taken from Canada's 260 census divisions. Each tier reflects the district employment level, district per capita income and provincial fiscal capacity. The four tiers are graded according to the economic need for assistance. Less populated areas are assigned greater contribution levels.

Support may take the form of a grant or a repayable contribution, depending upon the degree of technical risk involved in the project.

Projects carried out in Tier I (including major metropolitan centres, such as Toronto, Calgary, Montreal, Regina, Halifax, and Winnipeg) will receive a contribution that will not exceed 50% of the eligible costs.

Tier II projects, located in districts such as Prescott, Ontario, Nanaimo, B.C., and Quebec City, Que. will receive 60% of the eligible costs.

Projects carried out in Tier III and IV districts, such as Cornerbrook, Nfld., Inuvik Region, NWT, and Pontiac, Quebec, could receive 75% of the costs for the activities and consulting services required.

OTHER FEDERAL GOVERNMENT PROGRAMS

Small Business Loans Program (SBLP):
Administered by the Department of Regional and Industrial Expansion, SBLP provides new or existing small businesses with guarantees on loans. Loans are available for:
the purchase of equipment; the purchase or construction of new premises or the improvement of existing premises; or the purchase of land including buildings.

Industrial Research Assistance Progam (IRAP):
This series of programs is administered by the National Research Council of Canada.

The following IRAP programs may be applicable for software development assistance:

IRAP-L: This program pays a portion of the costs for a firm that requires the services of a consultant. With regards to software, IRAP could pay up to 65% of the consulting costs, up to a maximum of $4,000.

IRAP-M: This is a shared-contribution program;
the company would be required to contribute the same amount as that contributed by the government. Up to $30,000 is available for a program with a one-year duration. Assistance is provided toward the salaries of technical personnel working to solve specific scientific or technical problems. Any organization which does manufacture in Canada, and with less than 200 employees, may be eligible.

IRAP-P: Designed for a longer-term project involving applied research (generally projects which involve substantial technical risk), this program supports the salaries of scientific and technical staff. In general, there is no limit to the financial support that is available, nor is there a time limit, though it was noted that the median amount available is in the range of $300,000 to $400,000 over three years. It should be noted that this program supports only research and development projects, and will not fund market or feasibility-type studies.

B. PROVINCIAL GOVERNMENT PROGRAMS

1. BRITISH COLUMBIA

The Discovery Foundation and Discovery Parks Incorporated administers the Discovery Enterprise Program (DEP) which supports industrial development by providing a pre-venture capital fund. DEP is supported by the province and private sectors, and was established in 1983.

DEP is divided into four sectors: electrical, software, biotechnical, and mechanical/robotics engineering. Each sector is staffed by a review committee consisting of members of that industry. The members form a peer review which evaluate the potential of projects seeking support.

The Discovery Enterprise Program provides capital in the form of a loan with interest, ranging from 6% to 16% (though usually at a rate of 10 1/4% to 11 1/2%), or a debenture, with terms ranging from 3, 5, or 7 years. DEP operates on a 50/50 basis, providing funding for half of the estimated cost, to a maximum of $500,000 per year.

Only those firms manufacturing in the province of British Columbia are eligible for funding.

The first stage of application involves submitting a business plan. Following this, a five-page document is required for the review process, which involves the review committee providing feedback. It could take up to three months for final approval, since the review committee convenes once a month.

To date, about a dozen previously established software companies have received capital from the Discovery Enterprise Program. Amounts ranging from $40,000 to $400,000 have been granted.

The Discovery Foundation reports that the profits accrued through this funding project are sent to the universities in B.C. for research and development projects.

2. SASKATCHEWAN

The Department of Science and Technology administers the Industrial Research Program (IRP). This program was implemented in November, 1984. Only those projects that have received funding through the Federal Government's Industrial Research Assistance Program (IRAP), or the Industrial and Regional Development Program are eligible to apply for funding. The Saskatchewan Department of Science and Technology works in association with DRIE.

Only Saskatchewan-based companies are eligible to receive assistance.

The IRP does not cover salaries, only direct costs. It is not a grant, but based on a standard, signed agreement, with a work statement. The maximum limit for funding is up to 25% of the eligible project costs.

