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CANADA'S EXPORT STRATEGY

The International Trade Business Plan

1995/96

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***An Integrated Plan for Trade, Investment
and Technology Development***

The International Trade Business Plan is made up of an **Overview** highlighting Canada's international business development priorities, and a series of **Industry Sector Strategies**, which include lists of planned international activities. The following documents are available:

- Overview
- 1. Advanced Manufacturing Technologies
- 2. Agriculture and Food Products
- 3. Aircraft and Parts
- 4. Automotive
- 5. Biotechnologies
- 6. Business, Professional and Educational Services
- 7. Chemicals, Plastics and Advanced Materials
- 8. Construction Products
- 9. Consumer Products
 - Apparel and Fur
 - Textiles
 - Footwear
 - Sporting Goods (including recreational watercraft)
 - Tools, Hardware and Housewares
 - Residential Furniture
 - Business and Institutional Furniture
- 10. Cultural Industries
- 11. Defence Products
- 12. Environmental Equipment and Services
- 13. Fish and Sea Products
- 14. Forest Industries
- 15. Information Technologies and Telecommunications
 - Sector Overview
 - Computers and Peripheral Equipment
 - Electronic Components
 - Geomatics
 - Instrumentation
 - Software Products and Computer Services
 - Telecommunications
- 16. Medical and Health-Care Products and Services
 - Medical Devices
 - Pharmaceuticals
 - Health-Care Services
- 17. Minerals and Metals
- 18. Oil and Gas Products and Energy Equipment
- 19. Power Equipment
- 20. Primary/Secondary Industrial Machinery
 - Mining, Forestry, Pulp and Paper
 - Agricultural Technology, Machinery and Equipment
 - Ocean and Marine Shipboard Technology
- 21. Rail and Bus Equipment
- 22. Space
- 23. Tourism

For information on how to receive the Overview, or additional Industry Sector Strategies, please call: **1-800-267-8376**

All monetary figures in this document are expressed in Canadian dollars unless otherwise indicated.

© Minister of Supply and Services Canada 1995
Cat. No. C2-226/16-1995E
ISBN 0-662-22849-9

Aussi disponible en français sous le titre Technologies de l'information et télécommunications.



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Sector Overview

The information technologies and telecommunications (IT&T) sector includes telecommunications products and services, computer hardware, software products, information management, computer services, electronic components, geomatics products and instrumentation. IT&T is one of the most important industrial sectors in Canada, with revenues in 1992 exceeding \$43 billion. The sector conducts 35 percent of total research and development (R&D) in Canada, and directly employs more than 320 000 people in some 13 000 firms across the country. The IT&T sector is also one of our most competitive.

The importance to Canada of exporting is well understood. Nowhere is this more evident than in the IT&T industry, where exporting is necessary not just for the prosperity, but for the survival of its firms. If Canada is to grow and prosper, this sector must develop a co-ordinated export strategy aimed not only at the United States, where 78 percent of products and services are currently shipped, but at other markets as well.

International Environment

Currently, North America represents 47 percent of the world market, Europe 32 percent and the Asia-Pacific region 18 percent. Half of the world's population is in the Asia-Pacific region, where the use of IT&T is growing at 20 percent annually. China's economy is expected to exceed the U.S. economy in total size by the year 2015. By the same year, countries within the Association of Southeast Asian Nations (ASEAN) are expected to have 150 million people with middle-class incomes (Source: *INPUT*). Canadian firms must learn to broaden their sights. In the world at large, the IT&T market is expected to exceed \$3.2 trillion by the year 2000, building on current global base revenues of \$1.9 trillion. Canada's share is now 3 percent. By the year 2000, the IT&T sector will account for nearly \$1 of every \$6 of global gross national product (GNP) (Source: SRI International).

The IT&T sector increasingly operates in a new, more open, global trade environment, characterized by multilateral agreements and

relaxation of domestic regulations worldwide. The conclusion of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) negotiations last year is one example. Of particular importance to the sector, the new World Trade Organization (WTO) should help to curb breaches of intellectual property rights, which are particularly damaging to the software industry. The accession clause under the North American Free Trade Agreement (NAFTA) can also facilitate the inclusion of other Latin or Central American states, perhaps as early as 1996. Many trading partners in Europe, Latin America and Asia are liberalizing their investment and competition laws and regulations, particularly in the telecommunications sector. There is an increasing need for both voluntary and mandatory standards to open the global marketplace. The information infrastructure programs announced in the U.S. and elsewhere recognize and plan to capitalize on the enabling effect of information technologies and telecommunications as an engine of economic growth. Canadian companies face a strong challenge, but also unprecedented opportunities, if they are willing to venture into the global marketplace.

Strategic Direction

In the rapidly changing global environment, the challenge for governments is to focus their activities where they will produce the greatest benefit to clients. Two types of information have been used to identify geographic priorities for trade develop-

ment over the coming year. First, eight key studies conducted over the last two years were reviewed, which identify four types of assistance required by firms, depending on their degree of export readiness. This information has been used to shape the nature of government intervention over the next year to assist exporters and would-be exporters. Second, trade data from Statistics Canada have been used to identify the countries and regions where Canada has a large volume of trade, and where the rate of growth is fastest.

Business needs from government can be grouped under four headings: strategic market intelligence; strategic brokering; project financing facilitation; and tactical intervention. The type of assistance firms need to help them export successfully varies considerably according to the size and type of company, their geographic interests, motivation and commitment to exporting. As Figure 1 shows, all large, and nearly all medium-sized enterprises already export, while most small enterprises do not export at all. To increase the number of firms exporting, and the volume of exports, government activities will focus on helping small- and medium-sized enterprises (SMEs) that are ready to begin exporting, and those that wish to expand into new overseas markets. At the same time, government will continue to assist larger firms that require specific tactical assistance that only governments can provide.

Our analysis and consultations with the private sector and provincial governments have identified the following strategic directions for government in 1995-96. Table 1 presents the proposed federal government response. These proposed actions will not be completed in a single year, but will form a basis for continuing international business development in the coming years.

Geographic Priorities

According to Statistics Canada, Canada's total IT&T exports rose by 76 percent between 1988 and 1993, from \$6.5 billion to \$11.4 billion.

Figure 1 — Distribution of Exporting IT Manufacturing Establishments

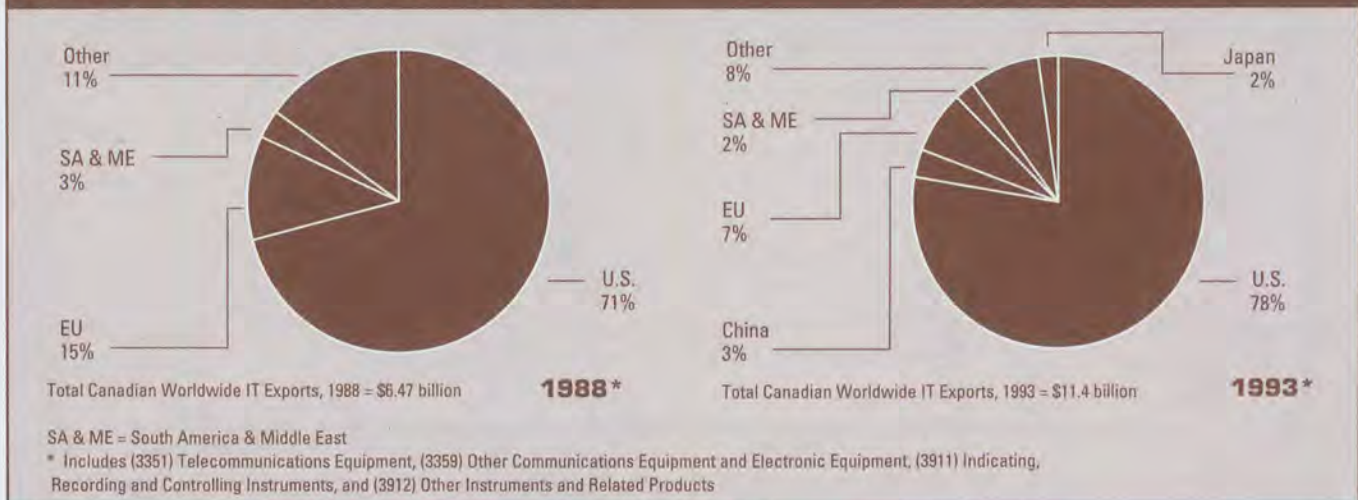


Source: Statistics Canada

Canada's customer base is also changing, as shown in Figure 2. The United States is Canada's largest market, and exports have grown proportionally more than average, from 71 percent to 78 percent of the total. Our second-largest customer, the European Union (EU), is becoming relatively less important: exports have dropped 17 percent over the last five years, from \$999.2 million to \$837.3 million. In contrast, there have been dramatic increases in exports to Japan and less traditional markets. China and Mexico have become major trading partners, followed closely by other Asian, Latin American and Eastern European nations.

Figure 3 plots the absolute size of several markets in 1993, against the growth in the proportion of Canadian exports to those countries. The chart is divided into six sectors. On the vertical axis, the dividing line is drawn at a point representing 100-percent growth over the last five years — the average for the sector. This divides the chart into above-average and below-average growth regions. Along the horizontal axis, two lines are drawn at \$50 million and \$200 million in 1993 exports. These lines divide the chart into small, medium and large markets, in terms of absolute size. A quick look at the chart will allow the reader to classify countries or geographical regions as small,

Figure 2 — Distribution of Canadian IT Exports



Source: Statistics Canada

medium or large above-average growth areas, or as small, medium or large below-average growth areas.

This analysis, supplemented by information provided by Canadian missions abroad and market research reports from the U.S. National Trade Data Bank, suggests that the geographic regions offering Canadian IT&T companies the greatest opportunity are East and Southeast Asia, Latin America and Eastern Europe. These general projections should, however, be read in conjunction with the more industry-specific information found in the subsector chapters of this report. In general, the following countries appear most attractive for IT&T:

United States: Canada's largest market (\$8.9 billion) remains the most attractive to all subsectors because of its size, geographic and cultural proximity, established relationships, and the continued beneficial impacts of the NAFTA. DFAIT will encourage new exporters to get their feet wet in the U.S. market by using the New Exporters to the U.S. South (NEXUS) program, will assist with trade shows and missions, and will provide tactical assistance as required.

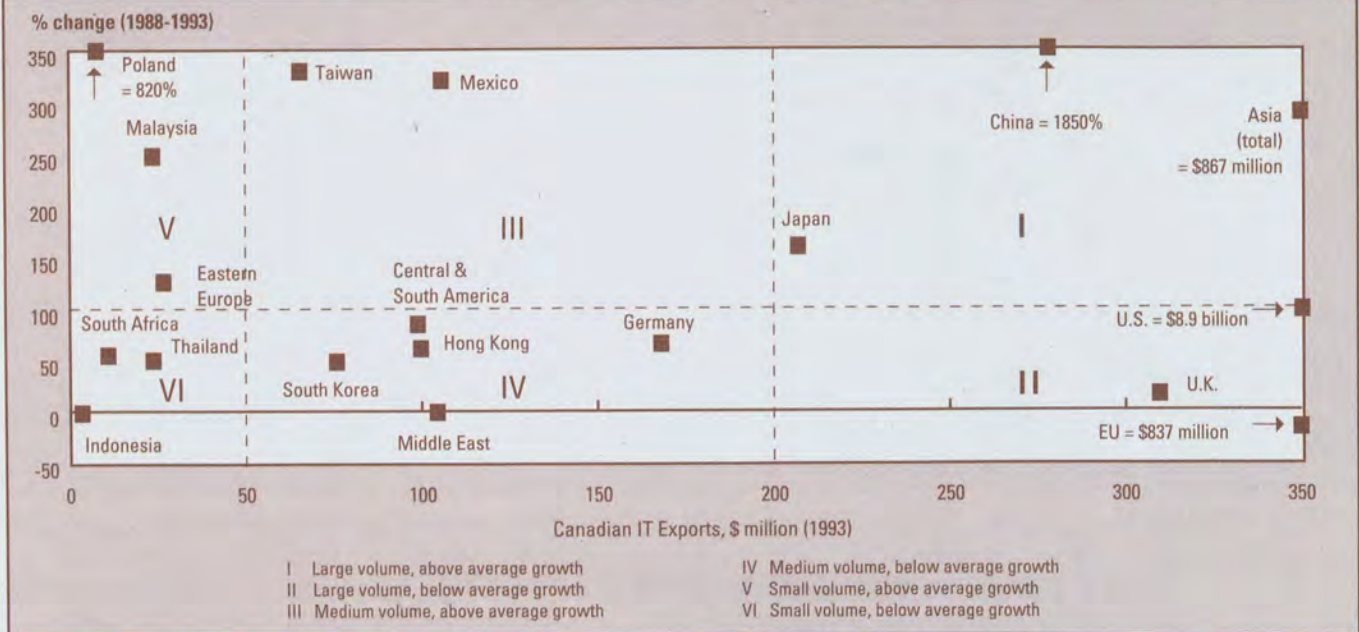
China: Between 1988 and 1993, China's IT&T market grew by 1850 percent to a current

total of \$277 million. Government-to-government memorandums of understanding (MOUs) have resulted in significant success for Canada. Subsequent high-profile visits, such as the November visit of the Prime Minister and Premiers, have improved Canada's profile. Commercial agreements and sales have followed, particularly in the telecommunications and components subsectors. China also has massive requirements for geomatics products and services. IFI funding is available for many projects in China.

Japan: Canadian exports to Japan have seen dramatic growth over the last five years, and Japan is a stronger Asian market than China for computers and peripherals, components, and software and services. Continued efforts will be made to help firms identify opportunities, to develop R&D agreements and partnering possibilities, and to provide information on how to do business in this important market.

Mexico: Growth continues to be strong in the Mexican market, with a 320-percent increase over the last five years. The strongest sectors are telecommunications and computers and peripherals. The NAFTA and resulting rapid liberalization are expected to produce a fast-growing market.

Figure 3 — Percentage Growth in Canadian IT Exports (1988-1993)



Source: Statistics Canada

Taiwan: Taiwan is approaching developed nation status, and continues to enjoy high growth rates in the overall economy and in the IT&T sector. For example, the telecom authority has aggressive infrastructure plans, with spending of US\$10 billion expected by 1997, and deregulation will produce strong opportunities in broadcasting and cable TV. Taiwan can also provide valuable experience for firms considering later expansion into the Chinese market.

Southeast Asia, Latin America, South Africa and Eastern Europe: These regions show strong growth, although they start from a weaker base than the nations mentioned above. All have growth rates in the hundreds or thousands over the last five years, and rapidly changing economies with the potential for expansion. Liberalization in Latin American and Southeast Asian telecommunications, the reopening of South Africa and the development of market economies in Eastern Europe all provide new opportunities. These regions are also priorities for IFI projects.

Note: Due to space limitations, information has been condensed. Additional information is available from the contact noted in each subsector.

