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THE INFORMATION HIGHWAY

Avenues for Expanding Canada's Economy, Employment, and Productivity in the New World Marketplace

**A Report on Strategic Positioning of the
Content Industries for Network Delivery**

prepared for
Information Technology Industry Branch
Industry Canada

by
Burke Campbell

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May 1994

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l'emploi et de la productivité dans un nouveau marché mondial.*



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Preface

This report discusses emerging global electronic networks, their uses and their impact on our society. As with two earlier reports published by the author, which deal with Artificial Intelligence-based expert systems and multimedia, the present report considers the new technology and its dramatic influence on culture, business, employment, and exports. This series of three reports describes the major and fundamental changes this new technology will effect in Canada in the next three years.

During the creation of this report in early 1994, the popular press was filled with headlines about the mergers of giant corporations. These mergers are mostly between those who own the networks, and those who possess the content that will travel over them. In the United States, these corporations included Time Warner, US West, Paramount and Viacom. In Quebec, the consortium Universal Bi-directional Interactive (UBI) was created, and in Ontario, Rogers Communications Inc. has merged with Maclean Hunter Ltd. These new mammoth corporations, with their complement of newspapers, magazines, radio and television, will promote and accelerate these technological changes.

In February 1994, the Information Technology Association of Canada (ITAC) and Canadian Advanced Technology Association (CATA) conducted Powering Up North America — Realizing the Information Infrastructure for a Knowledge-based Continent, a high-profile conference in Toronto attended by the elite of Canada's information industry. The two-day conference featured formal and informal discussion about electronic networks and their transforming effects on our world. Another conference, Racing towards Millennium — The Three Trillion Dollar Information Superhighway, was held in May 1994. Much of what will travel over the Information Highway will be multimedia products and services. Accordingly, in May, Multimedia 94 showcased this country's rapidly emerging multimedia industry.

Canada has made a profound transition from an industrial to a technological society. This country's economy, once based on natural resources such as timber, fish, hydro-electric power, agriculture and minerals, has given way to a new economic order. Now our wealth depends on vital but less tangible commodities such as knowledge, information, ideas, and expertise. This global shift in what constitutes a country's wealth has placed Canada at a crossroads. Rich in resources needed for the new world marketplace, Canada must learn to take advantage of the countless opportunities for creating jobs and opening vast new markets. Solutions to economic difficulties will be found not through more government spending but by developing new perspectives that identify and permit the use of existing resources.

In the past, discussions have focused on a technology-driven marketplace. Now, with the building of the Information Highway, industry must turn its attention to what will travel these global networks. As consumer demand rises for cultural and educational wares, the market will become increasingly content-driven. For this reason, this study stresses the importance of the content industries, and how they will furnish this country with products for both home and foreign markets.

In exploring these new perspectives, this report gives examples of how they are key to our economic prosperity, employment and productivity. It is written to inform those in government, business and education who are the builders of the Information Highway, or the creators of the content for it. At the same time, the scope of this undertaking is broad, eclectically drawing on examples from a variety of industries, not just those having to do with culture, education, or training. As a result, anyone wishing to become acquainted with the changes that are now transforming our society will find this work informative and enlightening.

Biographical Note on the Author

Burke Campbell

Burke Campbell is a Toronto writer whose dramas have been produced by CBC Radio. In 1982, he wrote the first novel written on computer, published electronically and worldwide over the computer network. In 1991, he wrote the sequel to that novel with the assistance of an Artificial Intelligence-based expert system. These events were reported by United Press International, and they received national and international coverage.

Mr. Campbell has written two reports for the federal government:

- *Canadian Expert Systems Software: Applications in the Marketing of Canadian Cultural Industries*, 1992
- *Multimedia: An Awakening Giant/Its Benefits and Strategic Impact on Canada's Cultural Industries*, 1993.

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The writer is currently a research associate at the University of Toronto and the Media Studio of the British Columbia Institute of Technology. He is also a member of the development committee for the Electronic Publishing Program at the Banff Publishing Workshop, Banff Centre for the Arts in Alberta.

Executive Summary

Electronic Networks Create a Global Marketplace and Economy

Electronic networks are the foundation of the global marketplace. Products and services travel these networks, across the face of the earth. Attempts are under way to assemble these existing systems into a seamless “network of networks” or Information Highway, which will permit unprecedented communications, trade, and market opportunities.

Much discussion has focused on the technologies that will be used to build this Highway. However, of equal importance is the “content” that will travel over these networks. Without content, the so-called Information Highway is an empty road which cannot produce revenues. This report investigates ideas for content, identifying resources or remarking on how existing resources might be better used. There are also examples of networked products and services throughout North America. When relevant, this study speculates on the impact networks and their content will have on our society.

The Content Industries

For the purposes of this report, the Content Industries are defined as:

- publishing (books, periodicals, newspapers, data bases, etc.)
- film and video (feature films, shorts, industrial or non-theatrical films)
- sound recording (compact disks and cassettes)
- broadcasting (television and radio)
- video game industry (such as Nintendo, Sega, and Atari)
- computer software industry (not all, but significant portions of courseware, computer games, CD-ROM-based products)

The Learning Industries

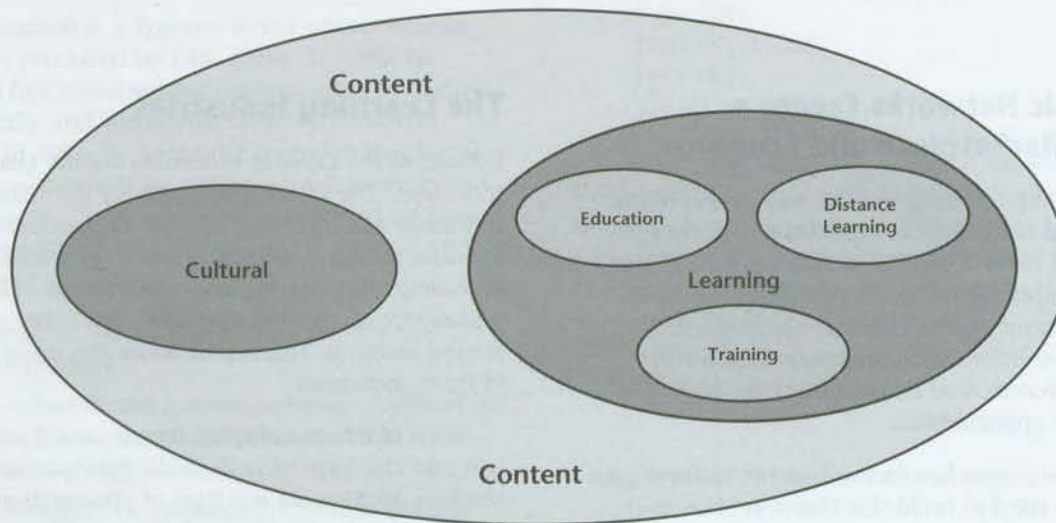
Related to the Content Industries are the Learning Industries. The two key markets for the Learning Industries are education and training. Education includes primary, secondary and post-secondary schooling. Training includes job training, skills enhancement, training upgrades, and other job-related learning. This report addresses many aspects of these industries.

Much of the content that travels over the networks will take the form of multimedia products and services. Multimedia is a type of presentation that involves the directed control of several forms of communications, such as text display, graphics, still imagery, animation, sound, and music. A multimedia presentation is a composite of many audio-visual sources and allows the discriminating viewer to proceed at a desired pace and with some level of interaction. The user controls the order and speed of the presentation. With some systems the user or viewer can import information from various sources, merging them into a new assembly or package and thus creating a new presentation, product or service. Multimedia can be sold as products or services, and is also used to develop these products and services.

Canadian Domestic Markets Merge with Global Ones

Although many traditional industries have declined, major new ones have emerged. Through decisive action, Canadians can participate in the growth of these industries. In the United States, the massive entertainment industry has become one of the fastest growing, creating thousands of new jobs. Aspects of entertainment have integrated with education to create a multimillion-dollar market for computer “edutainment” products. Both the entertainment and education markets offers global opportunities for the Canadian cultural and learning industries. Electronic networks and declining trade barriers have caused Canada’s domestic markets to merge with the larger world marketplace. To seize a share of this vast new market, Canada’s content industries must:

Figure 1 — The Content Industries



The Content Industries include Cultural and Learning Industries.
The Learning Industries include Education, Distance Learning, and Training.

- develop global strategies
- identify existing resources and use them to create products and services
- create products and services for export to the world
- centralize industry-related information in networked data bases
- develop new ways of raising venture capital.

Moreover, government institutions must:

- be given incentives which encourage the identification of and use of existing resources
- ally or partner directly with industry to create revenue-generating content.

Although the content industries may continue to create products and services for our home markets, they also exist to supply the world marketplace. While in the past it may have been appropriate for Canadian industries to cater to an exclusively Canadian audience, it is untenable in today's technological environment. Canadian product, while specific to our culture, is universal in its appeal.

Artists Play Strategic Role in Multimedia Production

A great deal of the content that travels across the Information Highway will be multimedia products and services. Multimedia products, presentations, or promotions will play a key role in every major enterprise. Canada's emerging multimedia industry has experienced phenomenal growth. Multimedia production relies on a wide variety of creative talent. Artists have become necessary factors of production in this industry as film and video makers, visual and graphic artists, designers, writers, actors, and musicians contribute content. As well, they offer ideas and concepts for both the design and use of services and products. Several Canadian cities, especially those with a history of investing in the arts, have demonstrated strengths in becoming multimedia centres.