3. ALBERTA

There are no specific programs offered in support of software development. The Advanced Technologies Program, administered by the Alberta Research Council (ARC) offers a program that focuses upon the microelectronics and computing technologies, and automation.

This new program works with industry to develop new industrial capabilities.

There are presently no formal policies developed with regards to the administration of this program, though the ARC intends to provide facilities that would be accessible to acceptable applicants. There is no financial assistance available.

4. QUEBEC

The Province of Quebec offers programs which could benefit software developers located in Quebec. These are offered through the departments of Trade & Commerce, and Communications.

Trade and Commerce offers three programs.

a) Program to support market analysis: The Department of Trade & Commerce will share (50%) of the cost of a market study with a company. If the study confirms potential in an area, support can be offered through the following program.

b) Research & Development Program: This program applies to existing companies and new businesses that are involved with high technology enterprises. The Department of Trade & Commerce offers an interest-free loan for a five-year period. For established firms undertaking a new project, a maximum of $1 million is available. New companies can expect support of $100,000, with a maximum of $1 million for exceptional projects. Established firms dealing in the areas of telecommunications, microelectronics, or software can expect support without any maximum ceiling. Payment of this loan is taken as a percentage of each sale made of the product developed.

An additional program offered by the Department of Trade & Commerce is similar to the Program for Export Market Development offered by the Federal Department of External Affairs. For firms with significant sales growth, the Province of Quebec offers a grant to develop a marketing plan and to support prospecting in international markets.

The Department of Communications offers two programs that provide support for software development. The AGIR program (Actions Gouvernementales d'Intensification de la Relance) came into effect in June, 1984, and supports:

a) Communications Applied Research Assistance Program: This program is primarily intended for applied research in the areas of data processing, including the development of software and databases. The projects must be involved in the creation or improvement of goods or services for commercial purposes.

Assistance is in the form of a subsidy; a maximum of 50% of admissible expenses may be granted to a maximum of $500,000. The projects must involve a total investment of at least $50,000, which includes the subsidy granted. Admissible expenses include all costs directly related to the project: fees for consultants, salaries of professionals, the rental or purchase of equipment, etc.

b) Assistance for Computerizing Communications firms: This second assistance program has three objectives:

-to increase productivity;
-to improve the quality of goods and services;
-to increase the ability to sustain competition.

Organizations in the following areas of the communications industry may qualify for assistance:

- press, radio, television, telecommunications, electronic information, data processing, and new communications service

All applicants must be established businesses in the Province of Quebec. There are two phases to this program:

Access to expert advice: Fees related to the use of consultants' services (i.e. for feasibility studies, etc.) will be supported to a maximum subsidy of 50% (up to $50,000 per project).

Acquisition of software and computer equipment: The objective of this phase is to help to defray the costs of computer equipment and software. The maximum subsidy is 50%, up to $50,000.

For all Department of Communications support programs, there are specific requirements made of the firm making application for assistance:

-Projects must be analyzed with respect to the problems that could have been encountered;
-All projects must have stated objectives;
-A target market for the end-product must be projected;
-Studies that have been undertaken to determine market conditions, project feasibility, etc., must be thoroughly described.

A recent example of the support offered by the Quebec Department of Communications is a grant given to Logiciels Micro Tempus of Montreal: Logiciels will spend $860,000 on applied software research in the area of communications between large mainframe computers and microcomputers. The Quebec Department of Communications provided a grant of $393,000.

5. NEWFOUNDLAND

There are no specific programs aimed at providing financial assistance to software developers. There are a few programs that may support the development of software if it is related to a specific area, such as ocean industries.

Ocean Industries Capital Assistance Program: Eligible service industries, such as those that provide maintenance and repair of electronic, communications and navigational equipment, and computer software for ocean industry use, could receive grants up to 50% of approved capital costs. The Regional Industrial Development Program of the Federal Government works in conjunction with this program; any support gained through this program would be deducted from the amount available through the Newfoundland Department of Development. The grants are forgivable over a four-year period at a rate of 25% per annum.