Table 1 — 1995 IT&T International Business Development Plan

Category	Identified Need	Strategic Direction	Responsibility
Market Intelligence	Tools to locate and make global marketing information available to clients	Establish electronic directories and profiles of global information sources	Industry Canada (IC), Department of Foreign Affairs and International Trade (DFAIT)
	Sector-specific regional market intelligence	Establish geographic focus groups to assess and meet client needs; market studies; mentoring programs for new exporters	IC, DFAIT
	Timely information on agents/distributors in priority regions	Redirect efforts toward providing agent/distributor information	IC, DFAIT
	Pathfinders for sources of government programs, representatives	Develop and improve electronic directories, fax-back systems; tie to single-window initiatives; enhance federal-provincial co-ordination	IC, DFAIT, provincial governments
Strategic Brokering	Cross-cultural research to improve market penetration in priority regions	Produce "How to..." guides for Asia and Latin America on a subsector basis	IC, DFAIT
	Focused sector strategies on a country-by-country basis; joint government/private-sector planning	Hold "Canada only" sector-specific events as part of development assistance (e.g. rural telecom seminars)	IC, CIDA Inc.
	Expanded private-sector participation in training and development agencies	Expand Telecommunications Executive Management Institute of Canada (TEMIC) recruitment activities; extend to broader range of IT&T sector training	IC, Canadian International Development Agency (CIDA), DFAIT
	Identification of technology in applications required targeted regions and potential partners	Undertake specific market studies and analysis; provide information to companies	IC, DFAIT
Project Financing Facilitation	Improved access to international financial institutions (IFIs)	Provide ready access to IFI information, assessments of IFI projects that are realistic targets for Canadian suppliers/subsuppliers	IC, DFAIT
		Assist in consortium building, identifying and developing suppliers for the IFI market	IC, DFAIT

Category	Identified Need	Strategic Direction	Responsibility
Tactical Interventions	Government-to-government relationships with selected countries	Develop bilateral accords, memorandums of understanding, R&D agreements	IC, DFAIT
	Systematic tracking of new Canadian technology developments, information to missions in target markets	Co-ordinate with agendas of other Canadian trade promotion organizations and missions abroad; develop information sources	IC, DFAIT
	Canadian access to markets through standards work	Participate in standards forums; facilitate access to standards databases; enable mutual recognition agreements	IC, DFAIT
	High-level lobbying efforts by executives	Develop a tracking system for high-level interventions; provide link to contact and project opportunities database	IC, DFAIT

Computers and Peripheral Equipment

The computer and peripheral equipment industry is a grouping of companies that manufacture electronic products used in various computing applications. Two important classification criteria to be used in this determination are: a) the product must be designed to be integrated within a computer expansion slot; and b) the product must be distributed through computer wholesale or retail channels. Unfortunately, several countries, including Canada, are finding the task of classifying computer goods within the appropriate industrial and harmonized trade classification code increasingly challenging. Much of this difficulty is brought about by the rapid technological convergence of analog and digital processing equipment. Computer technology is converging with the consumer electronic industry (household computers, monitors, HDTV, CD-ROM, and electronic games) and the telecommunications equipment industry. This transition is a natural one, and reflects the evolution of the analog telecommunications industry into a large distributed digital computer network. To respond to these issues, Industry Canada (IC), in partnership with other federal and international departments, will strive to ensure further harmonization and conformance with international trade and industrial classification systems. However, for the purpose of this report, computer and peripheral equipment constitutes the following:

- **Electronic computers** include super-computers, mainframes, mid-ranges, minis, personal computers (PCs), work stations, laptops and others.
- **Peripheral equipment** interfaces with or plugs into computers via a parallel or serial cable, and is often referred to as input-output devices. Peripherals include printers, plotters, joysticks, mouse, and desktop and handheld scanners.
- **Computer storage equipment** usually includes devices that store digital bits of information data whether or not the power is on. Secondary memory products include hard drives, floppy drives, optical disk drives and larger storage (disk arrays) subsystems.
- **Loaded computer processor boards** are fully populated and unpackaged computer subsystems that snap into mainframe, mid-range, PC, and work station expansion slots located on the motherboard. These are usually application specific, and include computer motherboards, video boards, audio boards, process controller boards, local area network (LAN) interface boards (Ethernet, Token, FDDI, mainframe emulation), telecommunication network interface boards (fax, ISDN), and other peripheral performance-enhancing boards (SCSI).
- **Computer terminals** are a hybrid between an output device and a work station. Within this environment, the terminal acts as both a display and an input device. Data processing is usually located on a remote computer, with complex video generation and communication processing allocated to the terminal. The most prominent distinction between a computer and a terminal is the latter's lack of a CPU microprocessor.

In an effort to provide some international context for Canadian production and international trade patterns, this report refers to several public and private sources of statistics and research. Readers should note that inconsistencies between figures and charts may appear, but are largely due to methodological and definitional differences between data sources. The specific deviations range from differences in product classifications and sampling techniques, to real-life categorization constraints, such as the distinction between

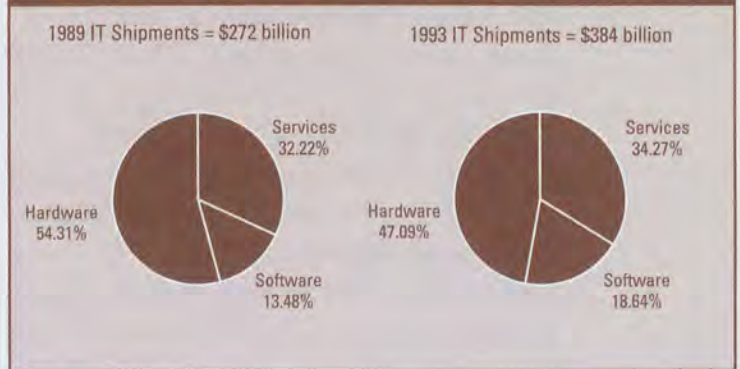
company classification versus establishment classification. A notable example of the latter is the treatment of IBM Canada. Although the largest producer of computer equipment parts in the country, it is currently considered a computer software and services company. Its manufacturing production is included within Canadian production and trade statistics; however, the financial statistics are not included in the computer and peripheral equipment industry foreign ownership analysis.

International Environment

Over the last two decades, the international information technology (IT) industry has grown considerably. Even over the last recessionary period, International Data Corporation (IDC) estimates that the IT industry, which encompasses computer services, software and hardware, has grown from \$272 billion in 1989 to over \$384 billion in 1993. However, as Figure 1 indicates, the software and hardware composition of the market pie has changed.

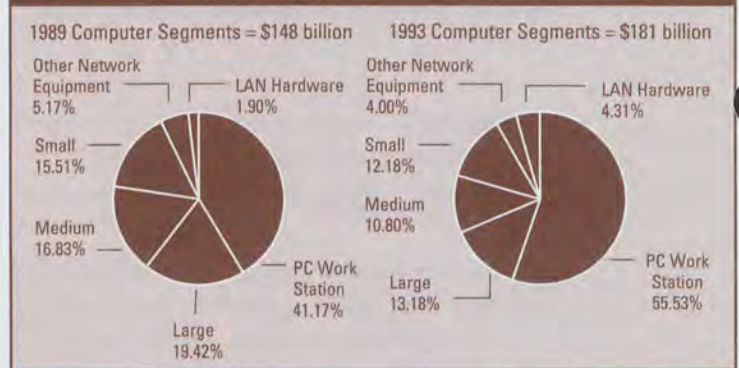
Although computer hardware revenues may be diminishing as a share of this growing industry, it is important to note that unit shipments are growing much more quickly than revenues, a trend that can largely be attributed to three factors. First, large and expensive mainframe revenues are quickly shrinking due to their proprietary nature — users are demanding increased openness between competing systems, and access to a wider selection of software programs. Second, the rapidly increasing performance of PCs and Reduced Instruction Set (RISC) work stations offers very high performance value that not only rivals but has surpassed that of larger system vendors. However, the greatest impact on revenues has been the dramatic shift in the industry's operating margins. A decade ago, large computer system vendors were few in number and hence benefited from near monopoly profit margins. While unit shipments of PC work stations have never been

Figure 1 — Major Worldwide IT Segments



Source: International Data Corporation

Figure 2 — World Computer Hardware Revenues



Source: International Data Corporation

higher, the entry of a large number of competitors has led to much narrower profit margins. As Figure 2 demonstrates, even over the past five years demand has shifted steadily from mainframe (large) and mid-range (medium) to work station and PC, as well as LAN equipment.

The above trends are also evident in unit shipments. Between 1989 and 1993, annual mainframe shipments shrunk from 4142 units to 2423 units (approximately a 10-percent decrease in annual growth), while shipments of medium-sized mainframes decreased from 56 390 to 31 895 units (approximately an 11-percent decrease in annual growth). However, these negative trends have been more than offset by

the phenomenal growth of work station and PC unit shipments, which almost doubled, from 21.4 million units in 1989 to 36.7 million in 1993 (approximately 17-percent annual growth).

While PC and work station unit shipments have averaged approximately 17.8-percent annual growth over the last four years, annual revenue increases over the same period have averaged 16.2 percent. Therefore the average shipment price per unit has decreased slightly, while over the same period of time, performance has increased substantially. In terms of the future growth prospects for the industry, Dataquest forecasts that the compounded annual growth rate for all segments of the industry from 1993, up to and including 1998, will be 5.7 percent. Industry Canada expects that the increasing performance of PCs and work stations, as well as the growing proliferation and flexibility of computer networking equipment, will continue the shift toward smaller, but more powerful systems. While the classification methodology between IDC and Dataquest differs somewhat, the Dataquest data-processing equipment forecast is indicative of the future international trend of the industry.

Many of these structural shifts will further benefit Canada's growing PC/work station-related equipment manufacturers. A review of a small

sample of international computer firms (see Table 1) demonstrates that those firms offering small-scale systems (work stations and PCs) have been profitable over the last several years. It is the monolithic computer companies such as IBM, Digital, Amdhal, and Groupe Bull with their portfolio of large-scale systems that have splashed red ink over the financial performance of the industry as a whole. Conversely, many opportunities will present themselves to nimbler and more innovative Canadian small- and medium-sized enterprises (SMEs) that demonstrate technological excellence and develop products for the rapidly growing PC/work station market.

Within the computer industry, technology has always played an important role. It was not long ago that computers were primarily the domain of large corporations. Direct marketing was carried out by these firms and was mostly aimed at coveted key buyers within large Canadian companies as well as multinational enterprises (MNEs). However, with the shift away from mainframes and the rapidly increasing competitiveness of PCs and work stations, high growth markets are now found within the ranks of private consumers, small businesses, and large businesses as they convert to more user-friendly client-server systems. The move toward inexpensive microprocessor

Table 1 — Sample of Mainframe and PV/Work Station Vendor Worldwide Revenue and Net Income Before Taxes (US\$ million)

Name	1988		1989		1990		1991		1992		1993	
	Rev.	NIBT	Rev.	NIBT	Rev.	NIBT	Rev.	NIBT	Rev.	NIBT	Rev.	NIBT
Apple	4 071	656	5284	744	5 558	779	6 309	450	7 087	140	7 977	140
Compaq	2 100	367	2876	485	3 599	641	3 271	154	4 100	295	7 191	616
HP	9 831	1 142	11 899	1 151	13 500	1 162	14 494	1 127	16 427	1 325	20 317	1 177
Dell	258	21	389	8	546	44	890	73	2 014	143	2 873	(39)
Sun	1 052	111	1 765	78	2 646	124	3 221	284	3 628	173	4 309	224
Amdhal	1802	361	2 101	255	2 159	307	1 702	7	2 525	(14)	1 681	(714)
Digital	11 475	1 741	12 742	1 421	12 943	74	13 911	(617)	14 027	(3)	14 371	(251)
IBM	59 700	9 033	62 710	6 645	69 018	10 203	64 792	121	64 523	(9 026)	62 716	(8 797)
Bull	N/A	N/A	5 124	(28)	6 406	(1 383)	5 930	(587)	5 706	(871)	4 989	(855)

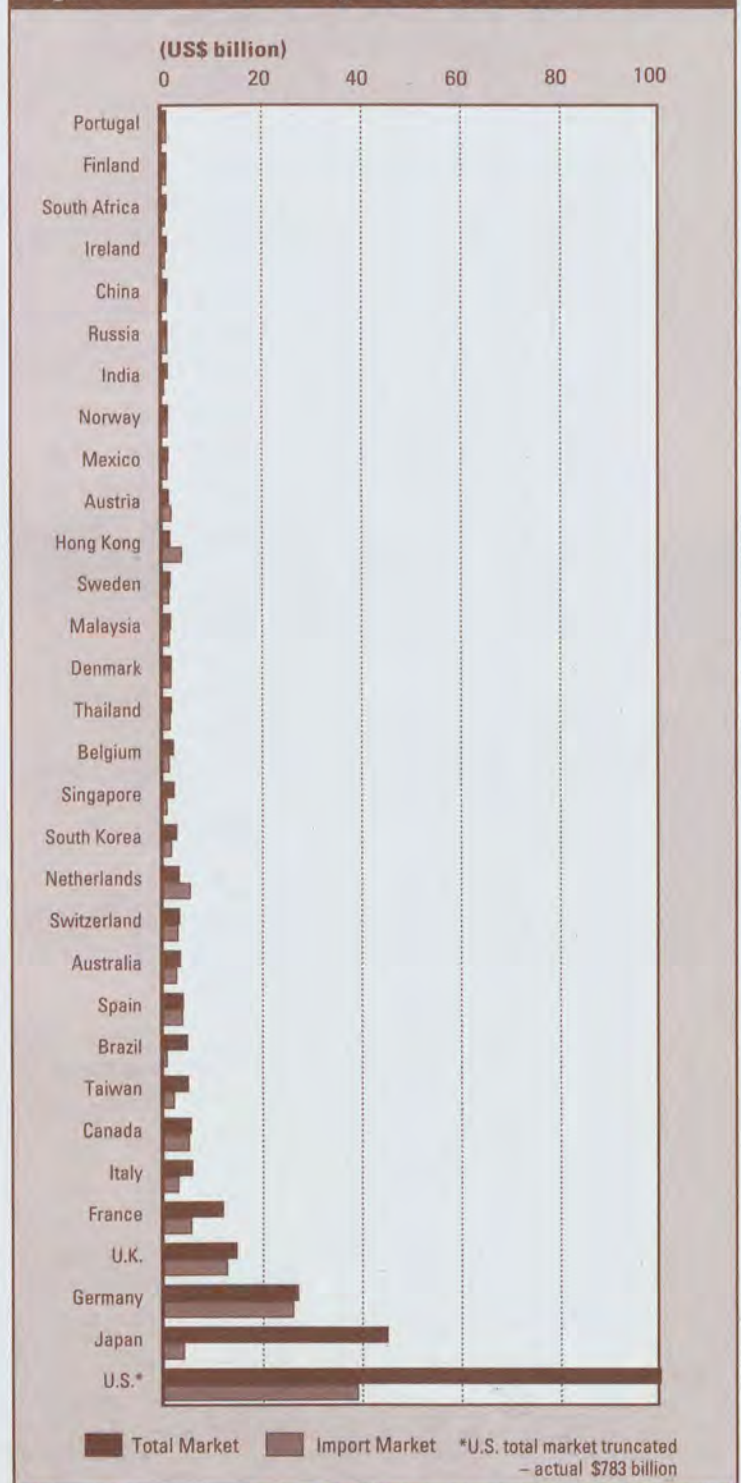
Source: International Data Corporation

hardware has imposed new economic realities on the computer industry, and is causing some fundamental restructuring as manufacturers adjust their costs to high-volume, lower margin production. The desktop-computer boom has, in turn, sparked another trend: the rise of computer networks, which enable hundreds of disparate machines to be efficiently linked and allow the same program to be run on more than one computer system.

Still, there are untold changes to come as new technological advances open up new markets. Multimedia applications, mobile computing and sophisticated work stations will fuel the rapidly growing small business, household, school and government segments. The most noteworthy of these applications will be images and voice-intensive applications; co-operative working between terminals at remote locations; and the intra-corporate transmission of high volumes of information at speeds barely conceivable today. Signs of the convergence of computers, consumer electronics and telecommunications have been apparent for some time, but the results will embrace new areas such as broadcasting, HDTV and image-intensive Internet applications. For household consumers, Canada's telephone companies will be pursuing further investments in switching and transmission (fibre, copper) technologies in order to provide ever-increasing bandwidth on demand for small businesses, households and large corporations. One such enhanced service to be rolled out in the near future will be an Integrated Services Digital Network (ISDN) for high-speed, high-quality digital transmission.

Figure 3 provides an overview of international computer markets. Compiled by the U.S. federal government, it is useful for assessing the relative size of the Canadian market vis-à-vis other countries, as well as the dominance of certain key industrialized countries. The data should assist companies in understanding the importance and size of the U.S. computer market, and should suggest which countries rely most on imports, and

Figure 3 — 1993 Foreign Computer Markets



Source: U.S. Department of Commerce, International Trade Administration

which geographic regions may hold the greatest potential. Future analysis will assess the computer intensity of each country by devising a per-capita measure of computer investments.

Canadian Position

In Canada, the establishments in this industry range from small operations with fewer than 10 employees to large manufacturing operations with more than 2500 employees. Their facilities and operations are varied, from minimal assembly and sales organizations to ones with complete research and development (R&D) and manufacturing capabilities and international sales and service offices. In 1993, of the 390 companies claiming a majority of their output to be products relating to computer equipment, five were large branch operations of foreign-owned MNEs. The remainder were smaller Canadian-owned enterprises that generally specialize in computer assembly, computer subsystem manufacture and peripheral equipment. Approximately 200 of these companies employ over 15 employees.

The computer industry is concentrated primarily within Ontario (70 percent of shipments) and Quebec (20 percent of shipments), with a small but growing number of operations

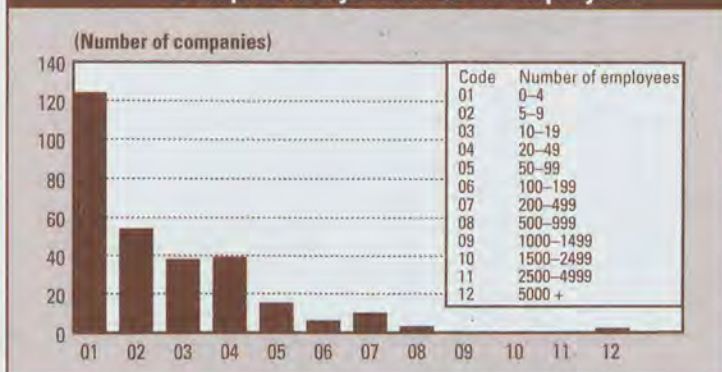
developing in British Columbia. Further economic contributions are also made by the wholesale and resale channels, which employ roughly 45 000 Canadians. The industry experienced positive and negative cyclical fluctuations between 1988 and 1992. Employment hovered between 12 000 and 12 500 employees, while domestic shipments over the period grew from \$1.5 billion to \$3.4 billion.