Converging Industries Create Problems for Hierarchic Government

New media, such as multimedia, have sped the merging of the various cultural branches — film and video, television and radio programming, publishing, and sound recording — into a single industry. The entertainment and learning industries have integrated into a gigantic whole. Historically, government has categorized its administrative and jurisdictional domains. However, as technologies and industries converge, these divisional lines cannot be maintained. Government and other organizations, which rule from the top down and which attempt to divide up “turf” along sharp jurisdictional lines, are at odds with the very nature of our new society. Too many Canadian institutions have not yet psychologically adjusted to the fact that we are a technological society and no longer an industrial one. As a result of this misperception, these institutions can exacerbate the problems they set out to alleviate. Eventually, hierarchical organizations must become less structured and more responsive to current social needs.

Developing the Perspective to Identify and Use Resources

Canada's economy has shifted from an industrial-based to a knowledge-based economy. Increasingly, Canada's resources and exports are information, expertise, and knowledge. Although the nature of our economy has changed, Canadian industries and institutions have not psychologically adjusted to this new reality. As a result, they frequently lack the perspective to identify, understand and use existing resources. The development of this perspective is paramount in finding solutions to our present problems of manufacturing and distribution, especially in the content industries.

The Primacy of Language in a Knowledge-based Economy

Canada's new knowledge-based economy is the by-product of human thought. Complex thought depends to a large extent on the knowledge and use of language. Scientists, computer engineers, and other professionals may use a highly technical, even artificial language, in their work. But for the most part, we rely on everyday language to understand,

debate, develop, and apply the discoveries of scientists and technologists. The larger our vocabulary, the easier it is for us to discern, to understand and describe subtleties, to refine our perceptions and express ourselves. Natural languages, such as French and English, are essential to thinking. Therefore, it is central to Canada's economic future that citizens be taught to read, write, and express themselves verbally. Language and the use of language produces knowledge, which is the basis of the new economic order.

Canada's Learning Industries Produce Exports

Education and training are now a continuous process, spanning a person's lifetime. More and more, training will be technology-based, complementing and in some cases replacing traditional training methods. The provinces, which have jurisdiction over education, have pioneered distance learning. Assisted by the federal government, they have created sophisticated educational networks. Within the past two years, American and European educational products have begun to flood the market. With little content of their own, Canadian networks will basically exist to benefit foreign interests. To avoid this, the provinces and the federal government should cooperate to create content for the learning industries. This content should not be created exclusively for Canadians, but for a world market. Canadians have the resources to make the learning industries a major export. Many Canadian educational and training products are already accepted by American and European clients. The learning industries cater to a vast international market and content should be produced which instructs not only Canadians, but also the world.

Canadians Expect Information-on-Demand

More and more, people expect that information is available when and where they want it. They expect to make a bank withdrawal, enjoy entertainment, or be educated at their convenience. Increasingly, government, corporations, and educational institutions can no longer control information as they once did. As information-on-demand becomes part of our everyday mentality, Canada will change dramatically. Canadian society, once governed from the top down,

will be directed from the bottom up. In particular, a powerful consumer-driven marketplace will direct Canadian government, business, and educational institutions, eventually defining their role in a new world order.

Social Imperatives Will Help Develop the Information Highway

Ultimately, the Information Highway is a manifestation of social imperatives which demand greater autonomy, freedom, and communicative powers for the individual. These forces have created the phenomenal growth and acceptance of technology such as the personal computer, cellular telephone, and the Internet. Government and corporations must assist the consumer's desire to have a flexible and responsive communications environment. Such a system, with universal access, will by its own dynamic not only create a greater market, but also generate further industry and employment.

Introduction

Over the past decade, new technologies have transformed our world. At first these appeared as separate and unrelated developments. Recently, however, it has become apparent that they are rapidly converging. Computers, telecommunications, television, and other technologies have become increasingly integrated. This integration is creating a gigantic global marketplace where the information, entertainment, and learning industries merge. The formation of this worldwide market affects every aspect of our lives and institutions. In 1971 (only 23 years ago!), this extraordinary historic event was clearly foreseen by the federal Department of Communications.

Some computer experts forecast that the marriage of computers and communications systems, if it can be successfully consummated, may generate, within the next two decades, social changes more profound than those of the past 200 years.

— *Instant World*, Department
of Communications

Part of this technological development is the emergence of electronic networks. Linking cities, countries, and continents, these networks enable products and services to travel instantly around the globe. In fact, these networks are the foundation and lifeline of the global marketplace, for without them this marketplace could not exist. Recently, government and business have seen the need to assist in linking these networks into a seamless whole, thus facilitating commerce, trade, and research. The creation of this so-called Information Highway is made more urgent by the needs of a voracious consumer market. This consumer-driven market has in fact forced major corporations to merge with rival companies in the hopes of cashing in on what some analysts call a "trillion-dollar bonanza."

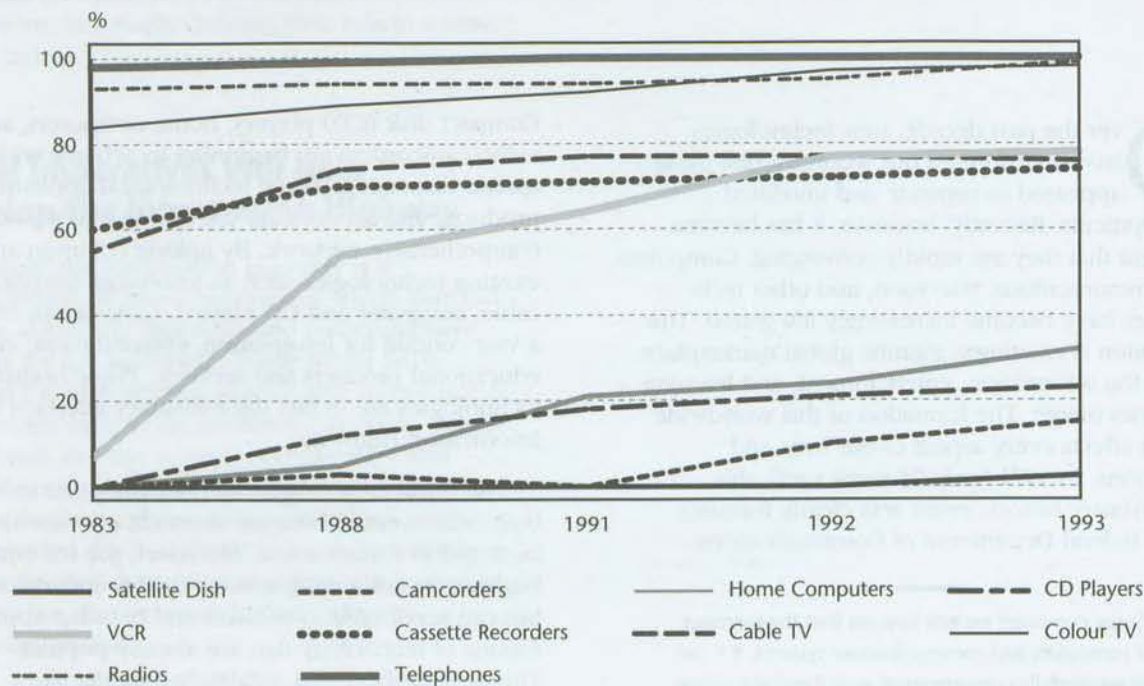
In Canada, the penetration level of consumer technologies is among the highest in the world. Market survey figures from Statistics Canada suggest that telephones, radios, and colour television are almost universal in the Canadian home (Figure 2). Also, cable television, cassette recorders and video cassette recorders (VCRs) are widely available.

Compact disk (CD) players, home computers, and video camcorders are beginning to achieve widespread dispersion. These technological appliances, products, and services are the key to a new and comprehensive network. By linking common and existing technologies such as television, telephone, cable, computer and CD players, Canada can create a vast conduit for information, entertainment, and educational products and services. These household technologies are in fact the consumer interface to the Information Highway.

The Information Highway does not need to be built from scratch, because elements of it are already here and in common use. Moreover, the Information Highway is not a wild, science-fiction undertaking, but can serve now to connect and broaden applications of technology that are already popular. Throughout the 1980s, established media like telephone and television began to integrate with newer ones such as cable television, VCRs, home computers and CD players. Although we may see explosive new media growth in everything from satellite dishes to camcorders to CD-ROM players, it is the convergence of established and new media that in the next few years will revolutionize every aspect of our society. For example, introduced a little over a decade ago, the Automatic Teller Machine (ATM), which dispenses money at any hour, changed consumer notions of banking and spending. When these machines are further mated with consumer technologies such as television and shopping networks, it will be possible to shop from home locally or internationally, fundamentally altering the way we buy and sell. Matching up the telephone, fax machine, and computer has made it increasingly feasible and desirable for employees to work at home, rather than commute to busy downtown cores. In short, the refinement and merging of these technologies may prove to be as profound a phenomenon as their invention.

If properly understood and managed, the integration and convergence of all of these disparate technologies can bring new wealth and employment. Therefore, it is crucial that Canada facilitate the completion of this Information Highway. Our continued abundance depends upon it. It is essential

Figure 2 — Popularity of Household Media Equipment



Source: Statistics Canada.

that Canadians understand the nature of this Highway, and how its implementation creates employment, increases productivity, and propels this country into the 21st century. This report explores some of the ways in which Canada can create its future.

Purpose and Objectives of Report

The ideas expressed in this report have been culled from interviews with professionals in business, government, education, and the private sector. Wherever germinal, their ideas and concepts have been developed further. Information has been gathered by referral and from the author's own continent-wide network, which includes academic, corporate, and media sources. This methodology of receiving information from a wide variety of sources provides insight into repercussions for the whole of society. Even if information is duplicated, it is often submitted from a different perspective. These differences permit a more informed view of the technology and the role it will play in shaping our culture, economy, and trade. For the most part,

technical terminology has been rendered in simple, accessible language.

In general, available and upcoming technology will answer our societal needs. Therefore, our task is to understand what our needs are so that we will know what demands to make on our technology. For this reason, the report concentrates on consumer trends and societal directions. The focus will be on industries that provide content for consumers, especially content that will flow over the electronic networks. These content industries include the cultural and learning industries, as well as related technologies such as certain software and multi-media, which are employed in product and service creation and distribution.