Another program, the Market and Product Development Program (MAPD) could apply, though only Newfoundland and Labrador-based companies that produce manufactured items, or items from processing a natural resource, are eligible for assistance. An outright grant for up to 50% of the project costs (to a maximum of $50,000; 75% for small projects) is offered to offset the costs of research and development of a new product, the promotion of existing products in new markets, or travel costs related to marketing of products.

6. PRINCE EDWARD ISLAND

There are two programs offered by the Province of P.E.I. which may provide assistance to software developers resident in P.E.I. These are general programs available to businesses, but the two cited below specifically provide assistance to firms involved in the development of computer software.

a) Pre-Venture Fund: The stated objective of this program is to develop new and expanding business in P.E.I. by providing grants to individuals or businesses to assist with costs of proving ideas and establishing a new business or expanding an existing business.

A maximum grant of $25,000 may be provided for an approved project, though typically grants of $10,000 or less have been awarded. The amount of assistance is dependent upon the project potential and the availability of funds.

In particular, this program provides support for the development of computer software, with the provision that this activity is in support of "computer hardware manufacturing". The original intention of the province was to encourage the manufacture of computer hardware products in P.E.I., but this activity was not generated. Instead, P.E.I. will examine all applications for software developers, and are specifically interested in a project that will result in a broadly marketable software product.

b) Small Business Equity Program: The objective of this program is to provide improved opportunities for small businesses through the provision of equity capital for expansion, or to bolster cash flow for expanding firms, or for those to be established.

   There are specific criteria that must be satisfied for project approval. It must have:

   -job creation potential;
   -economic significance to P.E.I.;
   -the potential for improved earnings;
   -the ability to redeem preferred shares on schedule.

Assistance takes the form of a preferred share investment; the P.E.I. Development Agency may purchase up to 40% of the total equity of a firm, up to $100,000 in non-voting preferred shares. This assistance is to provide financing without adding a debt burden to a small business, with less than 100 employees, and less than $5 million in sales.

Eligible firms include those concerned with software development. Despite the fact that the actual cabinet description of the program covers only software that supports computer hardware manufacturing (as in the above program), this program, will also include projects that will develop any marketable product.

An additional program offered by P.E.I., which does not specifically cite software development as an eligible activity, but which could support such a project, is the Investment Incentive Grant. If a new or expanding firm is making a minimum capital investment of $50,000 in fixed assets and has a project that will create a minimum of three jobs, the firm may be eligible to receive a grant of up to $8,000 per job created. The grant is limited to providing 50% of the annual salary for each job, and will go to a maximum of 50% of the capital assets of the firm. The total grant for any one project will not exceed $400,000.

7. NOVA SCOTIA

A number of general assistance programs offered by the province of Nova Scotia, have some particular significance to software developers in the province.

The Small Business Development Corporation has as its objective the creation of jobs through the enhancement of private business and the protection of existing employment. Nova Scotia considers firms involved in research and development and high technology to be of particular importance. Among the criteria examined in this program are the economic viability of the applicant, adequacy of management, net economic benefit of the project to the province, the number of jobs to be created in Nova Scotia, and a minimum equity position of 20%. Eligibility is dependent upon the applicant having less than $2 million in annual sales, less than 50 employees, and needing assistance of more than $5,000 but less than $250,000.

Similar to the Ocean Industries program offered by the province of Newfoundland, Nova Scotia has established the Ocean Industries Innovation Centre to provide support (financial, advice, etc.) toward technology enhancement, product development, etc. The level of financing is dependent upon the needs of the applicant and the nature of the project; usually no more than 75% will be offered.

The Product Development Management Program (PDMP) is available to assist Nova Scotia manufacturers and processors to upgrade the design quality of existing products, or develop and market new products. The PDMP provides 50% of the approved cost, to a maximum of $2,000 for market studies and industrial design, and 50% of the approved cost, up to $7,500 toward the cost of constructing and testing prototypes.

8. ONTARIO

Software developers can seek assistance from general support programs. The Ontario Development Corporation which provides financial assistance in the form of loan guarantees, term loans, or export support lines of credit, may be available. The Small Business Development Corporation, which was established to encourage equity investment in Ontario-based small businesses, may provide support for software development.