The Canadian subsidiaries of a half dozen large MNEs account for the majority of shipments and employees. As an indication of the contribution of these MNEs to the total manufacturing capacity of the Canadian computer industry, in 1991 computer MNEs held 25 percent of assets, generated 65 percent of revenues, and employed roughly 59 percent of the total computer industry labour force. The Canadian economy benefits from the presence of several computer MNEs, including IBM, Digital, Hewlett Packard and Unisys. However, for reasons explained earlier, it is important to note that IBM's manufacturing establishments are not included in the data in Figure 4.

In this environment, Canadian computer equipment manufacturers have been able to develop either niche or high-volume international markets for their products. In terms of international sales, some of the most notable Canadian SMEs include Advanced Gravis, ATI Technologies, Correo, DIPIX, Dynapro, Eicon, Epic Data, Matrox, Merit and Widecom. Other SMEs have had greater success domestically and limited success in other markets.

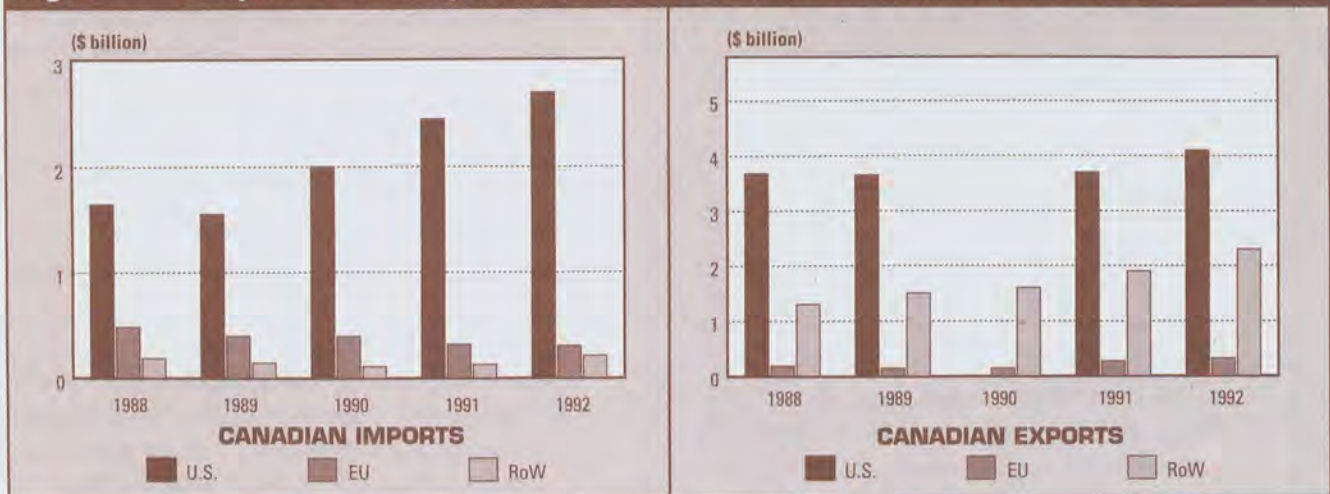
Like the rest of Canada's trade picture, the bulk of our two-way trade in computer equipment is with the United States. Unlike other sectors, however, this is not only due to the proximity and size of the U.S. market, but also shows that our trade agreements do benefit Canadian producers. Conversely, the huge trade imbalance between imports and demand with Japan suggests that it has a relatively closed market. Overall, Canada has a large and growing trade deficit in the computer equipment sector, as shown by Figure 5.

Figure 4 — Distribution of Canadian Computer Companies by Number of Employees



Source: Statistics Canada

Figure 5 — Computers and Peripherals (SIC 3361) Imports and Exports, 1988-1992



Source: Statistics Canada

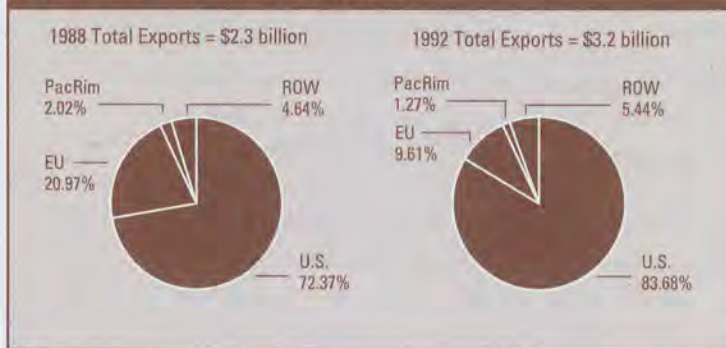
It is important to note, however, that very few countries in the world, including the United States, have a positive trade balance in computers. However, even setting aside the theoretical question of what constitutes a reasonable trade balance given the absolute size of the domestic computer market, it is disconcerting to witness our increasing deficit position. Also surprising is the rapidity with which Asia has developed into a major exporting bloc and penetrated the Canadian market, given the U.S. tariff preference combined with the narrow margins typical of many Asian computer goods.

Canada's computer equipment industry has demonstrated international competitiveness in PC/work station cards and peripherals, the market segment that is experiencing the greatest growth and has the strongest future potential. It is within this environment that smaller Canadian high-tech firms must plan and carefully execute costly international marketing campaigns, undertake risky but critical R&D projects, and try to influence international standards to maximize the return of earlier R&D efforts.

The Canadian computer industry also benefits from the presence of subsidiaries of MNEs. Some of these have clearly defined roles that do not

necessarily include international markets, but are restricted to North American mandates or supplier status within the parent organization. However, a few of Canada's MNEs do have world product mandates. These are often provided with considerable autonomy in the development, marketing and manufacturing of their products. Coupled with this new autonomy, however, is the new reality that losses will not be subsidized indefinitely nor allowed to accumulate and tarnish overall corporate earnings. In these cases, Canadian subsidiaries of MNEs with world product mandates are almost indistinguishable from other indigenous Canadian computer companies.

To a certain degree, the supply and demand for computers is geographically driven. Europe, Asia and North America have all developed either indigenous or subsidiary computer assembly operations. This trend can be largely attributed to General Agreement on Tariffs and Trade (GATT), European Union (EU) and North American Free Trade Agreement (NAFTA) tariff rules that are predicated on the concept of substantial transformation, as well as higher transportation cost differentials between subassemblies and finished computer systems. In North America, for example, the NAFTA signatory nations may not act as a

Figure 6 — Canadian Exports

Source: Statistics Canada

backdoor entry for offshore suppliers; rather, companies are required to demonstrate substantial transformation in order to trade inter-regionally. The lower volume taken up for smaller components or subassemblies also significantly reduces the variable per-unit transportation cost of Canadian computer board products. Therefore, Canadian computer firms that design and manufacture differentiated computers, subsystem cards and peripheral equipment are more likely to succeed offshore than Canadian firms or MNE subsidiaries primarily engaged in the assembly of computers.

Figure 6 provides an illustration of the changing geographical market for Canada's computer equipment exports, and underlines our increasing reliance on the U.S. market. Although these data cannot be used as the sole indicator of Canada's industrial competitiveness, the increasing percentage of sales going to the United States shows that Canadian products are competitive in the world's most demanding market. Figure 6 also shows that there may be significant further opportunities for growth in offshore markets. Indeed, given Canada's relative competitiveness in the U.S. market, it is somewhat surprising that we do not perform better elsewhere, perhaps because Canadian firms focus almost exclusively on the U.S. market.

In the next year, several potential impediments and industry structure issues will be explored to

help Canadians understand why our exports are so strongly concentrated in the United States. Possible factors range from the proportion of international trade originating from subsidiaries of MNEs and the extent to which these enterprises have mandates to supply the local, North American or international marketplace, to the slowness of indigenous Canadian computer firms to explore offshore markets once success has been achieved in the United States. Although these and other factors play a role, we cannot yet be certain about their importance relative to other factors. Nonetheless, early quantitative analysis, combined with input from IC's ongoing consultation with the computer industry, suggests that Canadian companies lack information about some of these markets. As a result, there is a natural tendency to devote more marketing resources toward the United States, where information about trade regulations, consumer interest, pricing practices, distribution channels, competing products, and market size is readily available. Sources of information on the U.S. market abound because of its proximity, commonality of language and culture, the benefits of the NAFTA, and general and specific sources of market information from North American trade journals, product magazines and broadcast media.

In economic terms, it is generally assumed that information on potential markets is uniform, and that companies will optimize their international marketing investments to generate the highest positive return. Therefore, Canadian computer companies should shift the destination of marketing resources to other international markets when an additional dollar spent on marketing in another market begins to generate a higher return than the same incremental investment in the United States. However, consultation with industry shows that information is not as readily available for offshore markets as for the U.S. market. To address this problem, IC and the Department of Foreign Affairs and International Trade (DFAIT), in collaboration with the private sector, will focus resources on acquiring and providing to Canadian developers more information on offshore markets.

Table 2 — Key Computer Export Markets

	1993 Total Market (US\$ billion)	TM Growth 94-95 %	1993 Import Market (US\$ billion)	1993 Cdn. Exports (US\$ million)	IM Growth 94-95 %	LC ^a	FC ^b	Market Barriers ^c	Import Receptivity ^d
<i>Asia</i>									
Taiwan	4.9	17	2.0	9.6	15	3.5	5	3.5	3.5
Hong Kong	1.4	10	3.8	10.0	8	4	3	5	4
<i>Europe</i>									
Germany	27.0	8	26.0	83.9	15	4	2	5	5
U.K.	14.0	5	12.0	84.1	5	3	3	5	3
France	11.0	6	5.5	26.4	4	3	1	4	5
<i>Latin America</i>									
Mexico	1.1	25	1.0	24.6	25	4	4	4	4

In the following scales, 1 is the poorest score for foreign exporters to the particular market, and 5 is the best score.

^a LC — a 1-to-5 index score of degree of local competition

^b FC — a 1-to-5 index score of degree of foreign competition

^c a 1-to-5 index score of degree of market barriers

^d a 1-to-5 index score of degree of receptivity of imports

Source: U.S. Department of Commerce

There is no intention to try to persuade Canadian companies to allocate resources to non-U.S. markets, but rather to provide reasonable access to other international market information that can be incorporated into their decision-making processes.

The majority of small companies will likely continue to follow the natural optimization path for product and market development, beginning with the domestic market, and gradually moving outward to the United States, and eventually to other offshore markets, since this approach is likely to bring the greatest returns. However, depending on the nature of the product and firm, the initial benefit resulting from Canada's proximity to the U.S. market may become a disadvantage if market information of similar quality and quantity is not available for other markets. Companies may not be aware that they are overlooking greater possible returns for the same marketing investment in other markets.

Strategic Direction

- In most instances, the federal government will continue to encourage and help small Canadian computer companies to develop their first export market in the United States, by providing market information and key regional contacts. Once companies have demonstrated reasonable product and marketing success there, IC and DFAIT will assist by providing them with sector-specific information on selected foreign markets. DFAIT and IC can also help companies to organize and plan an investigatory trip abroad.
- In order to maximize available resources, as well as the value of foreign market information, IC and DFAIT, in consultation with industry, have identified key computer markets in each geographic and economic trading bloc. Criteria used to assess potential entry points include: the size of the total and import PC/work station computer markets; import receptivity

conditions; local competition; market barriers; and available DFAIT resources. The countries chosen are shown in Table 2.

- For the countries identified, IC and DFAIT will collaborate to develop and make available geographic and sector-specific market analyses tailored to the PC/work station orientation of the Canadian computer industry. Although coverage of international computer markets will be selective, the strategy will assume that familiarity and success in key priority markets will lead to greater knowledge and familiarity with consumers and distribution channels for the rest of the geographic area. Efforts will be made to assess market conditions and relate them to Canadian capabilities.

IC and DFAIT will collaborate annually on the following:

- analysis of the quality of international trade Harmonized System (HS) and standard industrial classification (SIC) data (IC);
- analysis of the capabilities and competitiveness of the domestic computer equipment industry (IC);
- analysis of the international trade contribution of MNEs and SMEs (IC);
- analysis of foreign market trade penetration (IC, DFAIT);
- sector-specific foreign market analysis (IC, DFAIT/missions);
- foreign technology partnering opportunities and brokering (DFAIT, IC);
- integration of federal trade programs with sector capabilities and foreign market opportunities.

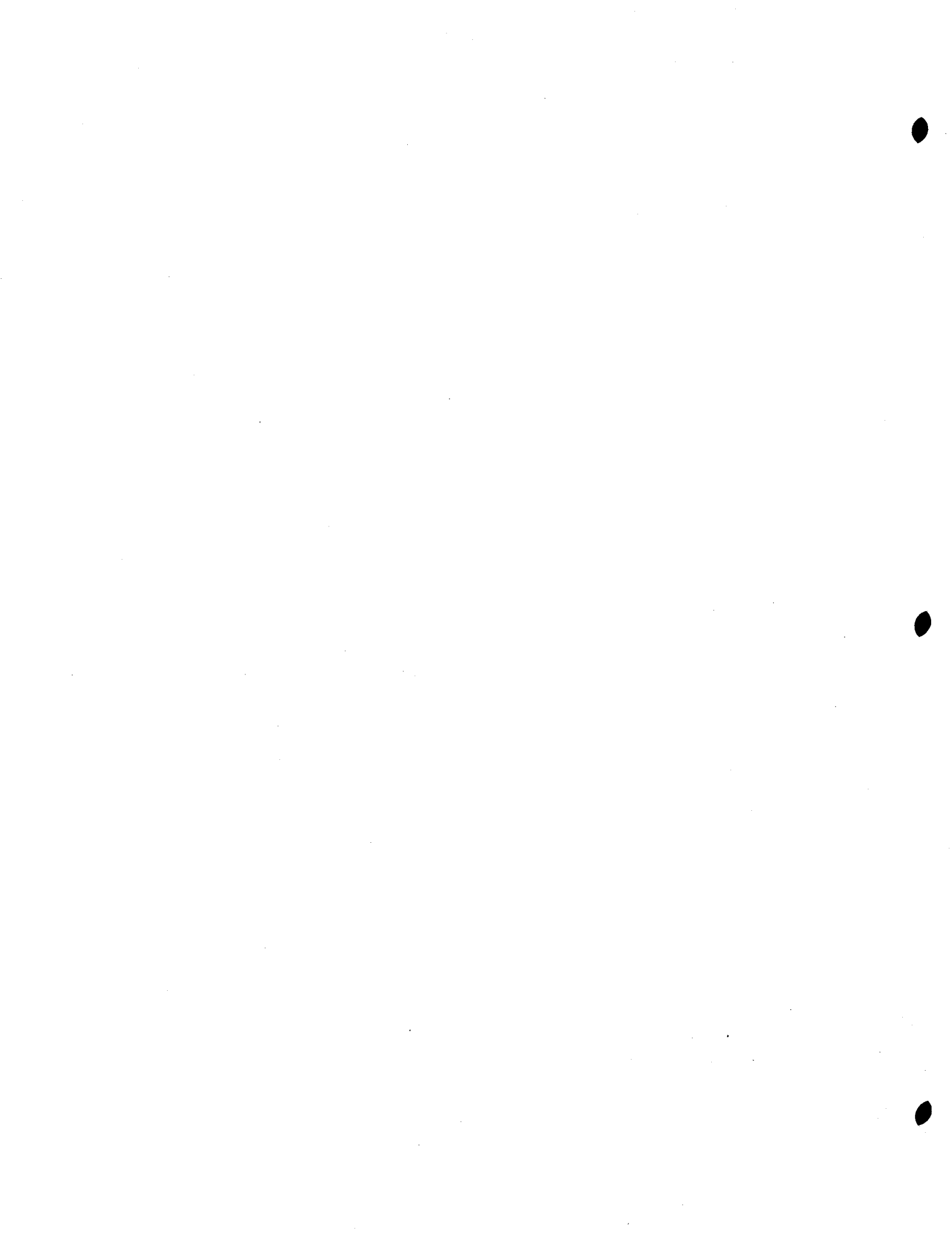
Greater emphasis will also be placed on providing Canadian companies with information on foreign market opportunities, and the value-added services they present. To measure progress, emphasis will be placed on regular monitoring of sectoral trade flows rather than trying to evaluate the successes of individual firms' investigatory missions. Industry can contribute to this plan,

and hence help other small Canadian companies, by providing intelligence to foreign missions with respect to the calibre and capabilities of different foreign trade shows, distribution channels and agents.