An Information Highway without content is an empty road which cannot return investment. More disturbing yet, the Highway can annihilate our individuality and culture if it carries in only American, European, and other foreign programs, services, and perspectives. Therefore, this report emphasizes the relationship of the "carriage" (the network itself) to the "content" (the programming that travels over the network) and how these are interdependent. This

study also points out that many participants in government, business, and education have yet to identify their resources. These resources are of great value and can be used to generate revenue and create employment for thousands of Canadians.

Finally, electronic networks are not dumb or passive carriers of text, image, and sound. Rather, they can create new business relationships and jobs, as well as whole new industries. Accordingly, this study explores ways in which the Information Highway will be the dynamo and turbine to generate employment and exports.

New Methods of Information Gathering: The Role of the Professional Scout

Corporations attempt to create products and services the public wants. They pour billions of dollars into research and development, as well as praise the notion of innovation. But many corporations and institutions follow their own internal agendas and ambitions, creating products and services which have little to do with the real needs of the larger society. These bureaucracies are often insulated from the signals, pressures, and inspirations of the marketplace. Corporations, by their nature, tend to be removed from the street, from the needs and wants of a consumer-driven market which they must serve in order to survive.

The market today is more varied and volatile than ever before. In order for corporations and governments to keep informed, they must have special "scouts." These scouts monitor the market in general and specific ways, noting innovations that often go unnoticed, and discerning trends that are likely to culminate in one large wave. Such scouts need not belong to any one corporation or government department. Rather, their value lies in their being free agents, able to observe the market firsthand and objectively assessing significant factors or events. Their observations can introduce or verify valuable perspectives and provide needed guidance using available technology innovatively. They offer views of the marketplace outside the sometimes narrow vision of the corporate structure. Such views will become increasingly necessary in a market that is becoming less and less structured.

The Changed Nature of Consulting in a World of Instant Communications

In the past, consulting firms targeted select groups and individual experts, gathering information in formal interviews and techniques. Information gathered in this fashion was accurate but researched in a vacuum — it was data gathered by and for an elite professional class and by its nature removed from the street and the real forces at work in a user-driven market.

New market research techniques are far more fluid and unstructured, with information gathered at any hour of the day or night, by telephone, voice messaging, faxes, computers, and global electronic networks. Information is gathered from a broad spectrum of professionals in various disciplines. These data are combined and integrated with incoming impressions of the larger society and what is happening in the street.

Traditional consulting firms find out what the public wants by circulating questionnaires and conducting sample market survey groups, but such undertakings are not always successful. The public have trouble articulating what they want before they can sample it in some tangible form in the marketplace. For example, no consumer questionnaire could have predicted the enthusiastic public acceptance of the Ford Mustang sports car, the home computer, or the Internet. Often, it takes an unscientific entrepreneurial hunch or a designer's intuition to anticipate market needs and emerging trends.

Mining Anecdotal Information at the Cutting Edge

As our society changes quickly, traditional methods of research prove inadequate. Those working at the so-called "cutting edge" of technological and other development have little time to report fully on their findings.

If you're at the frontlines, you're too busy working to write about it.

— An IT Professional

More and more, professionals with ideas, opinions, observations, and valuable insights are too involved in their work, frantic schedules, and ongoing deadlines to adequately reflect on and express their views. As a result, a researcher must cull information on significant discoveries or trends for society at large by means of anecdotes from one-on-one interviews, in person or by telephone or e-mail.

This anecdotal information is gathered at several levels or layers. The researcher seeks not only the technical data, but also an understanding of the various conditions, aspirations, stresses and anxieties of those working in a given field. Through contacts with government, business, education, the press, and the private sector, the researcher learns about various social and market trends and the forces driving them.

Such an understanding is important because ultimately the plethora of new and disparate technologies will converge into a seamless whole. This convergence is being forced by a consumer-driven market that demands easy-to-use, compatible technologies, ones which lend themselves to useful integration. To plan for such a society, it is essential to have an informed overview, not just of one sector or technology, but of many — and to relate this information to the real world.

Content Industries in Canada: Providers for the Global Networks

This report focuses on both Canadian and non-Canadian examples of content for the Information Highway and speculates how content might be produced and distributed. Identifying existing resources, the report also shows how these can be best utilized in the new world environment. The Canadian content industries will provide the networks with products, services, and other commodities that generate revenue, as well as advertise and promote this country all over the globe. The quality of these wares, many of them utilizing multimedia technology, will profile Canada as a centre of cutting-edge technological development. Providing content for the new global networks may well become one of Canada's major sources of revenue.

This section discusses manufacturing, distributing, and promoting content and why this is essential to our economy. Many Canadian institutions are reservoirs of content material which can be repackaged and sold. It identifies new resources, develop new perspectives, and discusses how the creation and global distribution of content affect employment, the economy, and new industries. These are examined in the context of social and cultural changes that are unfolding as Canada completes its transition from an industrial to a technological country that must now compete in a global market.

Content Providers: Definitions

Throughout the discussion, the content industries include:

- publishing (books, periodicals, newspapers, data bases, etc.)
- film and video (feature films, shorts, industrial or non-theatrical films)
- sound recording (primarily music)
- broadcasting (television and radio)
- video game industry (such as Nintendo, Sega, Atari)
- computer software industry (not all, but significant portions, including courseware, computer games, and CD-ROM-based products).

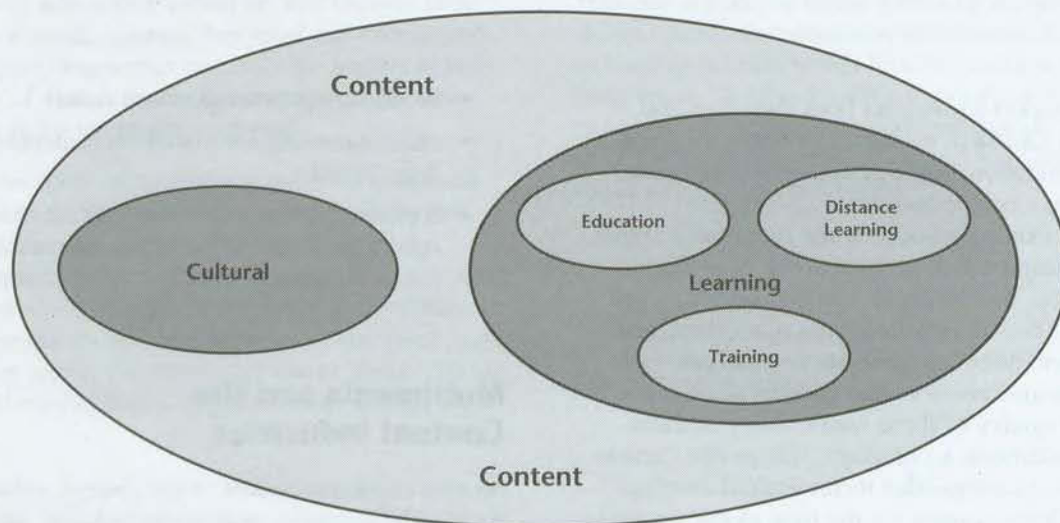
Multimedia and the Content Industries

An important component of the content industry is the rapidly emerging multimedia industry. Multimedia is a type of presentation that involves the directed control of several forms of communication, such as text display, graphics, still imagery, animation, sound, and music. A multimedia presentation is a composite using many audio-visual sources and allows the discriminating viewer to proceed at a desired pace and with some level of interaction. With television, for instance, the viewer is passive and cannot control the media events or pace within a given program. With multimedia, the viewer can control the order and speed of the presentation. In certain cases, the user or viewer can import information from various sources and merge them into a new assembly or package, thus creating a new presentation, product or service. Multimedia is also an essential production tool for the content industry, used to create products and services.

In Canada, this industry has mushroomed so suddenly that many in corporations and government still have no real understanding of its importance, particularly the strategic role it will play in the production and marketing of other industries. For example, merchandising kiosks, a common form of networked multimedia applications for marketing, numbered 65 000 in the United States in 1991. This number is expected to jump to 1.5 million by 1995.¹ In fact, the kiosk is the public consumer interface,

¹ Bohdan O. Szuprowicz, "Multimedia Networking and Communications," a report by Computer Technology Research Corp. (Charleston, S.C.: Computer Technology Research Corp., 1994), Ch. 4, p. 41.

Figure 3 — The Content Industries



The Content Industries include Cultural and Learning Industries.
The Learning Industries include Education, Distance Learning, and Training.

and may emphasize applications that differ from the private consumer interface, or from that found in the home. Once the kiosk is connected to online networks, it moves beyond information exchange and into the arena of interactive transaction. It may then be used to advertise, market, and sell everything from real estate to tourism to entertainment.

Some American buyers are already aware of the importance of Canada's multimedia industry. The Toronto firm Milestone Entertainment, a member of the Multiple Images Group, produced and held worldwide TV broadcast rights to the first awards show for "interactive" media. Presented in Los Angeles in June 1994 by the Academy of Interactive Arts and Sciences Awards, the awards honoured the best in interactive movies, television and music, virtual reality and compact disks, as well as interactive video games.² In response to growing interest, Multiple Images has recently opened an office in New York City to aggressively pursue CD-ROM titles and interactive online services, including interactive television in the American market.