The Ontario Ministry of Education may provide assistance to software developers who provide exemplary software programs which provide capabilities for the Ontario Ministry of Education microcomputers. All software must meet the needs of the curriculum. In 1984, $5 million was allocated for software development. This amount will be increased in 1985. To date, approximately 100 packages have been funded in this manner. This program is administered in a contract manner: payments are made according to the stages of development that are reached. The amount of a project depends on the amount of work involved. All terms are negotiated.

All funding programs administered through the Department of Industry and Trade are currently under review.

In April, 1985 the Ontario Government announced the opening of the Software Development Assistance Centre to be funded by the Board Of Industrial Leadership and Development (BILD) under the Ministry of Industry and Trade. It proposes to promote development of computer aided learning materials for microcomputers approved for Ontario schools. As well, it proposes to co-ordinate support to software developers and act as a clearing house for information. So far, the Icon is the only microcomputer that has been approved for Ontario schools.

Ontario's six technology centres were established under the direction of BILD and the High Technology Centres Act. Three of these include the Ontario Centre for Microelectronics, the Ontario Centre for Advanced Manufacturing - Robotics, and the Ontario Centre for Advanced Manufacturing - CAD/CAM. The purpose of these centres is to provide research, design, and new product development through research funding, joint venture funding, and information services, etc.

The IDEA Corporation is an Ontario Crown corporation, reporting to the Minister of Industry and Trade, and is also funded by BILD. Its purpose is to encourage and finance the commercial development of technological innovations. It has four business operations: pre-venture capital, venture capital, technology transfer and licensing, and public education and policy advice.

9. NEW BRUNSWICK

The province of New Brunswick administers general assistance programs for industry and small business. In particular, N.B. provides the Venture Capital Support Program (VCSP), which was

established in order to encourage the investment of venture capital in "certain strategic industries". Of the industries cited, the VCSP notes that assistance may be available to Venture Capital firms for investment in operating companies where the "principal activity is in the knowledge and information development business (i.e. software development, video and movie development, and research and development) if their products are primarily market oriented and not custom made".

The only eligible form of investment by the Venture Capital firm is in common shares, non-cumulative preferred shares and non-interest bearing subordinated loans. The investment is not to replace any previously-issued common or preferred shares, but must be a new investment. A Venture Capital firm must have a minimum equity of $50,000, must be incorporated and primarily involved in making equity investments in other firms, and must be registered with Provincial Holdings Ltd. as a venture capital firm. VCSP maintains specific stipulations regarding the relationship that the Venture Capital firm can establish with an eligible company.

10. MANITOBA

The Manitoba government administers several general assistance programs for high technology, industry, small business and trade. The Manitoba Graduate Scholarship Program is designed to encourage technology and science skills. It awards eight scholarships a year to graduate student research in technology and science.

The Strategic Research Support Program is also designed to encourage and promote growth in technology research across the province. The first section awards research grants to individuals (not organizations) that are associated with universities in four research areas including electronic communications technology. The other section provides contract support for industry work in electronic communications technology.

The Technology Commercialization Program is designed to help bring leading edge technologies to the market. Section one provides new business assistance by helping entrepreneurs find office and manufacturing space, as well as providing technical support and business advice. Section two is designed to provide financial support for development. It provides $20,000 to

$200,000 and the client must provide at least 25% of the cash flow. Repayment is by percentage of the royalties once the product reaches the market. The third section is designed to aid in technology transfer from government, private laboratory, and universities to industry.

The Manitoba Trade Branch assists companies in export marketing, by organizing trade missions and sponsoring booths at trade fairs like the Montreal International Market this spring. The Trade Branch also provides data base services and publications which list companies that provide goods and services in communications.

The Infotech Program has three major thrusts: Technology tranfers to educational, office and public information markets, software/content and development, and technology pilot project support. The Educational Technology Program (ETP) offers support to educational software products with Canadian content, and works cooperatively with major computer manufacturers, the Department of Education, and the Manitoba Job Fund to provide equipment and people to support computers in education. The ETP is unique in its involvement with the private sector. The Office/Public Technology Program, still under development, will take a proactive role in creating awareness of office and public technology potential, create new business opportunities, and aid in pilot projects, software development, market assessment, and support services.

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