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Electronic Components

Electronic components include printed circuit boards (PCBs), connectors, capacitors, resistors, switches, relays, transformers, semiconductors and a number of other electronic devices.

Components are commonly thought of as being either active or passive in nature. Electron tubes, integrated circuits and transistors are examples of active devices, while capacitors, resistors, connectors, relays, transformers and PCBs are considered passive devices.

This dynamic export-oriented subsector comprises approximately 300 companies and employs some 12 000 people. Canadian production stands at about \$3.13 billion, of which approximately 80 percent is exported.

Canada currently imports about \$5.5-billion worth of electronic components, 85 percent of which comes from the United States. Other suppliers include Japan, Korea, Taiwan, Hong Kong, China and Germany.

Electronic components are the basic building blocks of the electronics industry. Virtually all original equipment manufacturer (OEM) equipment contains a mix of active and passive components. The demand for components is dependent on sales to such markets as telecommunications, computers, consumer electronics, and defence, automotive and medical products. The main customers of Canadian manufacturers are telecommunications and computer companies.

International Environment

Canada is extremely successful in the higher-end electronic components industry worldwide. Canada faces fierce competition from many countries, especially the United States and Japan, in the area of technologically sophisticated products. North American firms often lead in the introduction of new products, but Japan and recently Korea have been able to refine the process and can now produce in large volumes at less cost. With less sophisticated products, Canada cannot

compete effectively with such countries as Mexico, China, Singapore, Korea and Taiwan.

The United States is Canada's largest export market for electronic components. Trade is concentrated in seven product areas: PCBs, semiconductors, capacitors, resistors, switches, connectors and magnetics. PCBs and semiconductors account for the bulk of this trade.

The electronic components industry is expected to expand by about 9 percent in 1994. This expansion will be fuelled mainly by the computer, communications equipment, consumer electronics and automotive sectors. Today's customers demand products that offer higher performance, greater reliability and continued miniaturization at less cost. Worldwide buying patterns for components are based on technological superiority, cost, delivery and reliability. A number of variables exist in production costs, including labour, material, capital and regulatory enforcement costs for worker safety and environmental issues. Canadian manufacturers must pay close attention to these variables to remain competitive in the global market.

Canadian Position

Canadian strengths in electronic components are centred in the following areas:

Printed Circuit Boards

Printed circuit boards provide the interconnect link and the physical platform for most OEM products. When electronic components are mounted on boards, they become electronic assemblies that are the building blocks for electronic products. The functionality of every electronic product depends upon the design of the PCB. In recent years, PCBs have become more

important because of the emphasis placed on miniaturization in the packaging of components. A strong relationship exists among PCB material suppliers, equipment vendors, design engineers and OEMs. The fostering of a strong PCB sector is paramount to the competitiveness of all electronic equipment manufacturers.

In Canada, PCBs are produced by approximately 40 independent manufacturers. The top five supply over 80 percent of the market, with 1993 sales of about \$380 million.

The United States has approximately 700 independent manufacturers. The Institute of Interconnecting and Packaging Electronic Circuits (IPC) estimated PCB sales at \$5.9 billion in 1993. According to IPC, in 1979, OEMs were responsible for 60 percent of production, while independent PCB vendors accounted for 40 percent. By 1993, a record high 69 percent of total production originated from independent producers, while OEMs accounted for only 31 percent.

Many OEMs have discontinued their PCB lines in the past few years as equipment costs have risen sharply. Traditionally, most R&D in the PCB business has been done by the captive board producers and PCB equipment manufacturers. Independent manufacturers have relied on the trickle-down effect for their product and process improvements. As many OEMs have discontinued their PCB lines, R&D must be picked up by the independents and the equipment manufacturers. This is a new role for the independents, and the effect is being felt in Canada.

PCB manufacturers will play a significant role in the development of multichip modules (MCMs) using laminate substrate. The MCM-L has advantages over other types of MCMs (Cs and Ds) because of its lower production cost and generally shorter delivery times.

Surface-mount PCBs are growing rapidly in the world marketplace. IPC estimates that 64 percent of the boards produced in the United States in 1993 were for surface-mount applications, compared to only 2 percent in 1984.

In industry assessments performed by Industry Canada (IC), Canadian manufacturers compared favourably with the U.S. competition. However, Canadian manufacturers face major foreign competition because their costs are higher than those in other industrialized countries. The cost differential is mainly related to higher wages, and safety and environmental standards.

Domestic exports of PCBs in 1993 were more than \$520 million, and imports were over \$723 million.

Semiconductors

Semiconductor devices are incorporated not only in traditional electronics equipment, but also in an increasingly wide range of applications, from simple consumer products to sophisticated industrial systems. Advances in enabling technologies such as information technology and biotechnology are critically dependent on advances in semiconductors.

The Canadian semiconductor industry constitutes a very small portion of the global semiconductor industry, estimated to be worth about US\$65 billion in 1993. The development and growth of the Canadian industry was spurred by the growth of Canada's communications industry. A large portion of semiconductor production is destined for the in-house use of two vertically integrated telecommunications equipment companies: Northern Telecom and MITEL Corporation. Northern Telecom's microelectronics operations supply the in-house needs of its parent and subsidiary companies, while MITEL's production is for both internal use and commercial markets. Gennum Corporation operates the only bipolar silicon fabrication facility in Canada. With the exception of these companies, the Canadian semiconductor industry is composed of approximately 30 smaller companies specializing in niche products or design and test services.

Domestic exports of semiconductors in 1993 were \$1.8 billion, and imports were \$4.4 billion.

Capacitors

In electronic applications, capacitors are used for filtering, coupling, isolating, tuning and storing electrical energy. Current trends in the capacitor industry are toward surface-mount components and miniaturization of the complete electronic capacitor product line. According to *Electronic Components* magazine, the smallest-size chip capacitor currently being mass-produced is 1.6 mm by 0.8 mm, and the next generation of chips will be about 50 percent smaller.

Chip capacitors are generally priced higher than the leaded versions. However, most new OEM designs call for surface-mount devices, and the unit price is decreasing as manufacturing volumes increase. Major applications for chip capacitors include telephones, computers, video-cameras, televisions and automotive products. In 1993, domestic exports of capacitors were \$20 million, while imports were \$138 million.

Resistors

Resistor products display electrical resistance, and are used in an electrical circuit for protection, operation or current control. As with most electronic components, the trend is also toward surface-mount components. Japanese and Korean companies appear to have a significant lead on other countries in this product area. Several Canadian companies are very active in thick film resistor networks.

In 1993, domestic exports of resistor products totalled over \$8 million, and imports were \$81 million.

Connectors

Connectors include electrical apparatus for switching or protecting electrical circuits, or for making connections to or within electrical circuits for a voltage not exceeding 1000 volts. Examples of connectors include switches, relays, fuses, surge suppressers, plugs, sockets, lamp-holders and junction boxes.

Connectors create the electrical junction or interconnection in virtually all electronic products. The trends toward surface-mounting and miniaturization across the entire product line are rapidly taking place in the field of connectors.

Connectors are a strong niche area for Canadian manufacturers. They are expected to be a growth area, with strong prospects in fibre-optic connectors, followed by printed-circuit and special-purpose connectors.

According to Technology Forecasters, a market research firm, the North American connector market should continue to grow by an average of 5 percent annually over the next few years.

In 1993, domestic exports of connectors were \$325 million, and imports were over \$1 billion.

Magnetics

This category covers electrical transformers, static converters and inductors. Canadian manufacturers supply many of these products, and many specialize in power supplies for computers, telecommunications equipment and various other OEM products. Several Canadian companies have made significant advances in switch-mode supplies, and are exporting much of their product.

In 1993, domestic exports were \$388 million, and imports were \$565 million.

Strategic Direction

The electronic components industry is expected to expand at an annual rate of 7 to 10 percent through the mid- and late 1990s. The continued expansion will be fuelled by the rising demand for communications equipment, computers, consumer electronics, and medical, environmental and automotive products. Components suppliers will have to closely monitor the complexity of the packaging and the interconnection needs of the new OEM products to anticipate the changes that may be required for their own products.

Establishing close working relationships between components suppliers and users will be critical if Canadian companies are to remain competitive in world markets.

- Participation at trade shows and in missions continues to help companies maintain a competitive position in the supply of products and services.
- In 1993, IC visited a cross section of Canadian microelectronics companies to identify the countries with which they would like to develop export sales and alliances. The companies also identified a number of trade shows of interest. The countries mentioned include India, Japan, China, Thailand, Mexico, Germany and the United States. The trade shows included Comdex, Nepcon West, Semicon West, CeBIT, Electronica, Composant and WESCON.
- IC and the Information Technology Association of Canada (ITAC) have signed a funding agreement for the delivery of an innovative set of supplier development services. ITAC has established a program office and retained staff to approve projects and manage this agreement. Program services include:
 - information gathering on second-tier suppliers;
 - information gathering on other types of available assistance programs;
 - regional networking events;
 - operational assessment services;
 - partnership assistance services.

For additional information, contact ITAC at:
 Tel.: (613) 599-4233
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- The Strategic Microelectronics Consortium (SMC) is a not-for-profit corporation established to help the Canadian microelectronics industry achieve sales of more than \$1 billion by the year 2001. The SMC strives to present a unified voice for the microelectronics industry in Canada. Member companies undertake to

define their technologies and capabilities in such a way that they can be applied to the creation or innovation of products and/or processes that have immediate or mid-term capacity for generating revenue.

SMC has five microelectronics program categories under development:

- low-power projects;
- high-density packaging;
- video and multimedia;
- general microelectronics;
- quality improvements.

For additional information, contact SMC at:
 Tel.: (613) 592-8155
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Geographic Priorities

The Canadian Position section of this report identifies six product areas, which together amounted to over \$3.13 billion of domestic exports. The country of destination for over 85 percent of electronic components domestic exports is the United States, while the remaining 15 percent go to such countries as Taiwan, Japan, Hong Kong, Korea, Malaysia, Germany, the United Kingdom, France, Italy and Mexico. These are expected to continue to be Canada's largest markets.

The Mexican market for telecommunications, computers and consumer electronics products is growing rapidly. Private and foreign investors are expected to invest over \$30 billion in Mexico, installing new telecommunications and computer systems.

This will increase Mexican demand for PCBs, semiconductors, cathode-ray tubes, transformers, connectors, power supplies and capacitors. Canadian suppliers are well positioned to fill this need.

Canadian component suppliers will benefit from the implementation of the North American Free Trade Agreement (NAFTA), as it provides for preferential tariff treatment for all "originating"

North American goods traded among Canada, the United States and Mexico. Rules of origin are used to determine whether a product qualifies as a good originating in North America. These rules ensure that NAFTA benefits are only available for goods substantively produced in North America.

The NAFTA rules of origin for telecommunications equipment established the following requirements:

- Each non-North American input must undergo sufficient transformation during production in one or more of the NAFTA countries to result in a specific change in tariff classification.
- For most telecommunications goods, there is an additional condition relating to the number of non-North American printed circuit assemblies permitted to be used.
- For a few telecommunications goods using specific non-North American parts, the manufacturer is required to meet a value-content test.

The rules of origin should ensure that more electronic contract assembly work is done in North America, which in turn ensures that more components are purchased here.

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Geomatics

Geomatics is a technology sector focussing on the acquisition, storage, analysis, dissemination and management of geographically referenced information. The principal domains of this subsector include positioning and control surveys, topographic and thematic mapping, land and cadastral surveys, hydrographic surveys and nautical charting, remote sensing and image processing, and geographic information systems (GIS). The term geomatics is routinely used in Canada and increasingly so in other countries, although "GIS" or "remote sensing" are also used to refer to the same industry.

International Environment

While the global economic situation is expected to improve slowly, the growth of the geomatics industry is bolstered by the increasing demand worldwide for spatially related information. Estimated at more than \$10 billion and growing at a rate of more than 20 percent per annum, the global geomatics market represents enormous opportunities for Canada. In 1993, the software business alone was estimated at \$456 million for companies with headquarters in North America.

Statistics on the geomatics industry are not recorded routinely in Canada or internationally. Most of what is written is obtained or extrapolated from market studies. Daratech Inc. of Cambridge, Massachusetts, reviews and analyses the industry, and annually publishes detailed information on more than 250 vendors and products. In 1992, Daratech reported that the U.S. and Canada accounted for 45 percent, Europe for 37 percent, the Far East for 10 percent and the other regions for approximately 8 percent of the worldwide geomatics market. That same year, a study conducted for the Department of Foreign Affairs and International Trade (DFAIT) estimated the geomatics market in the U.S. government (federal and state) to be \$1.1 billion, corresponding to nearly half of the total U.S. geomatics market. Growth in North America outpaced Europe, but lagged behind the Far East, which exhibited the highest growth rate of any region in 1993. A study carried out for Industry Canada (IC) in 1993 estimated that the Latin American market

will be between \$650 million and \$1.5 billion for the 1993-98 period.

Competition

Worldwide, the market for geomatics products and services is dominated by government — national, state, provincial and local — and public enterprises. Competition in this subsector comes from several developed countries, most of which have very supportive export policies, and in particular from organizations that are heavily government subsidized. Competitors in traditional surveying and mapping have largely been countries with similar industry profiles. These include the United States, France, the United Kingdom, the Netherlands, the Scandinavian countries and, more recently, Japan, Australia and New Zealand. Each has its own niche, principally emanating from economic, cultural or colonial ties. Increased competition will soon be inevitable from countries such as Korea and Poland, which offer low labour costs coupled with modern technology. Competition in the emerging geomatics areas is also expected to come from large U.S. and other international companies that are entering the geomatics market as part of a strategy to develop broader products and services.

Trends

Geomatics is experiencing a technological revolution that is changing the way clients and suppliers interact, and that will change the products and services that will be in demand in the future.

The significant technological trends include:

- introduction of low-cost, compact, high-capacity data storage and processing technology;
- implementation of distributed, seamless databases;
- use of data network facilities, with integrated information management;
- increased adaptation of a common standard to exchange worldwide digital geographic data;
- widespread access to airborne and spaceborne remote-sensing imaging, which yields high-resolution data for operational applications;
- introduction of low-cost, high-precision Global Positioning System (GPS) technology.

Worldwide business trends over the coming year, as expressed by business leaders, include:

- North America will continue to represent the largest market;
- government will continue to be a dominant client group;
- market growth in Europe and Asia will continue to be rapid and will represent enormous opportunities;
- tremendous growth will take place within the commercial business arena;
- national or international consortia that are capable of arranging financing will be a significant force;
- public-private sector partnerships will be necessary to implement comprehensive geomatics solutions that serve multiple agencies;
- the high cost of populating databases will continue to hamper the forecast rapid growth rates for GIS;
- environmental applications will represent significant opportunities.

Canadian Position

A study conducted for IC in 1991 estimated that the geomatics industry in Canada consists of approximately 1350 firms employing about 12 000 people. It revealed that 86 percent of the firms were small- to medium-sized enterprises (SMEs) with annual revenues of less than \$2 million and employing less than 50 people. These firms are evenly distributed across Canada, relative to the population. The study reported 30-percent growth in employment between 1983 and 1990, and revenue growth of 115 percent over the same period.

The 1991 study estimated geomatics sales at \$750 million, including \$120 million (16 percent) from exports. Since worldwide annual growth rates of 20 percent to 30 percent have been reported for geomatics during the past four years, we can conservatively estimate an annual growth rate of 5 percent for the domestic market and 20 percent in exports, which would mean that the Canadian geomatics industry is now at just over a billion dollars in sales, including \$250 million in exports.

The development of world-class software systems and applications of geomatics technologies to natural resources management and environmental monitoring has always been a strong suit of the Canadian geomatics community. Canada's strengths in the maintenance of databases in digital form, coupled with its enviable reputation for radar data acquisition capability, are fine examples of contributions to export revenues.

Co-operation emerging among members of the Canadian geomatics community is promising for the success of international trade promotion. In 1993, the Geomatics Industry Association of Canada (GIAC) and Geomatics Canada developed the Competitiveness Strategy for the Canadian Geomatics Industry. The Canadian Council on Geomatics (CCOG), a discussion group comprising officials from federal, provincial and territorial government mapping and charting agencies, has

established a Working Group on Export Market Development to help members of Canadian consortia and companies in the global geomatics market to improve their success rate and expand their imports.