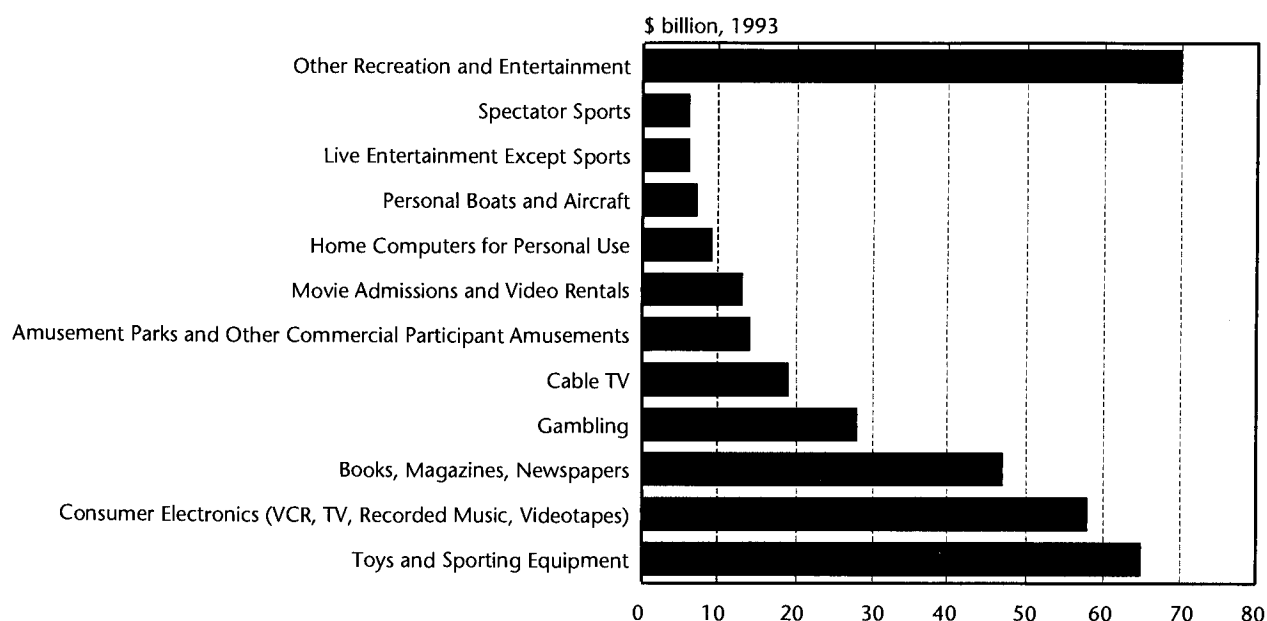
Artists Become Factors of Production in the Multimedia Industry

Multimedia production relies on a wide variety of creative talent. Artists are necessary factors of production in the multimedia industry. Film and video makers, visual and graphic artists, designers, writers, actors, and musicians contribute content. As well, they offer ideas and concepts for both the design and use of services and products. Several Canadian cities, especially those with a history of investing in the arts, have demonstrated strengths in becoming multimedia centres.

Many nations are now technologically proficient. Still, Canada, with its particular culture and cultural bias, may be particularly fortunate in its use and deployment of new technology. Major American centres have the wealth and technical ability to create, design, and market entertainment and learning products for a mass audience. But often these same centres do not necessarily possess the needed array of creative skills required to develop the most competitive products, especially in the area

² *Marketing*, January 1994.

Figure 4 — U.S. Consumer Spending on Recreation and Entertainment



Source: *Business Week*, The Entertainment Economy, March 14, 1994.

of multimedia wares. Without a large and diverse artistic community to partner with, the technological industries may find they lack the creative talents and “streetwise” intuition to create and adapt technology for a mass market. Hence, the artist has a vital role to play in multimedia production.

As cultural — and other — multimedia products and services become more and more refined, artistic skill and imagination provide what is often a subtle but critical improvement in the presentation. This improvement becomes the competitive edge in the information-glutted marketplace.

— **Michael Keefe, Director of Multimedia,**
Multiple Images Inc., Toronto

Some other countries, because of their abundance, enjoy an advantage over us in the marketplace. However, if Canadians are shrewd in applying their special skills and insights in design, manufacturing, and production, they will secure an ample share of the global market. Canadian skills and expertise are renowned far outside of Canada. For instance, corporations such as Disney Studios in Los Angeles routinely advertise for Canadian graphic artists in *The Globe and Mail* newspaper. It goes without

saying that in many areas ranging from the technological to the artistic, Canadians rank with the best in the world, and in some cases are the best.

Initiatives Promote Canada's Multimedia Industry

For purposes of growth, trade and export, it is critical to profile Canada's multimedia industry. A promising initiative currently under way is the match-up of Canadian and American multimedia developers. Catharine Arnston originated and managed a project commissioned by the Canadian Consulate General in Boston, Massachusetts. The project (to create a directory of multimedia strategic alliance partners in Canada and New England) provides information for content providers, publishers, multimedia developers and suppliers to form effective partnerships. It also serves as an extensive resource, identifying multimedia shows, publications, marketing channels and other key multimedia contacts in the United States and Canada. In spite of the short timeframe allotted to completion of this project, the response from both American and Canadian multimedia communities had been far larger than expected. This confirms not only

the level of interest but also the need for this kind of information and cooperation. The multimedia alliance directory (available as of May 1994) contains the names of over 700 companies and detailed information about their multimedia products and plans for future joint ventures. Ideally, such a directory should be stored in a data base and made available electronically, with the capability to include profiles on all Canadian and American multimedia developers. Again, Canadians have skills and talents that are needed in the marketplace. This need will create jobs and vital industries. Of note, it may be such individual initiatives as the creation of a directory, newsletter, or toll-free number that wind up having significant impact on this country's economy. Often, it is the simple idea, simply executed, that outperforms costly and elaborate schemes.

In the United States, the \$340-billion entertainment industry has become the central growth area for the economy. Multimedia is an integral component of the entertainment industry and one of the most dynamic in terms of job creation.

From the perspective of wages, the most promising segment of entertainment is the evolving business of multimedia technology. Companies are luring educated and creative people with well-paying jobs. Crystal Dynamics Inc., for example, now employs 60 staffers, up from 3 just 15 months ago, to design computer games for PCs and the new 3DO player.

Salaries for new hires at the Palo Alto-based company range from \$30 000 to \$100 000.

— *Business Week*, March 14, 1994, p. 63

Changing Definitions in the Global Lexicon

In the past decade, changes in our society have altered commonplace notions of what we mean when we speak of work, play, and learning. This section explores how these changes have come about, and how they affect our daily lives, as individuals and collectively.

Traditional Definitions and Concepts Undergo Fundamental Change

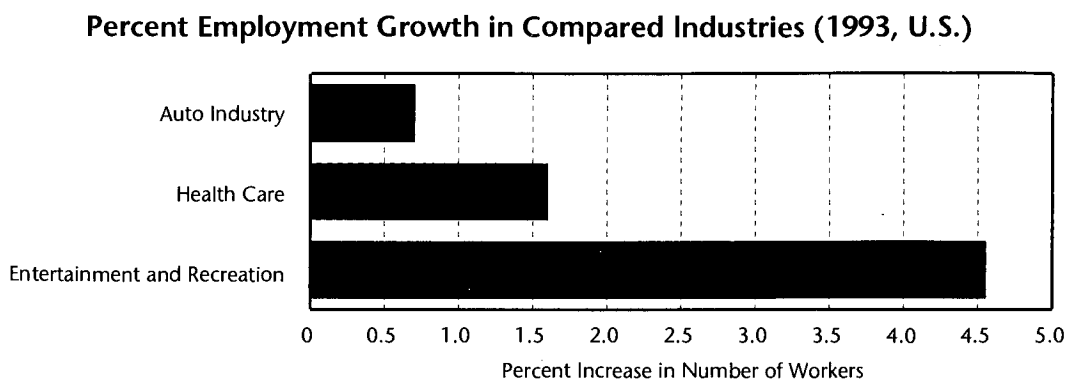
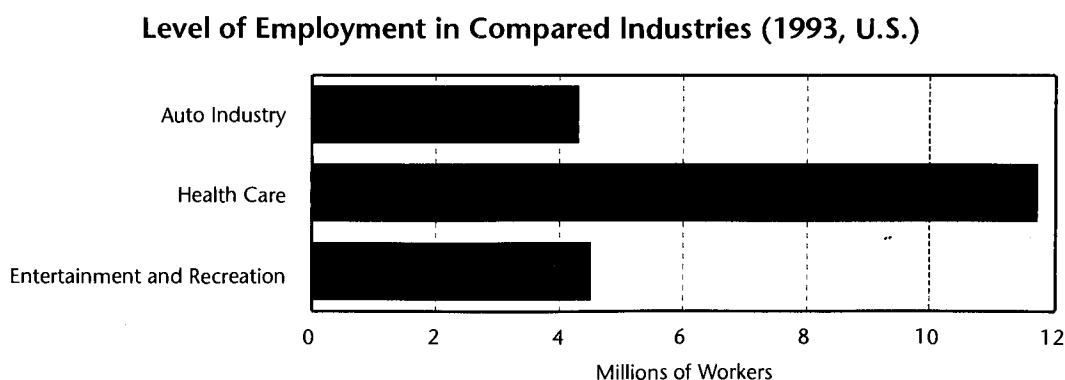
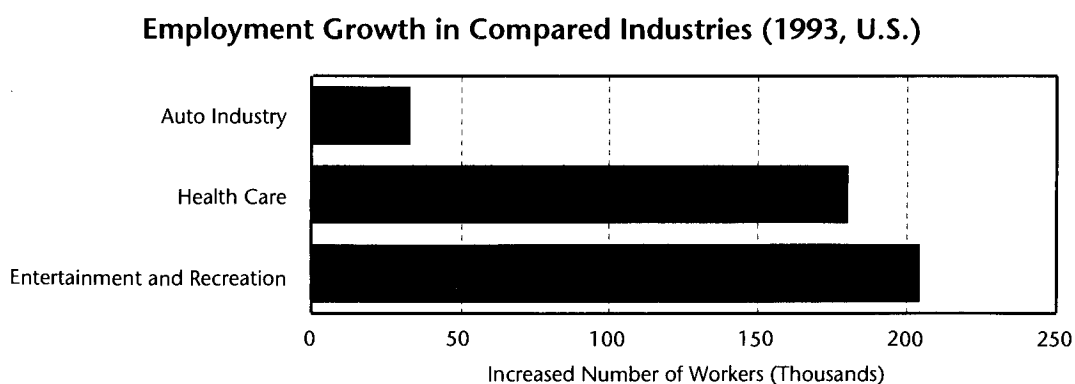
New technologies, including electronic networks, have changed every aspect of society. In particular, they have broken down the divisions in traditional industries. For example, the cultural industries — which include film and video, publishing, and sound recording — are all components of multimedia technology, which works to integrate image, text, and sound. In recent months, giant communications companies have formed mergers with major entertainment corporations, further hastening the synthesis of the traditional cultural industries with other industries, such as video games, learning products, and software. As computer and communications technology converge, these industries will continue to integrate, ultimately creating one massive and interconnected “content industry.”