Strategic Direction

Geomatics can be used strategically to enhance Canadian exports by linking together sectors such as mining, forestry, agriculture, fisheries and environment. The three major application categories of geomatics — natural resources management; infrastructure development and maintenance; and environmental management — will continue to figure prominently in the world marketplace over the next five years. The driving force for growth or increased business may vary from time to time and from region to region, and is often influenced by political, economic or other local considerations. For example, coastal zone information is a major area of growth. Over 120 coastal states have claims for exclusive economic zones (EEZs); however, the majority do not have the required marine geomatics infrastructure to support sovereignty claims and sustainable development. Also notable is the increase in the market due to value-added spatial information, which is expected to reach \$12 billion in the United States, and \$48 billion worldwide, by the year 2000.

Currently, the United States and Western Europe are the two largest geomatics markets. Canada has had some success in both of these markets, particularly in selling to the private sector and through subsidiaries and joint ventures. Business practices in both markets are similar to those in Canada, where contracts can be secured without public-sector endorsement or involvement. The rest of this report therefore focusses on the other markets where government involvement is considered essential for opening doors.

Asia and Latin America are expected to be the two most important growth markets for Canadian

geomatics products and services over the next five years. Other important markets are Central and Eastern Europe and the countries of the Commonwealth of Independent States (CIS). Potential opportunities in specific countries of these regions are significant, and conditions may be especially conducive to market development.

Asia is viewed as the most opportune place for Canadian geomatics products and services, for the following reasons:

- The region's economic buoyancy and planned developments (infrastructure, power, etc.) in China, India and Malaysia will create massive geomatics requirements.
- A report released in 1993 by the World Bank identified Asia's environment as one of the greatest development challenges in the world. Over the last three budget years, the Bank has increased its environmental lending to \$1.2 billion per year, raising the environmental portion of its lending to 12 percent of the total.
- The Canadian geomatics community has developed enviable credibility for its technology and technical expertise, largely generated while working on development assistance projects conducted by the Canadian International Development Agency (CIDA).

In addition, challenges also exist that should be recognized, including unfamiliar market and business practices and cultural differences.

Opportunities in the Latin American market are important for the following reasons:

- the economic wave moving through the region;
- the North American Free Trade Agreement (NAFTA) with Mexico and possible similar agreements with other countries in the region (e.g. Chile);
- physical proximity of the market to Canada.

In each of these regions and in other selected areas, important opportunities are developing, including the modernization of geographic data production infrastructures; the identification of EEZs; and the implementation of cadastral

systems to manage land registration and taxation. The trend toward privatization of land, and the tendency of national governments to transfer responsibilities to local governments, are other commercial opportunities. In addition, geomatics technologies are being used more frequently to manage natural resources through sustainable development, as well as for monitoring the environment.

In the markets identified, the international financial institutions (IFIs) are a vast source of funding for the geomatics application areas. For the IFI projects, the public sector may be engaged to make strategic suggestions during project development and to influence decisions on the scope of these projects.

Canadian firms are finding it difficult to successfully penetrate the global geomatics market. The low level of internationalization of the Canadian geomatics industry, and the high cost of sustaining international marketing make it difficult for most Canadian firms to secure international projects. Many Canadian companies do not have the resources to collect the market intelligence, to seek out the opportunities, to do the required preliminary research, or to sustain lengthy project development cycle efforts.

It is generally accepted that a co-ordinated public-private sector partnership can help to ensure strategic and focussed penetration into the global geomatics market. This will facilitate long-term sustainability as well as short-term gains. Although governments in both industrialized and developing nations form the major potential client base, the need for public-private sector partnerships is particularly evident in developing nations. The recent success of a Canadian industry-government consortium in completing a major project to modernize Mexico's mapping program is an excellent example of this approach.

Specific activities for implementing the strategic direction include:

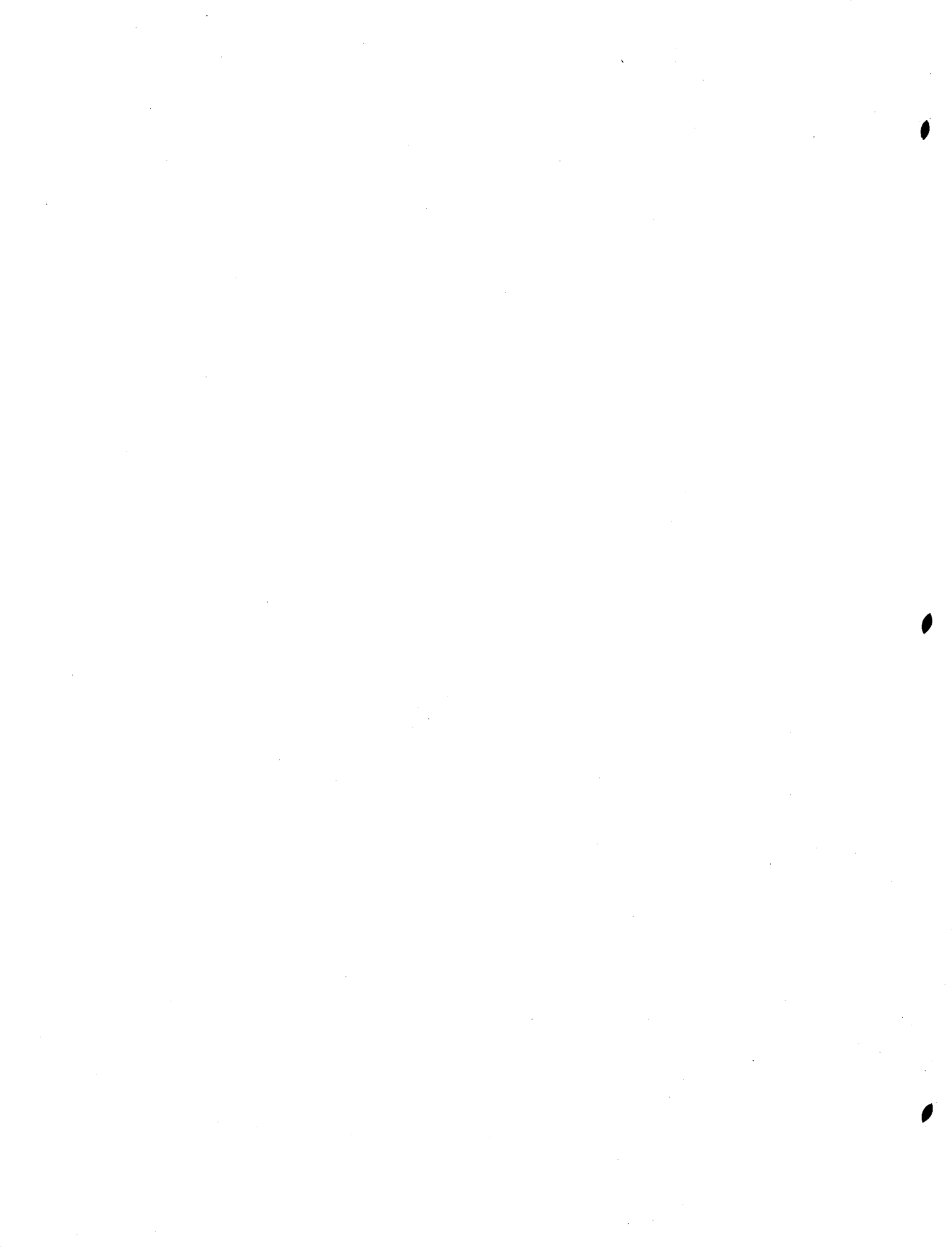
- conducting a geomatics potential market study for Asia (IC and Natural Resources Canada [NRCan]);
- seconding or assigning geomatics personnel to selected Canadian embassies in Asia and Latin America (DFAIT, NRCan, others);
- seconding government employees to foreign government agencies involved in geomatics (DFAIT, NRCan, IC);
- identifying opportunities to place Canadian geomatics specialists in IFIs (DFAIT, NRCan, Department of Fisheries and Oceans [DFO] and GIAC);
- strengthening knowledge of geomatics in Canadian missions abroad (NRCan, DFAIT, DFO, GIAC);
- strengthening communications mechanisms to share market intelligence and information (DFAIT, NRCan, IC, DFO, GIAC, others);
- promoting government-industry participation in international projects; through appropriate business structures such as flexible business networks (NRCan, DFO, Canadian Commercial Corporation [CCC], Export Development Corporation [EDC], DFAIT, GIAC);
- enhancing support for project financing and commercial export financing (DFAIT, EDC, CCC, CIDA, NRCan);
- focussing the use of Canadian trust funds in IFIs to support projects that could potentially include Canadian geomatics products (CIDA, DFAIT, NRCan, GIAC);
- promoting Canadian geomatics technical capability and expertise through technical missions to selected countries in Asia, Latin America and elsewhere (DFAIT, NRCan, GIAC, industry);
- strengthening the liaison among federal departments and other agencies to improve the effectiveness of government support programs (DFAIT, CCOG, industry).

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Instrumentation

The instrumentation industry encompasses manufacturers of virtually all types of measuring, sensing, recording and controlling devices, which are used in most phases of commerce, industry, transportation, exploration and research. The products extend from simple bimetallic thermostats, to technologically sophisticated optical/electronic, computer-based measuring apparatus.

The nine major subsectors are: building control and supervisory systems; environmental monitoring and control devices; geophysical and geological instrumentation; industrial process control; medical instrumentation; navigation instrumentation; photonic (e.g. lasers and optical/electronic) instruments; security and alarm systems; and testing and measuring equipment.

International Environment

The instrumentation industry has expanded fourfold since 1975, from dollar shipments of less than \$500 million to almost \$2 billion in 1992. Employment has increased by 36 percent, from 13 324 to 18 100 employees.

During this same period, the Canadian market has grown from \$725 million to over \$3.3 billion. Canadian manufacturers produce up to 35 percent of the current needs of the domestic market and export over 40 percent of their production. Because of the multiplicity of instrument types, it is essential that efficient producers establish niche markets worldwide. Thus, most Canadian suppliers specialize in a select number of the many possible types of instrumentation.

Since one of the most important advances during the coming decades will be the refinement of the integration of instruments into production and facilities management systems, many technologies that make such systems possible are also developing rapidly. All of these will serve to provide a data highway from the operator to the executive office, and even to a company's suppliers and clients.

The instrumentation industry will continue to grow rapidly, particularly in the area of devices

and systems that contribute to the increased productivity of its clients. These include instrumentation used in automated manufacturing, advanced sensor technology and photonic-based instrumentation. As the demand for conventional scientific instruments continues to decline, the need for computer-based scientific instruments and sensor systems is expected to increase.

The integration of computers or telecommunications switches with instrumentation will also become more evident in two subsectors — building control and supervisory systems, and security and alarm systems — because of the increased market for intelligent buildings. This term describes buildings that use advanced instrumentation and control systems that are linked together, which respond automatically to changes in the structure's environment, including fire and security occurrences. In addition to automatically initiating proper control sequences, the system alerts operators and tenants, marks events and maintains historical records.

This new generation of product design will eventually make current instrumentation and control systems for buildings and homes obsolete. Communications companies have begun offering custom-designed control systems that integrate, through advanced electronics, communications and facsimile machines, security and environmental controls, entertainment systems and other features into one package that operates through a programmable control centre.

Technological advances are also being made in determining the exact geophysical location of objects. If these advances prove to be economically feasible for automobile and commercial vehicle tracking and mapping systems, it will open new

markets in the navigation instrumentation subsector.

The changes in Europe brought about by the realignment of formerly Communist countries have the potential to benefit the Canadian instrumentation industry. Political restructuring has opened new marketplaces and liberalization has revealed new markets, especially in environmental monitoring and control devices, and in factory refurbishing instrumentation. To capitalize on these opportunities, Canadian firms will likely have to form appropriate networks and be prepared to work in conjunction with various foreign and domestic government organizations.

European Union

Within the European Union (EU) market area, Germany is expected to remain the largest consumer and producer of process control instrumentation equipment, followed by France, the United Kingdom and Italy. High growth and consequent instrument demand are also expected in Spain, Scandinavia and in the newly emerging Eastern bloc countries. The low instrumentation base and the extreme need for upgrading the former Eastern bloc countries' industrial and commercial infrastructures will facilitate marketing efforts. These modifications to the European political-economic landscape will open the marketplace to the myriad of smaller companies that are able to act quickly to adapt new technologies.

Canadian Position

Exports of Canadian-made instrumentation started from a small base of about 12 percent of production in 1975, but now exceed 40 percent. Export sales advanced from \$70 million in 1975 to \$960 million in 1992. The U.S. is by far the largest market for Canadian instruments, followed by the European Union. The largest source of imports into Canada is also the United States.

In 1990, Statistics Canada identified approximately 450 Canadian companies whose

primary products and predominant output were classified as instrumentation, with more than 1000 firms that manufactured one or more instrumentation products. Firms listing instrumentation as their primary product in 1991 produced slightly over \$1.88 billion in shipments and employed over 18 700 people. Preliminary and unadjusted figures for 1992 indicate that while the production level increased by 2.7 percent, at \$1.93 billion in shipments, employment in the industry was down approximately 3 percent, reflecting current North American economic realities.

Because most Canadian-produced instrumentation is designed to fill a niche market where price is secondary to performance, the Canadian dollar's fall in value against the U.S. dollar in recent years has made Canadian instrumentation firms competitive in the U.S. market.

World-leading technologies are to be found in the design of Canadian instrumentation industry products. However, this advantage could rapidly change, and these technologies could become commonplace tomorrow. At the same time, a multitude of factors works against the continued competitiveness of smaller firms in the industry, not the least of which are their small size and limited presence in major world markets, and the high level of continuous investment needed to keep up with international competition. These considerations promise to test their managerial and technical capabilities to the fullest. Certainly, they face great opportunities as well as great challenges.

Canada's instrumentation industry is competitive in selected product areas, including geophysical and geological instrumentation; environmental monitoring and control systems; security and alarm systems; remote sensing; laser equipment; and spectroscopy, all of which have shown growth. Although they are competitive and have pockets of outstanding technological excellence, many Canadian firms have the offsetting weaknesses typical of small companies, namely a lack of financial resources and deficiencies in marketing

skills, which prevent them from exploiting potential opportunities. The most effective method of entry for Canadian companies is to find a suitable local partner firm that has in-depth knowledge of the market and clients. Unfortunately, it is often difficult to find a partner who knows not only the details of Canadian technology but also the key personnel in the customers' establishments. This factor could be a major barrier for Canadian companies in penetrating new markets. To assist in overcoming these weaknesses, Industry Canada (IC) will provide advisory support and assist in developing market networking.

Technological change will continue at an ever-increasing rate. Firms in this industry will need to gain access to these new technologies and apply them, to remain competitive. Continued use of links and networks to universities and other centres of basic research is an important method for Canadian instrumentation firms to become and stay competitive in their chosen subsector specialties. Also, by developing agreements with foreign companies for exchanges or licensing of the use of technologies, Canadian instrumentation firms will increase their visibility in world markets.

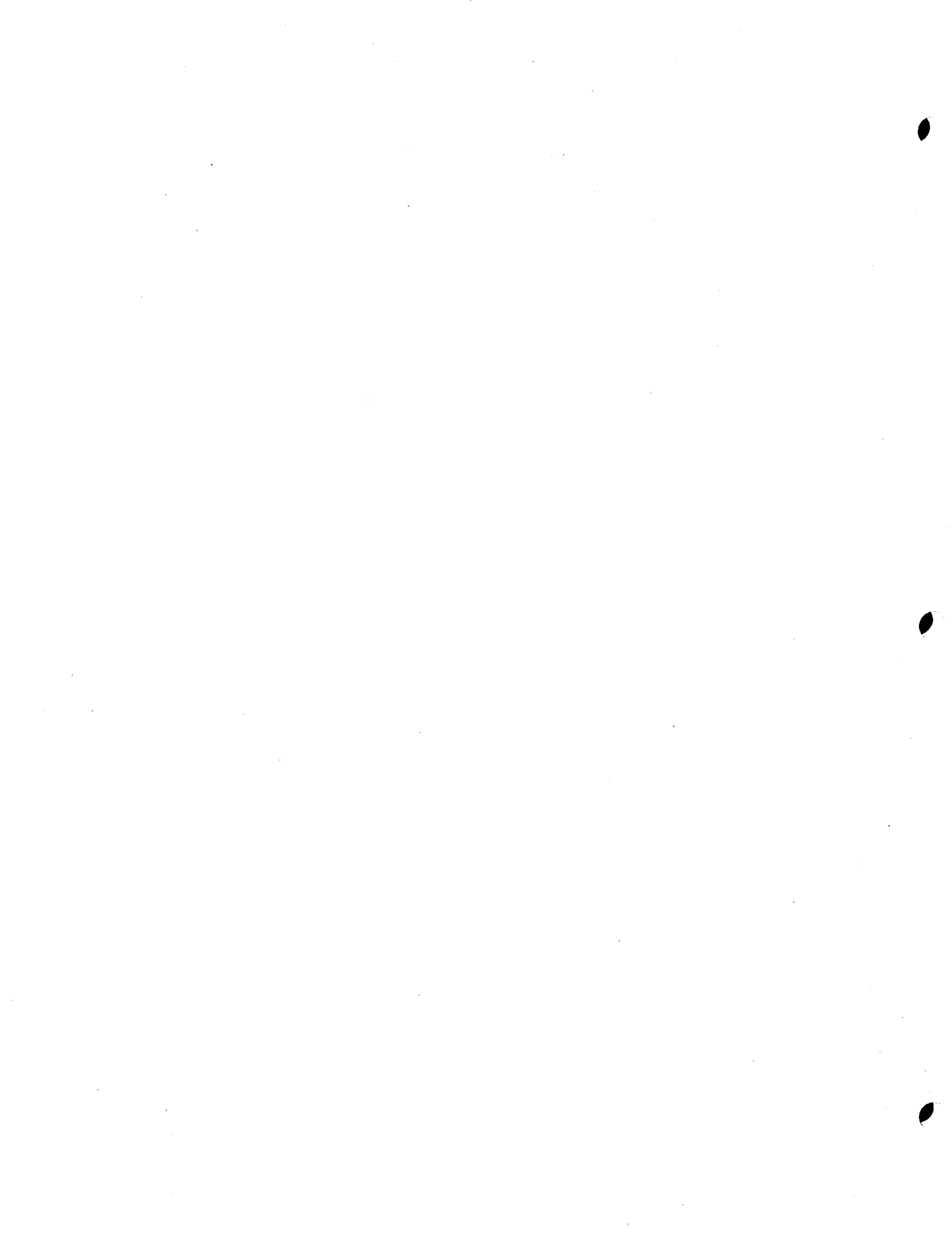
Strategic Direction

As an important component of the Canadian information technology (IT) industry, firms specializing in instrumentation technology will benefit from the strategic activities identified in the Sector Overview and the individual subsectors.