These changes, monumental in scope, cause us to reappraise our familiar definitions, divisions, and concepts, an important and vital task. Through this process of examining and revising our terminology, we will better understand how to formulate strategy and take advantage of the new order. Furthermore, our ongoing scrutiny of traditional definitions will help us develop informed perspectives. These perspectives alone will prove to be our most valuable resource.

New Definitions of Work, Education and Educators, and Resources

As our society undergoes great changes, the meanings of words and phrases also change. In language, the meaning of words depends largely on context. As our whole society has undergone transformation, everyday words take on new interpretations. Examinations of these words offer clues to the changes that affect the larger society. The following are a few examples and comments:

Figure 5 — Employment Level and Growth in the Entertainment and Recreation Industry Compared to the Health Care and Auto Industries



Source: *Business Week*, March 14, 1994, report on *The Entertainment Economy*.

Work, Employment, and Job

In the popular sense and in an industrial society, the terms “work,” “employment,” and “job” were used interchangeably. Usually, a person attained employment or was hired for a job. This provided him or her with work. The job description covered a series of routine tasks, performed during a prescribed number of hours at a specific location. Most urban dwellers found a 9-to-5 job, hopefully one that lasted years, and in some cases, a lifetime. The employer described the job, and the worker filled it.

Today, we no longer live in an industrial society, but a technological one. In Canada, our economy is increasingly based on information and knowledge. For this reason, a worker is valued by the way he or she gathers, produces, distills, interprets, and presents information and knowledge. Most often, it doesn't matter at what hour this is done or where the worker lives, since the products (memos, reports, photos, design specs, product descriptions, or software testing and results) can be transferred electronically and instantly as required.

While many traditional jobs are vanishing, such as in the manufacturing sector, new ones are constantly emerging. These new jobs do not always come from government or business, at least not directly. Generally, job seekers must learn to create their own jobs. Unfortunately, a sizable portion of Canada's work force was never taught entrepreneurial skills, although such skills are becoming increasingly necessary in today's economy. Most workers have been told what their skills or talents are in relation to available work. They have rarely developed a perspective of their total skills (and of the value of those skills) beyond a pre-defined category or job description. The result: workers are without sufficient self-awareness of their own talents to adequately market their skills.

Education

In the popular sense, education began in elementary school and ended with a degree from university, after which the fresh graduate emerged, prepared for a lifetime of work. Now, in a society in the midst of major changes, technical skills learned at any level may become obsolete within years, and in some cases, months. For example, over the past decade the medical profession has had to race to keep up with the onslaught of new scientific discoveries and a technology that has transformed

medical practice. Today, the term “education” must now refer to a lifelong pursuit, in which the individual actively gathers needed information by means of a thousand different networks or channels.

Educator

Educators may no longer merely convey information to students. Rather, they assist in helping them cope with the increasing tide of information. Educators teach students how to navigate through the data searching for themes, relationships, and help them think conceptually. Students are being exposed to a technology which means fewer lessons in a classroom conducted by a teacher and more time to selectively retrieve information via television, video, interactive instruction, and the computer. More and more, learners will obtain information instantly on their own, relying on the teacher mainly to educate them in how to grasp essential principles, ideas, and concepts.

In the past, bulk memory work played a large part in education. Students were required to ingest large amounts of facts and figures, whether they actually understood them or not. Increasingly this information is available on command. It is now more important to be able to know what to look for — to see the connections that make sense of a thousand random facts and figures.

The job market has become unstructured, requiring an individual to have new and unexpected skill sets. We can no longer expect any individual to know, possess, or anticipate all of these requirements. Education, then, can play a key role in developing a keen and agile eye for themes, connections, and concepts. This will encourage a confidence in perspective that will guide a person through an ever-changing and often bewildering landscape.

Resources

If our ideas about work, education, and educators have changed, so have our notions about resources. Traditional Canadian resources are fishing, timber, hydro-electric power, mining ore, and agriculture. However, more and more, we sell what we think; that is to say, we sell expertise, information, and knowledge. Technology allows these new commodities to travel instantly all over the globe. Canadian universities and government agencies, such as Statistics Canada have produced quality statistical data. Such data are a major commodity in the new

world marketplace. If properly packaged and delivered, information of this type is now viewed as a valuable resource.

In all of the terms mentioned above, the words have remained the same but the meaning or implication has changed. Definitions must be discussed and updated, testing and refining commonly used terminology in the wake of extraordinary societal changes. This understanding of the terms we use is part of a necessary process by which we harness and, to a greater degree, manage these changes.

New Strategies and Solutions for Canadian Industries in the World Marketplace

While Canada produces excellent goods and services that could be successfully marketed globally, many Canadian businesses do not have the resources to profile their wares beyond our borders. Now with the rapid evolution of electronic networks, unexpected solutions often occur.

Roswell Computer Books, a Halifax bookstore, recently listed the store's inventory of 4 500 computer-related titles on a computer network serving the Atlantic provinces. The store owner hoped to attract a few hundred inquiries a month. However, the regional network was linked to the Internet, which connects 20 million users in 91 countries, and is doubling in size every 10 months. In the first month, thousands of orders poured in to Roswell Computer Books, the majority coming from places such as Singapore, France, Norway, the United Kingdom, and places outside Canada.³

Canadian film animators are routinely recruited by major American companies such as Disney Studios. There is such demand for Canadian talent that companies such as Bardel Animation in Vancouver compete with American corporations for skilled animators. Such examples remind us that Canadians no longer cater to an exclusively Canadian audience. Rather, we sell to the world.

Technology for the Content Industries Becomes More Accessible

Recently, the price of computer and related technology has fallen considerably. Computers that only three years ago cost \$3 500 are now selling for under \$1 000. Bulky laser printers which five years ago sold for upward of \$4 000 are now closely rivaled by other technologies. For example, Canon's small, compact bubble-jet printers offer quality printing for under \$500. Fax machines which used to cost up to \$1 000 have been increasingly replaced by fax cards for the computer which are under \$100.

Publishing is one area in particular which has been revolutionized by affordable technology. For instance, Microsoft's Office Version 4 software, priced at around \$1 000, is a suite of programs for Microsoft's popular Windows. Such software makes the act of writing and document design a single function, permitting both a lone writer and a large publisher to create manuscripts. Technology has become more and more affordable every year, and this has permitted the content industries to create products and services for less.

The rising popularity of multimedia products and services has also worked to drive down the price of consumer technology, and has intensified the need to implement global channels of distribution.

The networked multimedia developments in the consumer market are of great significance because its huge size provides an incentive to investors. As a result, hardware and software products facilitating implementation of interactive networked multimedia applications may come to market sooner at more competitive prices than would otherwise be the case.

— **Bohdan O. Szuprowicz, *Multimedia Networking and Communications***

³ *Canadian Business Magazine*, December 1993.

As networked multimedia products and services proliferate, content providers can produce the content more cheaply, with the promise of extensive and global distribution. The creation of the Information Highway will also permit the enterprising content producer to market goods and services directly, bypassing such traditional distributors as publishers, record companies, and even film studios.

New Resources From Old

Canada has abundant and unseen resources. Our manufacturing, production, and distribution problems are often perceptual rather than real. In the content industries, institutions such as TV Ontario, Canadian Broadcasting Corporation, National Film Board, Stratford Festival, and our museums and cultural agencies are storehouses of valuable commodities. Unfortunately, the bulk of these treasures are rarely viewed and they lie shut away in libraries and archives.

For example, the archives of the CBC contain thousands of programs from radio, television, music, news, interviews, and film; in fact, more cultural and historical information about Canada than any library could. Much of this information could be repackaged, and presented to an international audience in a variety of new entertainment and educational formats. In the case of TV Ontario and the CBC, most programs are broadcast only once or twice a year. More and more, it will be possible to make these available to an audience upon demand. Such programs could be made available via networks to a world audience. In the case of live works such as drama, little attempt is made to record these for distribution to a wider audience.

On all levels of government, Canadians are often leaders in public debate, planning, and projects. Records of this process are seen as news and ultimately as part of our history. However, these records — contained in documents, photographs, sound, film, and video — are potential exports. Properly edited and presented, they are an instructive product to assist other governments in the management of their own particular problems. Although our laws are different from those of other countries,

the way we discuss and act upon urban and other problems can be a useful model to others. In the recent discussion of a public health care system for the United States, time and again reference was made to the Canadian model. What was of interest was not only our health care system, but also the process by which it evolved. In the global marketplace, it is essential for Canadians to develop a perspective on the strengths of their own cultural assets.

We can expect these assets or skills to translate into services and products for a world audience. Quite often we may not understand our own resources. But as we expand our trade with other countries, we will, through experience and interaction, gain a more detailed understanding of how to exploit our advantage. This perceptual awareness of our skills will translate into enhanced products and services, as well as a greater knowledge of how to market them.

Consumer-driven Market Forces New Alliances and Directions in Business

In the past year, the daily press was filled with announcements of major corporate mergers preparing to take advantage of a burgeoning consumer marketplace. In May 1993, US West, the major American Telephone Company, invested \$2.5 billion in Time Warner Inc. to create a new network with various programming drawn from the entertainment and publishing giant's huge libraries. Time Warner and US West intend to pour \$5 billion into a full-service interactive system which will allow television viewers to order whatever programming they want "when they want it; shopping for virtually anything they need; checking bank balances to see if they can afford what they just bought."⁴

This year in Quebec, Universal Bi-directional Interactive (UBI) (a consortium made up of Le Groupe Vidéotron Ltée, New York-based Hearst Corporation, National Bank of Canada, Hydro-Québec, Loto-Québec and Canada Post Corporation) has come together on a \$750-million project to offer home banking and shopping, electronic mail and advertising, and tutoring. The project will begin in spring 1995.⁵

⁴ *Newsweek*, May 31, 1993.

⁵ *Financial Post*, January 25, 1994.

Also, Rogers Communications Inc. has merged with Maclean Hunter Ltd., and in the U.S. the giant Paramount Inc. has merged with Viacom. In the near future, these corporations must provide available products and services in abundance in order to pay for their costly investment. For example, this year, Time Warner Inc. plans to offer its 4 000 subscribers in Orlando, Florida, a service which permits them to receive movies via their television sets. Viewers will use a remote control to order films at any hour of the day.⁶

Developments that many had assumed would take years, even decades, have occurred virtually overnight. This dramatic rush to reap the rewards of a global market has influenced every aspect of Canadian business. Smaller and medium-sized enterprises (SMEs), especially those with a background in multimedia, are attempting to change their focus. Previously, many responded upon demand to the needs of a corporate client, but now initiate and create products and services for export. Within recent years, even during the recession, it has been the SMEs which have created thousands of jobs.

In the January to September period of 1993 there were 439 815 net new jobs created, a pace 40 percent greater than in the same period of 1992. Large firms, those over 200 employees, showed a net job loss of 2 592 in this nine month period; firms with less than 200 employees registered, on the other hand, a net increase of 442 409 jobs. Within the less-than-200 employee size group mid-sized businesses (50–200 employees) grew at twice the rate as did the under 50 employee firm size group, i.e., 15 percent versus 7 percent.

— *Quarterly Report on Small and Medium-sized Enterprises, Entrepreneurship and Small Business Office, Industry Canada, Ottawa, December 1993, based on information supplied by Statistics Canada*

These small and medium-sized companies will supply this country with expanded employment opportunities, opportunities which include essential skills training and retraining.

In content industries, artists play a critical role in production — contributing the concept, as well as

working in the areas of design and creation. But as the consumer market develops, writers and filmmakers may also find it beneficial to form alliances or partnerships directly with software and other technological firms. Gradually, alliances with a technological company may well replace the one artists traditionally have had with publisher or film company. This is a logical evolution, with the artist producing “content” and the technological or communication firms acting as the global distributor.

The Interdependence of “Content” and “Carriage”

In regards to the Information Highway in Canada, a great deal of attention has been paid to “carriage.” For the most part, this refers to the various networks that will carry products and services across this country and the world. However, less attention has been paid to “content,” the products and services themselves that will travel over the networks. Without such content, the networks cannot generate revenues. Therefore, any discussion of one necessitates discussion of the other, as they are in fact interrelated and interdependent.

In the past, many Canadian industries — especially cultural, education, and training — focused mainly on small domestic markets. With the creation of global “carriage,” domestic markets have opened into international ones. Industries such as the content industries can now produce valuable exports for foreign markets. Because of carriage, these markets are easier to reach and because of content, Canadians will reap the rewards of trade.

Other than financial gain, there are other reasons that Canadians must be concerned with content and assisting content providers for these networks. Very soon, the Information Highway will be flooded with an unimaginable array of programs, products, and services. If Canadians do not produce their own cultural and other commodities for these networks, they run the risk of being wiped out culturally by an incoming Niagara of information. Many believe that regulation of content will protect cultural sovereignty. But in a world of instant communications, government has limited power to control the distribution of information. The only viable strategy to protect our cultural heritage is to produce content which celebrates it.

⁶ *The Globe and Mail*, January 22, 1994.

The Content Is the Product

The emergence of electronic networks (and their ongoing convergence) is opening global markets for our cultural wares. Many cultural products and services already exist in the form of radio and television programs, books, and music. Many more will be created by repackaging them as multimedia entertainment or learning products.

The electronic networks can be used to promote and market these entertainment and educational goods. However, there is at present much concern over which format to invest in: Should the products be delivered on video, CD-I, or CD-ROM? What if the format is not a success in the marketplace? Such questions are misguided because, although the format may change, the product is not lost. Usually the product can be transferred to a new format.

Eventually, the networks offer the hope of delivering most of these products and services directly, via the Information Highway. In other words, Canadian institutions and companies can take new and existing goods, transfer them into digital information, then transmit and sell them anywhere in the world.

Major industries including computer, telecommunication, and entertainment are quickly merging. Although there are many opinions and points-of-view, we have no exact picture of how the future will develop. Formats such as video, CD, CD-I, and multimedia are important. However, these formats are ultimately incidental to the content that they carry or contain. In the larger scheme of things, content is the product.

— **Mathew Diamond, President, Digital Presentations Inc., Toronto**

In time, format will become optional. Stored as digitized information, products and services can be distributed directly to the home via networks, available on demand. Entertainment and educational wares, in the form of digital data, will be delivered like water. The consumer will turn on an electronic tap, selecting the appropriate container and pouring the required amount.

Changing Government Policies: Bolstering Industry and Exports

The multimedia industry is composed of a number of small companies in fierce rivalry for limited funding. Generally it would be more productive for these companies to co-venture on projects. Unfortunately, the government tendering process tends to enforce this rivalry. For any number of projects which the government undertakes, it will issue a request for proposals from a large number of small companies. As a result, these companies, each with marginal resources, are exhausted trying to create a concept, design, storyboard, and other presentations to win the competition. Ongoing investments in proposals deplete this fledgling industry. Overall, it keeps small companies divided, weak, and fractious. At its best, competition creates better products, but in an already precarious situation, it can thwart and even damage industry.

Government must devise realistic policies which promote alliance among small businesses, especially those in the multimedia and content industries. There is ample business for Canada in the larger North American market, and government should assist, facilitate, and directly partner with Canadian firms to ensure that Canadian products and services flow south of our borders.

Network Cross-indexing Creates Industries

The printing press made it possible to record and reproduce information for mass consumption. But it was cross-indexing from one subject to another, connecting objects and ideas, which produced a violent growth in knowledge and inventions.

Networks often act as cross-indexing systems, with individuals exchanging ideas in cyberspace. This exchange of ideas is done in formal conferences, or in random meetings. For example, a literary scholar who was trying to trace undated manuscripts from scribe to scribe back to the original source received an electronic note from an evolutionary biologist, who suggested using a computer to sleuth for spelling anomalies and other identifying signs in the manuscript. After all, the scientist reasoned, if we can trace how one species descended from another

by noting physical anomalies, then perhaps this concept might work in spotting the recurring and significant evidence of a particular, and perhaps sloppy, scribe. The scholar, excited by the notion and assisted by the computer, soon discovered rather suspicious patterns in the volumes of text and solved his mystery swiftly. In this fashion, one area of learning can give form to and illuminate another. It can also give rise to whole new industries.

Cross-indexing and cross-referencing can multiply knowledge, introducing one area of expertise to another. Using electronic networks for this purpose can introduce a researcher not only to a related list of topics and titles, but also to specialists in these areas. This new environment can multiply knowledge in unexpected ways. And in a knowledge-based economy, this expansion of knowledge can sometimes precipitate the birth of major industries.

Artificial Intelligence-based expert systems can assist this cross-indexing, acting as a scout to go from one subject to another, drawing up related information. For example, General Magic Inc. and American Telephone & Telegraph (AT&T) have produced a software, Telescript, which sends an "agent" over electronic networks to gather or deliver information on behalf of the user. The agent travels to either "service providers such as travel agencies, airlines, news services and banks, or to a host network such as PersonaLink, designed to be a centralized electronic meeting place for buyers and sellers."⁷ Motorola and Sony, partners in the General Magic alliance, currently plan to introduce personal communications devices with the Telescript technology in 1994.⁸ What may start out as a convenience to assist the consumer with banking and shopping may quickly develop into more industry-oriented research and cross-referencing for critical information, ideas, and relationships.

Canadians Must Become More Entrepreneurial

By and large, Canadians do not see the marketplace as welcoming — and even if our goods and services are in demand, we are often slow to respond. Even now, the Canadian economy is guided by the supply of goods and services to a largely captive audience, with less focus on what consumers want. As a result, Canadian entrepreneurs struggle against both cultural and government controls.

Historically, discussions regarding telecommunications in Canada have primarily focused on the supplier side — the characteristics of the network, rate of return for the supplier structure of the industry, regulatory matters, and the like.

— *Telecommunications — Enabling Ontario's Future*, Toronto, Ontario Ministry of Culture and Communications, August, 1992

This same "focus on the supplier's side" runs across most Canadian industries, even the cultural ones. However, in a world market that is consumer-driven, the buyer, not the supplier, has the real power. In such a market, Canadians must become more entrepreneurial, anticipating and responding quickly to consumer needs.

This antipathy towards the entrepreneurial spirit is deep-rooted in the Canadian mind. It is very telling that in Canadian film, television, and fiction, there are few stories in which the hero or heroine becomes wealthy, either by accident or design. And yet Canadians enjoy hundreds of American stories with a rags-to-riches plotline. On some level, we do not see ourselves as able or worthy of such enterprise. Although undocumented, present funding in the arts may favour stories about the disenfranchised, downtrodden, dislocated, and depressed. Whatever the reason behind their creation, these stories give us a clue into Canadian psychology. Still, this mindset will have to change as we are now live in a world which requires us to be "winners," as opposed to "beautiful losers."