Contacts

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 Components and Core Technologies
 Information Technologies Industry Branch
 235 Queen Street, 9th Floor East
 Ottawa K1A 0H5
 Tel.: (613) 954-3291
 Fax: (613) 952-8419

Department of Foreign Affairs
 and International Trade
 Sectoral Liaison Secretariat
 125 Sussex Drive
 Ottawa K1A 0G2
 Tel.: (613) 996-1908
 Fax: (613) 944-0050



Software Products and Computer Services

The software products and computer services industry is a fast-growing information technology (IT) sector with fluid boundaries. The industry includes companies that generate more than 70 percent of their revenue from software products development, professional services and data-processing services. In 1993, according to Statistics Canada, the Canadian software and services market had revenues of \$8.1 billion and employed 70 875 workers. Between 1986 and 1993, the market experienced an annual growth rate of 13.1 percent.

International Environment

INPUT (April 1994) estimates that the worldwide market for software products and computer services grew to US\$276 billion in 1993 and will reach approximately US\$470 billion by 1998, representing an 11-percent compound annual growth rate (CAGR) (See Table 1). It further estimates that computer services, which include software products, represent 27 percent of total worldwide IT spending for internal and external products and services.

Growth rates differ in terms of delivery modes. Professional services make up the largest subsector overall, and will benefit from the shift to client/server architectures and systems-integration purchases. Growth opportunities for software products for new operating systems and client/server architectures are excellent. Worldwide, growth in processing services is expected to stay below the overall industry average, whereas demand for network applications and services will experience the highest growth rate.

Table 1 — INPUT Worldwide Market Forecast by Regional Area, 1993-98

	(US\$ billion)		
	1993	1998	CAGR (%)
North America	141	245	12
Europe	82	130	10
Asia-Pacific	47	80	11
Latin America	5	11	18
Middle East/Africa	1	4	20
Total	276	470	11

Competition in the software industry is at an all-time high. Product prices are falling, new technologies are being introduced and sales and marketing techniques are becoming more sophisticated. There are now over 120 million personal computers worldwide, more than 50 million of which run Microsoft Windows. Analysis of data contained in *Venture Capital Yearbook 1994* suggests that areas of higher growth will be database/4GL/CASE and reporting tools, multimedia and CD-ROM titles, business automation such as help desk software, environmental management products, financial management and analysis tools, sales/marketing automation, automated résumé processing, customer service automation, emergency response software and workgroup/workflow software.

North America accounted for 53.8 percent of the world software market in 1993, and is projected to reach US\$82 billion by 1998. The Canadian market is roughly 10 percent of the U.S. market. The U.S. packaged software industry clearly dominates world markets, capturing some 75 percent of global sales. According to *Forbes* (March 15, 1993), sales of U.S.-based software and service vendors have climbed at an 18-percent compound annual rate over the past three years, employing over 400 000 people. Five giants — Microsoft, Lotus, Borland, WordPerfect and Novell — owned 71 percent of the PC software market, or US\$11.5 billion in annual revenues, mainly in operating systems, spreadsheet, database, word-processing and networking software. Thousands of American firms are doing well in fast-growing market segments like home education, PC graphing and charting.

Besides demand-pull factors, other forces are at work, dramatically shaping the software products markets of the next few years. These include changing technologies, changing financial practices and new trends in sales and marketing. Operating system developments, new document architectures, fast new processors, new programming paradigms and the convergence of computer and communications technologies will create new market opportunities and undermine the entrenched positions of most software developers. Together, these technologies will make many existing applications and programs obsolete and will complete the shift from isolation to integration. All software will have cross-platform capability, allowing easy data transfer among various systems and applications. Developers will require broader expertise to be successful.

The emergence of very large and profitable software companies, together with the quest for market dominance, has led to deployment of huge amounts of capital and significant merger and acquisition activity worldwide. In recent months, equity participation in software companies has increased through large venture investments and strong initial activity. Large deals such as Novell/WordPerfect/Borland, Computer Associates/Ask Group (Ingres) and Adobe/Aldus were concluded, and Broadview Associates reported 291 deals valued at US\$14.2 billion in the first half of 1994. Strategic acquisitions in multimedia, client/server and workgroup/workflow applications are expected to continue. Alliances and partnering to achieve category leadership and product domination are on the rise.

Product positioning, market segmentation, channel selection, alliances, pricing, distribution and packaging are now taking precedence over technical superiority. Bundling agreements and product suites from the major companies are effectively undercutting smaller players. Superstores and large consumer products retailers have become a significant factor. Direct electronic distribution via Internet and CD-ROM is inexpensive and gaining in popularity. Within the PC software

market, large U.S. distributors such as Ingram and Merisel have recently begun to dominate the European market.

Given U.S. international dominance in software technology development, standards and marketing, the physical and cultural proximity of the huge U.S. market, and the rich infrastructure of ancillary services that has evolved over the years, it makes sense for Canadian software companies to first look south of the border for export sales, partners and marketing support. However, North American markets, though large, are becoming less attractive due to declining growth rates and increasing competitive pressures. Growth in world IT markets in Asia and Latin America provide the opportunity both to diversify exports and to find niche markets where competitive pressures are less intense and sales margins are higher.

Canadian Position

Software Products

While the vast majority of Canada's 10 000 plus software and computer services companies each generate less than \$1 million in annual revenue, at least 15 companies operate in the same dollar range as the top 100 U.S. firms. These include a number that have emerged as world niche market leaders, such as Corel, Cognos, Delrina, Alias and Softimage. Over half of the top 100 firms in Canada are located in Ontario, while 26 are in Quebec and 13 in the Vancouver area.

By U.S. standards, most Canadian software companies are small and undercapitalized at a time when capital intensity is rapidly increasing in the industry. Several Canadian companies, including Alias, Alis Technologies, CTMG, Gold Disk, Hummingbird, Jetform, PenMagic, TSB and Virtual Prototypes, have successfully attracted U.S. venture capital as a result of looking south for financing, managerial talent and support infrastructure.

Apart from the small size of its companies, Canada's software sector is notable for its dynamism and strong export orientation. According to the Branham Consulting Group (1994), the revenues of Canada's top 100 software producers totalled \$1.076 billion in 1993, an increase of almost 30 percent over the previous year. Further, two thirds of the top 100 companies generated half or more of their revenues from exports, principally to the United States and Europe. A recent report on British Columbia's IT industry found that 70 percent of firms gained their first export sale in the United States, followed by 8 percent in the United Kingdom and the remainder in a handful of other countries.

Operating systems development, new document architectures, fast new processors, new programming paradigms and the convergence of computer and communications technologies will likely present as many opportunities for Canadian software developers as they do threats.

While software product type plays an important role in determining the nature of competition a company will face, most Canadian software suppliers face the following challenges:

- meeting U.S. competition worldwide, which tends to be supported by superior capitalization and marketing know-how;
- getting favourable product reviews in the U.S. computer press;
- identifying the best export channels for a particular product;
- designing products so that culturally sensitive and linguistic features can be easily modified by translators and not programmers;
- financing market development abroad, making good on initial commitments and ensuring strong support to local customers;
- making any withholding tax on software products palatable to prospective foreign buyers who order directly from Canada (Note: a recent tax treaty between Canada and the U.S. has abolished the withholding tax on software products);

- overcoming the reluctance of Canadian banks and other financial institutions to extend credit on account of receivables generated by the export of software;
- compensating for piracy in countries such as China and India, where copyright protection laws are inadequate or not vigorously implemented.

Computer Services

Canada's top 25 professional services firms (companies with 50 percent or more of their revenues from professional services or other systems design activity) generated \$2.6 billion in 1993. The top five account for \$2 billion in revenues, of which 17 percent comes from foreign subsidiaries, revenues or exports. Major Canadian firms include SHL Systemhouse, DMR and ISM, three vendors that have encountered growing interest and success with global strategies.

Strategic Direction

For the majority of computer services firms, market expansion begins in Canada, then expands to include the United States and ultimately off-shore markets. However, many software product firms have found they need to develop a market in the U.S. before expanding in Canada.

The existing high level of Department of Foreign Affairs and International Trade (DFAIT) support for helping IT companies compete in the U.S. will focus on vertical markets, where strong Canadian capabilities are known to exist. Support for diversification of exports into other markets will aim to provide improved, more in-depth research into the markets of Southeast Asia, Latin America and Europe.

DFAIT and Industry Canada (IC) will focus on identifying Canadian supplier strengths by niche market. This exercise will be followed by complementary market analyses for each niche by priority sector.

Geographic Priorities

United States

The Canadian software industry must have easy access to the vast U.S. market, which leads the world in computing expertise. Most of today's leading software technology, from processors to operating systems, originates in the United States. *Software Magazine's* list of the world's top 100 independent software companies includes only seven that are based outside of the United States, and even these have a very strong presence there. Canadian software companies interested in forming strategic relationships therefore naturally look to the United States.

Top distributors of high-volume PC software worldwide are American firms such as Merisel and Ingram. Even the most prominent Canadian software distributors are subsidiaries of large U.S. distributors, and tend to follow the lead of the U.S. parent before distributing Canadian software. A good product review in an American computer magazine, such as a Ziff publication, has proven to be the most effective export launching pad for many Canadian software products.

The U.S. is made up of regional markets that call for different marketing strategies. The strategy should focus on the development of alliances to take advantage of niche market opportunities.

DFAIT's strategic priorities for the United States, which will focus on eight subsectors (business applications, education and training, graphics, application development and tools, client server, communications, system integrators and service providers) will be:

- to provide the missions with tools to effectively fulfil the delivery of market intelligence;
- to promote partnerships and strategic alliances through a series of regional events;
- to support current and prospective exporters through national stands at major events;

- to encourage the publication of articles in trade and mainstream media about Canadian IT in general and specific companies through tours to media centres in the United States;
- to describe U.S. developments through a newsletter to be distributed to Canadian industry;
- to maintain an ongoing liaison with Canadian industry associations;
- to promote and encourage U.S. buyers to attend key domestic Canadian events.

For its part, IC will commission research into attracting U.S. venture-capital investments in the Canadian software industry and assessing their impact.

Japan and Asian Newly Industrialized Countries (NICs)

Japan is the second-largest domestic market for software in the world. Japan's market for packaged software is changing rapidly, and is now open to foreign products.

Korea, Taiwan, China and the Association of Southeast Asian Nations (ASEAN) countries are emerging software markets of significance, and several Canadian companies have established successful alliances in Singapore and Hong Kong. Canadian exporters have done extremely well and have increased sales rapidly, but only a fraction of the market has been tapped. More information is needed on distribution channels and on the costs and details of adapting products to local markets.

With this in mind, key goals of Canadian missions will be to:

- provide the Canadian software industry with assistance in contracting consultants in the foreign country who can undertake custom market research;
- help the organizers of domestic Canadian trade events, such as Vancouver's Softworld '95, organize incoming missions of Japanese and Asian NICs' business delegates who are interested in Canadian software ventures.

Western Europe

The United Kingdom, Germany, France and Italy account for roughly two thirds of the European software market, which was estimated at \$24 billion in 1993. Companies such as Corel, Delrina, Eicon and Cognos have enjoyed notable success in Europe. Canadian software is well regarded, and benefits from the fact that North America is recognized as the leader in innovative software development. Professional services, data-processing and network services, and systems consulting represent an even greater opportunity, due to the European preference for custom solutions.

- The strategy will focus on the development of alliances to take advantage of niche market opportunities.
- Major Pan-European events such as CeBIT and SMAU will be leveraged to produce maximum value for the Canadian participants to develop alliances in all of Europe as well as in other participating countries.

Eastern and Central Europe

These markets present good opportunities for niche players of all sizes to establish relationships for the future.

- Missions will emphasize the development of market analyses and contacts to facilitate the identification of strategic alliance opportunities.

Mexico and Latin America

In 1993, the Mexican IT market was roughly \$2 billion, with hardware representing 62 percent, packaged software 12 percent, and services 26 percent. Business and government applications represented more than half the packaged software purchased. Several Canadian professional services and software firms have a permanent presence in Mexico, and many others have participated in trade missions. Copyright law is now enforced vigorously. The North American Free Trade Agreement (NAFTA) has resulted in a heightened

interest in Canadian IT offerings, and more Canadian companies should consider venturing into Latin America.

Industry Canada will:

- conduct a survey of software and computer service opportunities in government, health-care and financial services sectors in Mexico;
- conduct research on Canadian software and computer services firms doing business in Mexico and Latin America, to identify key success factors.

DFAIT will:

- leverage major Latin American events (e.g. Comdex Mexico, Comdex Brazil) to maximize results for Canadian participants;
- conduct strategic partnering missions to key Latin American markets;
- maintain the Canadian Business Centre in Mexico City as a showplace for Canadian suppliers and for special marketing events.

The federal government will continue to collect timely information on opportunities in Europe and in the fast-growing markets of Asia and Latin America.

References

The following publications can be obtained from Industry Canada:

- Abramson, Neil R. *Key Factors Affecting the Performance of Canadian Firms Doing Business in Japan and Korea*. December 1994.
- Abramson, Neil R. and Janet X. Ai. *Key Factors Affecting the Performance of Canadian Firms Doing Business in the People's Republic of China*. January 1994.
- Abramson, Neil R. and Henry W. Lane. *Key Factors Affecting the Performance of Canadian Companies in the United States*. December 1992.

- Francis, Dr. June N. P. and Scott Caldwell. *Export Strategies and Performance of the Information Technology Industry in British Columbia: An Industry Profile*. July 1994.
- Paterson, Dave. *Borrow Money Here*. August 1994. This is a directory of high-lending units of Canadian banks with experience in export financing.
- Pirovolakis, Christine. *U.S. Federal Information Technology FY95-96 Market Report*. August 1994.
- Venture Management Services. *Marketing Software in Europe: Observations from CeBIT '94*. April 1994.

DFAIT maintains a repository of market analyses and general information on geographic regions. Information can be obtained from (800) 267-8376 or through an interactive fax service (FaxLink) at (613) 944-4500.

Additional Marketing Aids

- The Virtual Marketplace: Supported by CATA, ITAC and the federal government, the Virtual Marketplace is a multimedia marketing kiosk promoting the Canadian IT industry and some 100 individual companies. The kiosk is ideal for display at major international trade shows. For information, call CATA at (613) 236-6550.
- For contact and profile information on Canadian computer software and services companies, which can be extracted from BOSS, WIN Export and the Branham500 database, call (613) 954-3286.
- Industry Canada's Insight diskettes, such as Insight resources for the IT industry and the Insight directory of contacts for Canadian software companies (under development). For information, call (613) 954-3286.

- For consultation of documents of special interest to the software industry (SPA publications, *The Culpepper's Letter*, Release 1.0, INPUT, Dataquest, etc.), contact Industry Canada's resource centre for the IT industry, at (613) 954-3286.
- For contacts and information on inclusion in DFAIT's Software Products for World Markets diskette, call (613) 996-1908.
- For contacts and information on the World Information Network for Exports (WIN Exports), call your local DFAIT International Trade Centre in the Industry Canada Regional Office.

A number of excellent directories, guides and reference books can be purchased from the following private agencies:

Culpepper and Associates Inc.
 7000 Peachtree Dunwoody Road
 Building 10
 Atlanta, GA 30328
 U.S.A.

Software Publishers Association
 1730 M Street N.W.
 Suite 700
 Washington, D.C. 20036-4510
 U.S.A.

Telecommunications

The telecommunications industry is made up of firms engaged in both the production of telecommunications products and equipment, and those involved in the provision of telecommunications services. The industry also manufactures products used in the production, broadcast and distribution of television and radio signals.

International Environment

The global market for the telecommunications industry was estimated at \$535 billion in 1992, and is expected to grow at an annual rate of 6.2 percent through the year 2000. Projected growth rates for different subsectors of this industry vary considerably. For example, demand for wireless and broadband products is expected to grow much more quickly than the average for the sector.

The global telecommunications industry is changing rapidly in response to a number of important developments, including:

- regulatory change;
- growing user demands;
- rapid technological evolution and convergence;
- industry restructuring;
- new global markets.

These interdependent trends have had a profound impact on the sector, and the challenge for Canadian firms is to understand and adjust to the changing competitive landscape. Success in this sector, more than any other, means looking at a domestic marketing strategy as just one part of an international marketing strategy.

Canadian Position

The telecommunications industry is essential to the Canadian economy, and Canadian companies have built on this need to develop world-class capabilities in a high-quality, reliable and widely accessible domestic telecommunications infrastructure.

In 1993, the total annual revenues for the Canadian telecommunications industry were

approximately \$26 billion. The breakdown of revenues was about \$9 billion for equipment and \$17 billion for services, which encompass cellular, reselling and paging services.

In 1992, equipment shipments were \$6 million, more than the apparent domestic market (ADM) of \$5.9 million. The value of shipments has grown at an average annual rate of close to 5 percent over the past five years. The equipment sector's contribution to Canada's manufacturing gross domestic product (GDP) exceeded the contribution of the aircraft and pharmaceutical sectors. There has been no growth in the ADM for telecommunications equipment since 1989, resulting in the growing importance of exports to this sector. With imports of \$2294 million and exports of \$2302 million, the sector had a modest trade surplus of \$8 million for 1992.

The telecommunications equipment segment of the industry is not homogeneous in terms of firm size, geographic distribution or employment. Northern Telecom is by far the largest telecommunications company in Canada, with 1993 revenues of \$8.1 billion and 58 000 employees worldwide. About 30 smaller firms have annual revenues in excess of \$5 million. This group includes MITEL, Gandalf, Newbridge and Glenayre. In addition, there are close to 300 small firms acting as specialized components suppliers or software developers. Overall, it is estimated that the top 30 companies account for over 90 percent of the equipment industry's revenue. The sector directly employs close to 45 500 people in Canada, and domestic ownership in the industry is high.

The success of the equipment sector to date can be traced to Northern Telecom's emergence as a global player striving for world market

leadership and to these second-tier and smaller firms, whose strengths lie in the technological excellence of their products and in their ability to identify and fill market niches. The industry will continue to be competitive in world markets if it actively builds on its technology strengths through extensive research and development (R&D) to consolidate the core technologies base in microelectronics, photonics and software development, while striving to develop a highly focussed and consistent marketing approach to growth niches. The sector's strong international orientation, as measured by its export success, is testament to its entrepreneurial vigour and its ability to compete in global markets.

Strategic Direction

In today's rapidly changing and complex environment, it is difficult to pinpoint specific countries or even regions that may hold greater potential than others. It is clear that immense export opportunities exist, both with traditional trading partners and in new markets. The geographic priorities identified here are not intended to suggest that firms will not find opportunities and niche markets in other parts of the world.

Major thrusts in 1995-96 will include:

- improving market access and market information by increasing domestic awareness of market opportunities through incoming missions and regional market studies;
- increasing the visibility of Canadian telecom companies and introducing new exporters to marketplaces through participation in trade shows, promotional activities and educational activities under the new exporters programs;
- promoting foreign investment and strategic alliances in the sector in order to attract high-technology firms to Canada.

Geographic Priorities

More detailed information is available from Industry Canada marketing managers. They can be reached by contacting the office listed at the end of this section.

United States

The United States continues to be the primary export market for most Canadian telecom companies. In 1992, 60.9 percent of Canadian exports of telecommunications products went to the United States, compared with 8.3 percent to China (the next largest country to which Canada exported), followed by Mexico with 2.1 percent. Capital expenditures for telecommunications are expected to double by the end of this decade, so the U.S. market represents the greatest opportunity for Canadian small- and medium-sized enterprises (SMEs), particularly those new to exporting. Canadian telecom companies must continue to take advantage of the North American Free Trade Agreement (NAFTA) and develop strategies to retain Canada's share of the market.

Latin America

A telecommunications revolution is currently under way in Latin America, highlighted by significant moves toward privatization, liberalization, and development of private networks. In Mexico, Argentina, Venezuela and Chile, telephone companies have been privatized, creating investment opportunities for foreign buyers and bringing much-needed foreign capital into the companies and countries involved, while at the same time creating opportunities for new competitive services. Over the next five years, this will result in investment of over \$20 billion in Mexico, Argentina and Chile alone. Foreign suppliers will have tremendous opportunities in these markets, which are backed by the purchasing power of some of the world's largest telephone companies.

Mexico is a high priority in Canada's marketing plans for the coming year. The NAFTA, ongoing privatization and deregulation

will bring new opportunities. Telecommunications expenditures over the next decade are expected to be between \$15 billion and \$18 billion. This sector is becoming more competitive as international companies recognize market opportunities in this rapidly growing country of 88 million people. At present, few Canadian telecom companies are active in Mexico, with the exception of Northern Telecom. Canada represents less than 3 percent of total telecommunications exports to Mexico.

Major market opportunities in Mexico include approximately \$100 million worth of rural telecommunications contracts; major investments in analog microwave systems; large central office switches; major expansions in private networks, cellular base stations, and an expected \$8-million spectrum management contract to be awarded by the Secretariat de Comunicaciones y Transportes (SCT).

Extensive privatization has already taken place in Chile, making it an active market. A modernization program is under way, and private networks are being established. Several Canadian companies have successfully penetrated the market, and marketing activity is expected to intensify.

Venezuela, which has one of the least-developed telecommunications infrastructures in South America, has recently privatized its national telephone company (CANTV), and accelerated the pace of privatization and liberalization. In addition, the telecommunications sector is being deregulated, which will create an increased market as new capital is invested and private networks are established. Financing for Venezuela is available from the Export Development Corporation (EDC), and several lines of credit are available.

After many years of chaos, the Argentinian telecommunications environment is beginning to stabilize. The national phone company has been privatized and sold to international consortia, and the market has been opened for the development of private networks to stimulate further investment. Domestic flight capital is being repatriated

for investment in a telecommunications infrastructure, including a possible satellite project. Canadian companies are interested in the market for both equity participation and equipment sales. Availability of financing has improved greatly over the last year, and EDC has recently opened several lines of credit.

Finally, Brazil's telecom market has great potential because of its large population, geographic size and relatively underdeveloped infrastructure. As a result, the state-owned carriers have established a telecom budget of over US\$30 billion to 1997. Brazil's government is expected to abandon its restrictive trade practices and Canadian exporters should be prepared to take advantage of new opportunities to establish partnership arrangements. The most promising opportunity in Brazil in 1995-96 stems from the privatization of value-added telecommunications services, which should result in consulting opportunities.

Asia-Pacific

Next to the United States, Canada's best trading partners are the countries of the Asia-Pacific region. Although Canada has an overall trade deficit with Asia in the information technologies and telecommunications sectors, our position is improving overall. China is the largest market in the region, but Taiwan, Korea, Hong Kong, and the Association of Southeast Asian Nations (ASEAN) economies are also promising.

China is the largest telecommunications market in the world. Statistics for 1993 reveal tremendous growth in the country's telephone network: 12 million new telephone lines were installed, bringing the total to about 40 million. By the year 2000, China plans to have an exchange capacity of more than 100 million lines and 65 million telephones. In 1993, investment in fixed assets reached US\$4.6 billion, 2.5 times the investment in 1992. In 1993, Canadian exports of telecommunications products to China were valued at over \$200 million.

The focus on China in the coming year will include increasing links with the Ministry of Electronics Industries, which is assuming a greater role in the development of the telecommunications market with Jitong and Liantong; increasing links with provincial telecom authorities whose power bases are growing as the Ministry of Posts and Telecommunications (MPT) is increasingly unable to cope with developmental demands; and maintaining a close relationship with the MPT.

The 1992 domestic market for telecommunications in Korea had an estimated value of US\$2.3 billion, amounting to a growth of 15 percent over 1991. The Korean telecommunications market is projected to reach US\$4.5 billion in value by 1996, and US\$12.5 billion by 2001. By 1995, Korean and other companies will be permitted to enter the international long-distance market, provided they offer full service to the entire Korean domestic long-distance market and make unspecified minimum expenditures on R&D. Before these changes are implemented, telephone rates will be restructured to reduce domestic long-distance rates and increase local rates, so that domestic long-distance service no longer subsidizes local service.

The legal distinction between wire and wireless telecommunications businesses will be eliminated, and Korea will soon clarify its position on competition in several new telecommunications fields, including personal communications service (PCS); trunk radio service (TRS); CT-2; and low orbit satellite communications. Competition is also expected in the domestic public telephone network. Korea Telecom, which will be permitted to go into the equipment business, has begun to investigate strategic alliances with international equipment providers, including Northern Telecom, with a view to becoming a global telecommunications company.

The focus on Korea in the coming year will include tracking liberalization developments in the telecommunications market; encouraging increases in foreign access; and signing an

agreement on the mutual recognition of equipment type approvals.

Hong Kong enjoys a level of telephone service similar to that in Canada. With 42 lines per 100 people, the highest in Southeast Asia, the network is fully digitized. The Telecommunications Authority, formerly part of the General Post Office, has a broad telecommunications mandate. The Hong Kong government is currently introducing competition in fixed-wire services. Three companies have already been awarded contracts for fixed telecommunications network services, and are expected to spend between \$1.2 billion and \$2 billion to establish their networks. Competition is also expected to be introduced in cable television in 1996. Also important for Canada are Hong Kong's close ties with China. Canadian companies established in Hong Kong are extremely active in selling to all levels of the telecommunications hierarchy in China and are poised to invest in the Chinese market as soon as possible.

Viet Nam's telecommunications environment is profoundly underdeveloped, with one of the lowest penetration rates in the world, at 0.3 lines per 100 people. The equipment is antiquated and inadequate. Recent moves by the government to slightly decentralize the Vietnamese economy and make telecommunications development a priority, have made Viet Nam an increasingly attractive market. Canada will assist by identifying and attempting to fulfil Viet Nam's telecommunications training needs; tracking market developments and liberalization policies in the telecommunications sector; and providing companies wishing to enter the Vietnamese market with information on contacts, market opportunities and financing.

Southeast Asia and Australasia represent some of the largest telecommunications markets in the world. The mixture of developed countries with well-defined facilities and developing countries with very limited infrastructures but incredible demand creates enormous market potential for virtually all technologies, including the latest

computer-based, value-added services. Sophisticated systems can be found in Singapore, Australia and New Zealand, including broadband and other state-of-the-art features, while less sophisticated facilities are found in Thailand, Indonesia, Malaysia and the Philippines. International financing from the World Bank, the Asian Development Bank and supplier credits make multimillion-dollar projects a reality for countries and firms willing to establish a presence in this dynamic and rapidly changing market.

The focus on Southeast Asia in the coming year will include encouraging decision makers to participate in selected trade shows that promote Canadian technology; conducting technical seminars on targeted technologies; supporting high-level incoming and outgoing visits by senior officials to promote dialogue and increase opportunities; and participation in Pacific Telecommunications Conference (PTC), and Asia-Pacific Economic Co-operation (APEC) working groups to support Canadian industry.

Eastern Europe

The European Bank for Reconstruction and Development (EBRD) has approved a \$100-million-plus financing package for Central and Eastern European countries to advance telecommunications projects. Central European businesses stand to benefit from this and other demonstrations of confidence. Credit Suisse First Boston has introduced a \$200-million equity investment fund for the region. The Central European Growth Fund will be the first international fund to focus exclusively on Central Europe.

The World Bank is setting a new direction for its telecommunications activities by shifting its policies squarely behind telecom liberalization. The International Finance Corporation (IFC), a World Bank lending affiliate, has shifted the focus of its telecom loans to Eastern Europe. In May 1994, the IFC established Central European Telecommunications Investment Ltd. (CETI), a venture capital company that will fund telcos,

cable television companies, cellular ventures, paging, data and wireless networks. CETI will focus its investments primarily in Poland, Hungary, the Czech Republic and Slovakia, and will also fund opportunities in Bulgaria, Romania, Slovenia, Croatia, Ukraine, Belarus and the Baltics. A total of \$100 million is expected to be raised.

These positive factors plus a strong funding program maintained by DFAIT's Renaissance Program for Central and Eastern Europe, make this target area a high priority for Canadian telecom companies.

South Africa

Telkom (South Africa) has launched a first draft proposal for its contribution to the government's reconstruction and development program. A proposal for a capital investment of \$2.9 billion over a five-year period is under discussion with the South African government, trade unions and the National Telecommunications Forum. The money will be used to substantially increase the penetration of basic services in underdeveloped urban and remote areas. An affirmative action program is already being undertaken within Telkom. The European Investment Bank is expected to start lending operations in South Africa in 1995, and the World Bank will take on projects through its office in Johannesburg. An incoming mission from South Africa to Canada is expected in 1995, and Canada will participate in the Telkom Conference and Exhibition in March-April 1995.

Europe

Canada's second-highest trade surplus in information technology and telecommunications (IT&T) is with Europe, after the United States, and companies will continue to find opportunities there. For example, in the Netherlands, opportunities exist in cellular telephony, satellite communications, and information highway systems and applications. In Turkey, there is interest in VSAT and privatization of the PTT promises to create consulting and investment opportunities. Canada will also continue to

pursue its close ties with France through bilateral consultations in April 1995. Telecom '95 will take place in Geneva, with strong Canadian representation by both government and the private sector.

Other Strategic Directions in Telecommunications

Industry Canada (IC) launched the Telecommunications Products Sector Campaign (TPSC), a set of interrelated initiatives that will help this sector's SMEs to compete internationally.

The TPSC's objective is to help SMEs respond more quickly to changes in technology and user needs, and to build on existing strengths to help Canadian firms become internationally competitive. The following initiatives are proposed:

Industry Consortia: Industry will be encouraged to undertake collaborative projects and to form local and international partnerships.

Standards: Telecommunications equipment firms will be encouraged to improve their awareness of, participation in and adoption of technical standards in order to capitalize on global market opportunities.

Industry Representation: Industry will be asked to provide input to government policy development to maximize the benefits of these policies to the sector.

References

The following publications can be obtained from Industry Canada:

- Abramson, Neil R. *Key Factors Affecting the Performance of Canadian Firms Doing Business in Japan and Korea*. December 1994.
- Abramson, Neil R. and Janet X. Ai. *Key Factors Affecting the Performance of Canadian Firms Doing Business in the People's Republic of China*. January 1994.
- Abramson, Neil R. and Henry W. Lane. *Key Factors Affecting the Performance of Canadian Companies in the United States*. December 1992.
- Francis, Dr. June N. P. and Scott Caldwell. *Export Strategies and Performance of the Information Technology Industry in British Columbia: An Industry Profile*. July 1994.
- Paterson, Dave. *Borrow Money Here*. August 1994. This is a directory of high-lending units of Canadian banks, with experience in export financing.
- Pirovolakis, Christine. *U.S. Federal Information Technology FY95-96 Market Report*. August 1994.