⁷ *The Wall Street Journal*, January 6, 1994.

⁸ AT&T press release, January 6, 1994.

The New Economic Order

In the past two decades, Canada has gone from an industrial-based to a knowledge-based economy. Traditional resources such as agriculture, timber, minerals, fish, and hydro power have been replaced by new resources such as knowledge, information, and expertise. These data can be stored in digital form and sent via electronic networks. These networks have worked to integrate Canada's economy into the global fabric. Products and services that were created exclusively for domestic consumption must now be manufactured and marketed for a world audience. Too often, Canada's business, financial, and government institutions have lagged behind in their understanding of this economic metamorphosis. This section offers examples of how a knowledge-based economy affects institutions, industry, and the larger society. It also touches upon the importance of language and its new relation to economic prosperity.

Financing Canadian Content Providers

Nothing so gives the illusion of intelligence as personal association with large sums of money.

— John Kenneth Galbraith,
economist and author¹

The content industries require financing in order to develop and create products. But one of the most serious problems faced by these industries is the fact that government funding has declined, and traditional financial institutions demand securities in order to obtain necessary loans. For the most part, Canadian financial institutions invest in tangible business ventures such as real estate, retail, and manufacturing. Conservatively, they shy from any enterprise which cannot give absolute guarantee of investment. As a Canadian bank manager once put it, "Americans are risk takers. Here, we like to see collateral."

But, over the past decade, the world has seen a new economy come into being, in which ideas, concepts, information, and knowledge act as currency. This development has spawned a number of successful Canadian companies that are doing tens of thousands of dollars worth of business and yet have never had any real dealing with a bank. These companies package and sell their expertise, store it on software, or send it electronically all over the globe. In fact, they may occupy a small, bare office — a computer and a fax machine accounting for their only "tangible assets." Knowledge, which is what they sell, is now a highly valued commodity. As a commodity, it may be said to be invisible. In fact, knowledge is real and frequently worth more than gold.

Canadian venture capitalists commonly invest in American companies, particularly for software and multimedia. This is not to say Canadian financiers believe American companies are better. Rather, American banks have experts on staff to assist in evaluating the viability of entrepreneurial ideas and inventions and how these might perform in the marketplace. This type of specialized expertise attracts investment as it recognizes the new reality of a knowledge-based economy. Canadian banks have been slow to recognize this new economy, and it is still hard to predict if they will psychologically adapt to it. Although we tend to think of financial institutions as secure, little can be taken for granted in this period of great social and political transition. As the saying goes, the miser who hoarded all the buttons in the world found his investment worth little with the introduction of the zipper. American banks have been more understanding of this dramatic change in the nature of wealth and its resulting impact.

¹ Quoted by Charles Trueheart in *The Toronto Star*, April 10, 1988, and cited by John Robert Colombo in *The Dictionary of Canadian Quotations*, p. 267.

Information technology has created an entirely new economy, an information economy, as different from the industrial economy as the industrial was from the agricultural. And when the source of the wealth of nations changes, the politics of the nations change as well.

— Walter Wriston, Inaugural Address of the Technology Lecture Series, Freedom Forum Media Studies Center, October 25, 1993

In the near future, we will see new concepts and models evolve in banking. Perhaps we will see more “industry banks” which cater to groups such as software developers and are more responsive to the particular problems of that industry. It should never be forgotten that in human relationships, the extended family — with its complement of uncles, aunts, cousins, and grandparents — has always acted as a natural and productive bank, issuing loans, providing securities, and renegotiating payments in hard times. With the dramatic changes taking place in our society, we must evolve financial institutions that are similarly flexible in nature. These new institutions must understand that the knowledge a person carries in his or her head may be more valuable than any automobile, house, property, or “permanent job.”

Financial Institutions Pioneer Technology and Services

Nevertheless, conservative financial institutions have in many ways been the boldest and most innovative users of networked technology. Automatic Teller Machines (ATMs), which permit a bank's clients to withdraw cash and perform other banking functions at all hours and across great distances, revolutionized consumer spending habits and expectations. Moreover, such machines introduced the broad public to an interactive interface, directly and indirectly showing users the ease of person/machine transaction. Only a decade before, a consumer's life seemed to rotate around repeated visits to a bank to deposit or withdraw funds. Now those in urban centres expect to be able to conduct their banking at any hour at a local ATM, which might be located in a video, grocery, or department store.

A successful example of innovation is to be found at Green Line Investor Services Inc., a wholly owned subsidiary of the Toronto-Dominion Bank. One of the services they offers clients is MicroMax. Using an IBM or compatible personal computer, a modem, and MicroMax software, a user can view stock quotes from all major North American exchanges and other market data. As well, the user can enter trade orders, day or night. Once the order has been placed, the user can access his or her account to confirm that the trade has been filled. Another service, TeleMax, gives the user quick access to realtime quotes and account information via a toll-free number. This telephone service permits clients to monitor both their portfolio and the market at any hour. Both services allow the investor to buy or sell orders for Canadian and U.S. equities, any time, from anywhere in Canada and the United States. These orders are reviewed by a Green Line representative and placed, as requested.

In these and other ways, the banks show they are capable of extraordinary enterprise. Usually, however, this is confined to the delivery of their own services. When they must look beyond themselves to the society at large as it undergoes phenomenal change, their attitudes seem conservative and in some ways out of touch. Again, government and business may have to create new arrangement to provide investment capital for the content industries. Otherwise, Canada could find itself shut out of the emerging multi-trillion dollar content market.

The Primacy of Language in a Knowledge-based Economy

The human word is neither immortal nor invulnerable; but it is the power that orders our chaos, and the light by which we live.

— Northrop Frye,
*Humanities in a New World*²

Knowledge, captured in the form of expertise, ideas, and concepts, has become the true currency in today's economy. This resource has superseded fishing, timber, mining, and hydro power as the basis of our economic growth and continuing prosperity. Thinking, probing, interacting, testing, and reflecting

² University of Toronto Installation Lectures, Four Essays (Toronto: University of Toronto Press, 1960).

result in knowledge. However, complex human thought itself depends on, and is directed by, our understanding and use of language.

Artificial languages, that is, languages of rules and specifications (used in mathematics, logic, or computer programming), are essential components of scientific thought. Natural languages, such as French and English, when used in any field of specialization such as the arts or sciences or law, employ terminology so precise that knowledge of the discipline is a prerequisite to proper use of the language. Ultimately, all of our thoughts and ideas, including their development and communication, depend on language. This language may range all the way from professional terminology to street slang. Taken together, these linguistic components permit thought and its communication.

In everyday life, we rely on natural language to understand, debate, develop, and apply the discoveries of scientists and technologists. The larger our vocabulary, the easier it is for us to discern, to understand and describe subtleties, to refine our perceptions, and to express ourselves. For reasons of economic development, the teaching and learning of language is critical. In effect, our future wealth depends on an ordinary, yet priceless resource: words.

Literacy, once considered a casualty of the media age, is now its motor. The information society resulting from new media requires more literacy, not less: it takes highly skilled people to design and develop new media products and services.

— **Department of Communications,**
New Media ...New Choices³

If we do not possess the tools to think, we cannot produce knowledge. Since our new economy rests upon knowledge — its production, distillation, and distribution — we must have equal concern for our proficiency with language. It has been said that a democratic government relies on a literate society. Our economic prosperity will rely on our citizens' ability to read, write, and express themselves verbally.

³ Department of Communications, *"The Information Society/New Media ... New Choices,"* (Ottawa: Supply and Services Canada, 1992).

Cybermart: The New Marketplace Supported by Electronic Networks

By its very nature, network connectivity tends to be a commodity.

— Robert Larribeau, Jr.,
The Internet Business Journal, 1993

The new marketplace is composed of electronic networks which connect buyers and sellers. These networks supply information and services to those who need it, as well as promote and market products, services, and ideas. The following section discusses a few of these networks — from the commercial to the non-commercial, from specialized to general, and from community-g geared to global.

Many of these networks link up with computers, such as the global Internet. Although generally available on computer, many of these services are delivered through the more universal medium of television. As the consumer market grows and as consumer wants become more apparent, the creators of products and services will be able to find the most appropriate vehicle to reach buyers. Computer networks and online services are discussed in this section, but ultimately the products themselves, not the means of distribution, are paramount.

Commercial Online Services

Online computer services offer to both corporate and home computer users a dialup via modem to an information centre. On the service, members can:

- scan directories of all information available on the service
- read news bulletins
- exchange e-mail messages
- engage in online conferences with other members
- advertise in buy-and-sell
- link up with other networks and services,
- receive (download) or send (upload) software files or other files containing text, images or data.

The software available from these services is either public domain (freely and openly distributed) or shareware variety (where the user is in an honour system to pay a small fee and register with the author for enhancements if the software proves useful). Online services offering posting and messaging systems are also called electronic bulletin boards.

CRS Online

With over 10 000 subscribers (paying members), Canada Remote Systems (CRS) is the largest electronic bulletin board in North America. Headquartered in Etobicoke, Ontario, CRS was named Reader's Choice (1992) for its quality and service by the American publication, *Boardwatch Magazine*. Subscribing members can:

- tap into a collection of over 500 000 programs and files
- send and receive messages globally
- get information from 5 000 online conferences, including closing results of the major stock exchanges
- scan online news wires from Reuters and United Press International
- participate in seminars and drop-in sessions
- sell products and services online by placing commercial advertising e-mail in a Buy and Sell Conference

The basic CRS membership provides a connection into the Internet and a limited number of services there including e-mail. CRS callers are automatically provided access to the Internet; no special software is required. (A fuller discussion of Internet follows in the section on Community-g geared Networks). An added subscription option at CRS includes FTP (File Transfer Protocol) and Telnet services.