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Information Technologies and Telecommunications

Activity	Date	Location	Dept.	Contact
Africa and the Middle East				
South Africa Computer Fair - Info Booth	May-95	Johannesburg	DFAIT	613-944-6590
Maghreb Visitors, Salon Informatique	Jun-95	Montréal	DFAIT	613-944-0396
Telecommunications Mission to East Africa	Jun-95	Kenya, Uganda	DFAIT	613-944-6586
Telecom '95 - Visitors from Africa and Middle East	Oct-95	Geneva	DFAIT	613-944-6994
Outgoing Mission to West Africa	Oct-95	Abidjan	DFAIT	613-944-6579
Telecommunications Mission to South Africa	Nov-95	Johannesburg	DFAIT	613-944-6590
Journées Techniques du Maghreb	Dec-95	Rabat, Tunis	DFAIT	613-944-8134
MECOM Bahrain	Jan-96	Bahrain	IC	613-990-4211
Mission to Saudi Comm '96	Jan-96	Riyadh	DFAIT	613-944-5984
Telecommunication Mission from Iran	Feb-96	Montréal, Toronto	DFAIT	613-944-7029
Overview of South Africa Information Technology Sector	Mar-96	Johannesburg	DFAIT	613-944-6590
Asia-Pacific South				
Demo of Teleconferencing Technology in New Zealand	Aug-95	Auckland	DFAIT	613-995-7652
Quebec Info Tech Mission to Indonesia	Sep-95	Jakarta, Surabaya	Quebec	514-499-2167
Geomatics Partnering Project - Asia-Pacific South	Sep-95	TBD	DFAIT	613-995-9617
Software Market Study - Update	Sep-95	Seoul	DFAIT	613-995-8744
Software Partnering Project - Asia-Pacific South	Sep-95	TBD	DFAIT	613-995-9617
Telecommunications Partnering Project - Asia	Sep-95	TBD	DFAIT	613-995-8956
Microelectronics Partnering Project - Asia	Sep-95	TBD	DFAIT	613-995-8956
Cable and Telephone Market Opportunities Study	Oct-95	Various	IC	506-851-6533
Telecan R&D Partnering	Oct-95	Japan, Korea	Ontario	416-325-6783
Comdex Asia - Info Booth	26-Oct-95	Singapore	DFAIT	613-996-5824
Elecrama '96 - Info Booth	Jan-96	Bombay	DFAIT	613-996-5903
Canada				
Distance Education Mission from New Zealand	Apr-95	Montréal, Vancouver, Toronto	DFAIT	613-995-7652
Strategic Alliance Seminars - South Pacific	Sep-95	Various/Asia	DFAIT	613-995-7652

Note: Dates and locations are subject to change.

Activity	Date	Location	Dept.	Contact
Central/Eastern Europe and the Commonwealth of Independent States				
Geomatics Market Study	Apr-95	Poland	DFAIT	613-996-7107
Communications Tech '95 - Info Booth	Apr-95	Prague	DFAIT	613-996-7107
Info Technology Mission	Apr-95	Budapest	DFAIT	613-992-1449
Info System '95	11-Apr-95	Warsaw	DFAIT	613-996-7107
Telecommunications Market Study	May-95	Poland	DFAIT	613-996-7107
Ocean Remote Sensing Mission to Russia	11-Jun-95	St. Petersburg	IC	902-426-8454
Modern Electronics Fair '95 - Info Booth and Mission	Oct-95	Ljubljana	DFAIT	613-992-1449
Invex - Computer '95 - Info Booth and Mission	10-Oct-95	Brno	DFAIT	613-996-7107
Mission to Turkey Telecom '95	17-Nov-95	Istanbul	IC	613-990-4211
Telecommunications Mission to Poland	10-Mar-96	Poland	DFAIT	613-996-7107
East Asia				
Incoming Mission: Canadian Cable Television Association	TBD	Canada	DFAIT	613-990-4232
Datacom Mission from China	Apr-95	Canada	IC	613-990-4232
Geomatics Market Study	Apr-95	Korea	DFAIT	613-995-8744
Computer '95 - Info Booth	May-95	Hong Kong	DFAIT	613-995-6962
Rural Telecom Mission from China	May-95	Canada	DFAIT	613-995-6962
Telecommunications Joint Venture Mission to India	May-95	India/Various	DFAIT	613-996-5903
Taiwan Ministerial Mission to CATA Conference	May-95	Calgary	DFAIT	613-995-8744
East Asia Mission to CCTA Conference	May-95	Montréal	DFAIT	613-995-8744
Van Seminar	May-95	Seoul	DFAIT	613-995-8744
APEC Technomart - National Stand	May-95	Taejon	DFAIT	613-995-8744
Korea Laser Products Market Study	May-95	Seoul	DFAIT	613-995-8744
Remote Sensing Industrial Co-operation	Jun-95	Taipei	DFAIT	613-995-8744
Korean CATV Mission to Canada	Jun-95	Banff	DFAIT	613-995-8744
Computer Peripherals Market Study	Jul-95	Seoul	DFAIT	613-995-8744
CATV Trade Show - Info Booth	Jul-95	Seoul	DFAIT	613-995-8744
Taipei Computer Application Show - National Stand	Aug-95	Taipei	DFAIT	613-995-8744
Taipei Satellite & Cable '95 - Info Booth	Sep-95	Taipei	DFAIT	613-995-8744
Comnet '95 - Info Booth	Sep-95	Seoul	DFAIT	613-995-8744
Media Mission from Japan	Sep-95	Canada/Various	DFAIT	613-996-2460
Taipei Telecom '95 - National Stand	27-Sep-95	Taipei	DFAIT	613-995-8744
China International Electronics and Telecom Show - Info Booth	Oct-95	Shanghai	DFAIT	613-995-6962
Software Mission	Oct-95	Singapore	IC	613-954-3284
Geomatics Mission to Korea	Oct-95	Seoul	DFAIT	613-995-8744
Viet Nam Telecomp '95 - National Stand	15-Nov-95	Hanoi	DFAIT	613-995-8649

Activity	Date	Location	Dept.	Contact
Telecom Market Study Update	Dec-95	Korea	DFAIT	613-995-8744
Computer Mission to Asia	Feb-96	Bangkok	IC	613-954-3454
Expo Comm China '96 - Info Booth	Oct-96	Beijing	DFAIT	613-995-6962
Japan				
Joint Canada-Japan Workshop on Satellite Communications	TBD	Japan	IC	613-990-4293
NTT (Nippon Telegraph and Telephone) Mission	TBD	Cross-Canada tour	IC	613-990-4293
Fifth Canada-Japan Telecommunications Exchange	Apr-95	Japan	DFAIT	613-996-2460
Latin America and the Caribbean				
Comexpo '95 - Info Booth	Apr-95	Caracas	DFAIT	613-996-5548
Mission to Telnets '95	May-95	Monterrey	Ontario	416-325-6792
Rural Telephony Seminar Workshop	15-May-95	Mexico City	IC	613-998-0416
Software Mission to Mexico	Jun-95	Mexico	IC	613-954-3284
Comdex - SUCESU - National Stand	Aug-95	Sao Paulo	DFAIT	613-996-5549
Canadian Software Networking Day in Mexico	Sep-95	Mexico	IC	613-954-3284
Geomatics Partnering Project - Latin America	Sep-95	TBD	DFAIT	613-995-9617
Software Partnering Project - Latin America	Sep-95	TBD	DFAIT	613-995-9617
Telecommunications Partnering Project - Latin America	Sep-95	TBD	DFAIT	613-995-8956
GIS Solo Seminar	Nov-95	Mexico	DFAIT	613-995-8742
Info Tech Solo Show	Nov-95	Mexico City	DFAIT	613-995-8742
Comdex Mexico '96 - Info Booth	Mar-96	Mexico	DFAIT	613-995-8742
Multiple Markets				
Incoming Visitors to CATA '95 Conference	03-May-95	Calgary	DFAIT	613-996-1908
Corel World Conference and Exhibition	Jun-95	Ottawa	IC	613-954-3294
Visitors from United States, Europe to International Symposium Software Engineering	21-Aug-95	Montréal, Quebec	IC	613-954-2855
Incoming Visitors from United States, Asia, Europe to Softworld '95	25-Sep-95	Vancouver	DFAIT	613-954-3294
Mission to Softworld '96	Sep-96	Halifax	IC	902-426-8454
Incoming Visitors to Intercomm '97	Feb-97	Vancouver	DFAIT	613-996-1908
United States				
Wireless Sector Mission	TBD	Los Angeles	DFAIT	613-944-6577
Partnership Seminar: Information Super Highway	TBD	Princeton	DFAIT	613-944-6577
Telecommunications Market Study	TBD	Dallas	DFAIT	613-944-6577
Telecommunications Market Survey	TBD	Seattle	DFAIT	613-944-6577
NEBS Telecommunications Mission	TBD	New York	DFAIT	613-944-6577
Partnership Events, Computer Software and Services - U.S.	TBD	Various	DFAIT	613-944-6576

Activity	Date	Location	Dept.	Contact
Outgoing Partnering Mission	Apr-95	New England	DFAIT	613-944-6577
Software Strategic Alliance (Follow-up)	Apr-95	Minneapolis	IC	612-333-4641
Info Tech Newsletter - U.S.	Apr-95	Ottawa	DFAIT	613-944-6576
Technology Inflow Mission, Outgoing	Apr-95	Atlanta	DFAIT	404-577-6810
Market Study of New York Regional Electronics Industry	May-95	New York	DFAIT	613-944-5149
Software Partnering Mission	May-95	Boston	DFAIT	617-262-3760
Telecom Partnering Seminar	May-95	New York	DFAIT	609-452-0777
Strategic Partnering Round Table	May-95	Boise	DFAIT	206-443-1777
Midwest Electronics Expo - Info Booth	Jun-95	Minneapolis	DFAIT	613-944-5149
Telecom Mission from New York	Jun-95	Montréal, Ottawa	DFAIT	613-944-6577
Software Seminar & Partnering Event	Jun-95	New York	DFAIT	212-596-1600
Showcase of Canadian Software (Princeton)	Jun-95	New York	DFAIT	609-452-0777
PCEXPO '95 - National Stand	Jun-95	New York	DFAIT	613-944-6576
Computer/Communications Mission from Chicago	Jun-95	Canada	DFAIT	312-616-1860
Chicago Mission to Comdex '95	Jul-95	Toronto	DFAIT	613-944-6576
U.S. Missions to Comdex/PacRim	Jul-95	Vancouver	DFAIT	613-944-6576
Multimedia Strategic Alliance Mission from Cincinnati	Aug-95	Regina	DFAIT	613-944-6577
SETA '95 Market Report	Aug-95	Atlanta	DFAIT	613-944-6577
Strategic Alliance Mission from Atlanta	Sep-95	Alberta	DFAIT	613-944-6577
Voice and Data Transmission Mission from Eastern U.S.	Sep-95	Ottawa	DFAIT	613-944-6577
Info Tech Partnering Seminar	Sep-95	Los Angeles	DFAIT	408-289-1157
Missions from U.S. to Softworld	Sep-95	TBD	DFAIT	613-944-6576
Geomatics Round Table	Sep-95	Boston	DFAIT	617-262-3760
Software Partnering Mission	26-Sep-95	Boston	IC	506-851-6479
National Association of State Telecomm Directors - Info Booth	30-Sep-95	Little Rock	DFAIT	613-944-6577
Geomatics Mission from New England States	Oct-95	Halifax	IC	902-426-8454
Wescon - National Stand	Oct-95	Los Angeles	DFAIT	613-944-5149
Software - Multimedia Courseware NEBS to Boston	Oct-95	Boston	IC	506-851-6479
Electronic Networking Mission to Boston	Oct-95	Boston	IC	709-772-4918
Iowa Info Tech Strategic Alliance Program	Oct-95	Minneapolis	DFAIT	612-333-4641
Colorado Software Strategic Alliances	Oct-95	Denver	DFAIT	612-333-4641
Wireless Telecom Market Study	Oct-95	Los Angeles	DFAIT	613-944-6577
Communications Managers' Association	Nov-95	New York	DFAIT	613-944-6577
Matchmaking Seminar in Conjunction with COMNET	Nov-95	Washington, D.C.	DFAIT	613-944-6577
Process Control Technologies and Software Mission	Nov-95	Boston	IC	902-426-8454
Info Tech Investor Breakfast Seminar	Nov-95	Los Angeles	DFAIT	213-687-7432
Systems Integrators Partnering Project	Nov-95	Chicago	DFAIT	312-616-1860

Activity	Date	Location	Dept.	Contact
Software Mission to California	Nov-95	Santa Clara	IC	613-954-3284
Pacific Telecommunications Conference - Info Booth	Jan-96	Honolulu	IC	613-990-4213
New Exporters to Border States Mission - Software	Jan-96	Seattle	IC	604-666-1443
Wireless Market Study Seminar	Jan-96	Los Angeles	DFAIT	613-944-6577
Matchmaking Seminar (Telecom)	Jan-96	Washington	DFAIT	202-682-1740
Multimedia Software Mission	Feb-96	New England	IC	902-426-9416
Software - Multimedia NEBS	Feb-96	Boston	IC	506-851-6421
Mission to Intercomm '96	Feb-96	Miami	Ontario	416-325-6656
Mission to SPA Spring Conference	Mar-96	San Francisco	Ontario	416-325-6656
Entelec '95 - Matchmaking Event	Mar-96	Dallas	DFAIT	214-922-9806
Telesolutions Conference	Mar-96	Toronto	Ontario	416-325-6815
National Broadcasters' Association - National Stand	Apr-96	Las Vegas	DFAIT	613-944-6577
Comdex/Spring - National Stand	May-96	Atlanta	DFAIT	613-944-6576
PCEXPO '96 - National Stand	Jun-96	New York	DFAIT	613-944-6576

Western Europe and European Union

SMAU '95 - National Stand	Sep-95	Milan	DFAIT	613-995-6435
Electronics - Atlantic Canada Mission to Hannover Fair	TBD	Munich	IC	506-851-6421
Telecommunications Mission to the Netherlands	Apr-95	The Hague	DFAIT	613-995-6435
Mission to Applied Software Engineering Centre	Apr-95	TBD	IC	613-954-2855
TMAB - Info Booth and Seminar	May-95	Brussels	DFAIT	613-996-1530
Document Management Mission to Europe	May-95	Montreaux	IC	613-954-3454
Telecommunications Sellers' Mission to Italy	May-95	Rome, Milan	DFAIT	613-995-6435
Geotechnica '95 - Info Booth and Partnering Mission	May-95	Bonn	DFAIT	613-995-9617
Thessaloniki International Trade Fair - Info Booth	Sep-95	Thessaloniki	DFAIT	613-995-6435
ESAP Geomatics Partnering Project	Sep-95	TBD	DFAIT	613-995-9617
ESAP Software Partnering Project	Sep-95	TBD	DFAIT	613-995-9617
ESAP Telecommunications Partnering Project	Sep-95	TBD	DFAIT	613-995-8956
ESAP Microelectronics Partnering Project	Sep-95	TBD	DFAIT	613-995-8956
Mission to SMAU '95	Sep-95	Italy	Ontario	416-325-6507
Telecom '95 - National Stand	3-Oct-95	Geneva	DFAIT	613-995-6435
Telecommunication Partnership Mission to Western Europe	16-Oct-95	Western Europe	IC	613-954-3315
IT Forum with SM - Info Booth	Feb-96	Paris	DFAIT	613-995-6435
CeBIT '96 - National Stand and Mission	Mar-96	Hannover	DFAIT	613-995-6435
Electronica '96 - National Stand	Nov-96	Munich	DFAIT	613-995-6435
CeBIT '97 - National Stand	Mar-97	Munich	DFAIT	613-995-6435

Acronyms and Initialisms Used in The International Trade Business Plan

(This list does not include sector-specific references)

ACOA	Atlantic Canada Opportunities Agency	IC	Industry Canada
AG Can	Agriculture and Agri-Food Canada	IDRC	International Development Research Centre
ASEAN	Association of Southeast Asian Nations	IFI	international financial institution
BBS	electronic bulletin board system	ISO	International Standards Organization
BOSS	Business Opportunities Sourcing System	ITBP	International Trade Business Plan
CCC	Canadian Commercial Corporation	ITC	International Trade Centre
CIDA	Canadian International Development Agency	MAPAQ	Ministry of Agriculture, Fisheries and Food of Quebec
CIS	Commonwealth of Independent States	MDB	multilateral development bank
CSA	Canadian Standards Association	NAFTA	North American Free Trade Agreement
DFAIT	Department of Foreign Affairs and International Trade	NATO	North Atlantic Treaty Organization
DFO	Department of Fisheries and Oceans	NRC	National Research Council
DND	Department of National Defence	NRCan	Natural Resources Canada
EC	Environment Canada	NRCan-CFS	Natural Resources Canada - Canadian Forest Service
EDC	Export Development Corporation	OECD	Organization for Economic Co-operation and Development
EU	European Union	PEMD	Program for Export Marketing Development
FITT	Forum for International Trade Training	R&D	research and development
FORDQ	Federal Office of Regional Development - Quebec	SMEs	small- and medium-sized enterprises
FSU	former Soviet Union	UNEP	United Nations Environmental Program
FTA	Canada-U.S. Free Trade Agreement	WED	Western Economic Diversification
GATT	General Agreement on Tariffs and Trade	WTO	World Trade Organization
GDP	gross domestic product		
GNP	gross national product		
HRDC	Human Resources Development Canada		



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