FTP allows the user to send and retrieve files, (programs, data, or text) to and from thousands of Internet sites around the world. Some examples of what is available are shareware programs, song lyrics, and travel advisories.

Telnet permits a subscriber to remotely log on to another Internet site anywhere in the world. Certain sites allow guests to log on, accessing data bases and retrieving information. The user can access library catalogs, get weather reports of international cities, and engage in live (text-based) conversations with people around the world through an International Relay Chat server.

Prodigy

Prodigy has hundreds of bulletin boards online permitting users to explore for a fixed monthly fee topics like Arts, Money, Computers, TV, Pets, Health & Lifestyles. Every member has a personal mailbox for sending and receiving messages to and from other members. Users may connect with an electronic mall menu which lists catalogs, discount outlets, convenience products, and gifts. Gifts can be selected, ordered, and rush-delivered. For travel, there is an online guide to the best hotels, restaurants, and attractions. The user scans prices to find the cheapest airfares and books reservations directly via computer for airline tickets, hotel, and car rental.

Founded in 1984 by IBM and Sears, Roebuck & Co., Prodigy offers the consumer a series of easy-to-use, visual menus. It has one million subscriber households, two million users, and 800 data bases.¹ For a variety of reasons, the system has lost around \$1 billion. A central problem facing Prodigy is in developing a mass market for online services. This has entailed the costly enterprise of educating the public. Prodigy has attempted to appeal to a broad audience, which made it difficult to target any specific market or group. Recent reports suggest that Prodigy has a brighter future, as larger numbers discover online services.

America Online

America Online offers services which include electronic mail, conferencing, software, computing support, interactive magazines and newspapers, and online classes. Magazines such as *Omni* and *Time* are available via America Online. *Time* Online provides the full text of the current edition of *Time* beginning Sunday afternoon, before it hits the newsstands. Back issues and articles are available. The service also includes fully interactive forums to *Time*

journalists and “news conferences” with newsmakers online to answer questions in realtime for *Time* readers.

Slow Acceptance of Online Services in Retail

Prodigy intended to bring retail to online services but, by and large, retailing has not done well on online services. For a mass audience, computer online presentation of goods is not nearly as sophisticated as that found on television commercials. The technology is not yet “virtual” enough to simulate actual shopping. Traditional retailing methods do not readily translate into the electronic environment, for so much of shopping is a sensual experience, where the buyer sees, touches, smells, tries on or tries out the merchandise.

Computer online services cannot adequately simulate the complex physiological interactions of street or boutique shopping. But this does not mean that online retail is doomed. As the technology becomes more advanced, a growing segment of the population will use it to supplement regular weekly shopping. Interactive television is probably its most likely medium, as home shopping is already a common fixture on TV. Consumers are often influenced by intangible motivations. A person may not feel like buying while sitting at the computer screen, but may feel more receptive in an armchair, viewing a larger screen, making purchases while flourishing a handheld remote control.

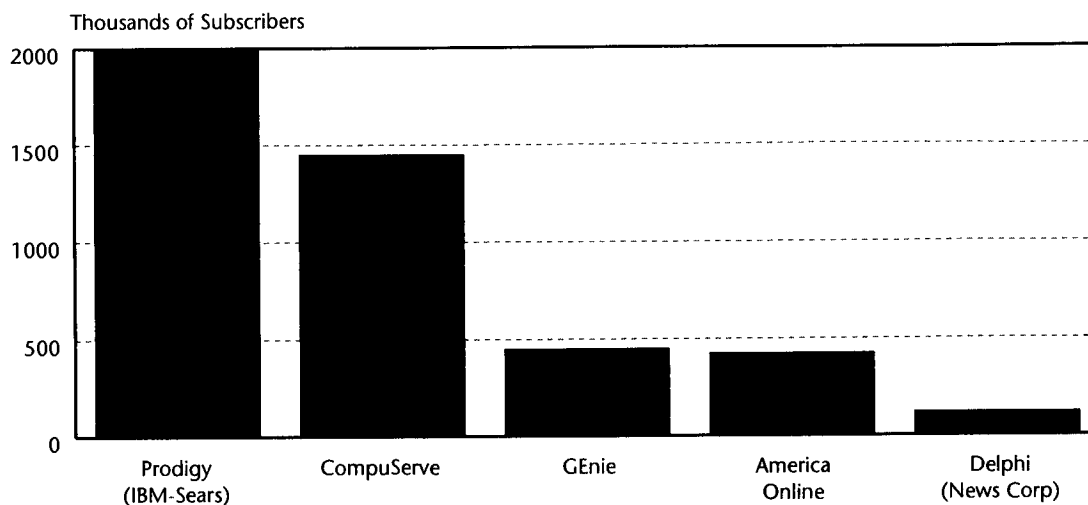
Each medium has its strengths and weaknesses, and these are only discovered through trial and error. For instance, the first movies merely attempted to record theatrical performances and plays, much as a photocopier reproduces a document. The “language” of cinema — camera angles, editing, subtler acting styles — evolved as artists and technicians became familiar with this new way of communicating. Any new medium requires a lengthy period of experimentation before its true value emerges.

Most online services have attempted to recreate the retail environment. Traditional retail, where the buyer examines merchandise and is helped by a salesperson, does not translate completely into an electronic environment, as discussed above.

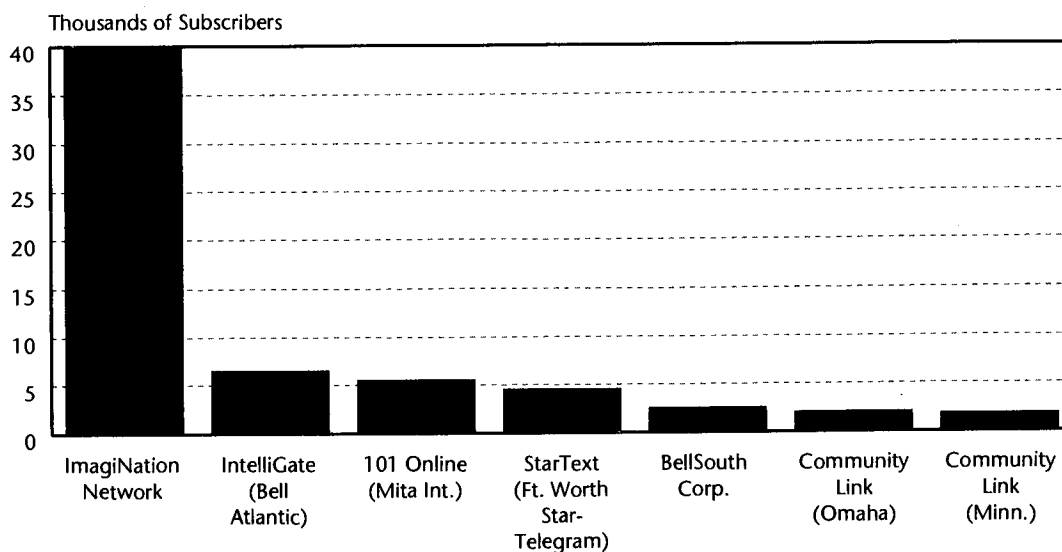
¹ *Forbes Magazine*, October 25, 1993.

Figure 6 — Popularity of Consumer Online Services

**Top Five U.S. Consumer Online Services,
by Customer Count, September 30, 1993**



**Next Seven U.S. Consumer Online Services,
by Customer Count, September 30, 1993**



Source: *Multimedia Business Report*, Vol. 2, No. 22, November 25, 1993.

Moreover, people often will pay more to have someone make arrangements for them, such as a travel agent. With online retail, like electronic publishing, it is essential to discover what customers like and don't like. It may turn out that an interplay between traditional retail and online services provides the most effective use of electronic networks. The ongoing development of the visual element in online services, so that customers can browse detailed catalogs, "travel" to the store via telepresence, and virtually inspect the goods, should provide the needed dimension to make online retailing a success.

In Cerritos, California, GTE, the giant American telephone company, pioneered making entertainment, shopping, and education services available via television in the Cerritos Project. By design, the project focused on technological development, not content or market testing of retail services. The jury is still out on how these services will fare. Online retail is a major technological, economic, and social initiative and will require infinite experimentation. Traditional retail itself is volatile by nature, with ongoing changes in market size, sales, pricing, marketing strategies, distribution practices, and so on. We should expect online services to be just as mercurial, especially as they are just now being invented.

Online Services and the "New" Computer

In the near future, all online services may appear on a "new computer," which is in fact intelligent television. Consumers who are resistant to computers may find in "smart" TV a superior mode of delivery, easily controlled with a handheld remote. Smart television would have all the capabilities of a computer, plus entertainment and learning programming. Smart TV might not require a new set, but rather an add-on, set-top box to receive and send digital information. Television, universally accepted in the home, would also replace the standard computer in the office environment. A consumer-driven market may insist on such a technological development. Consumer buying habits will more and more influence major corporate strategies and government policy. Business and government should never underestimate the directing power of a consumer-driven economy, as they are now plainly answerable to it.

One of the emerging problems with many of these consumer services is that, in many ways, they are not exactly "services." That is, the user is spending his or her own time, effort, and money to do things that in the past were performed by others. True, the shopper is given the privilege of doing the personal-touch banking, designing the greeting card, sending flowers, paying bills, ordering baseball and theatre tickets, but the novelty of all that self-service can wear thin. The shopper may wish to pay extra for human assistance and attention.

While the computerized services are faster than lineups and are offered at all hours, it is also true that the more convenient things become, the more services we expect machines to do. In terms of business, online services must enhance the quality of life through convenience, rather than simply make life busier.

Consumer Market Shifts Focus from Product to Functionality

In the past, each popular medium was designed to have a particular function. Television was for viewing programs, the telephone was for making and receiving calls, and a personal computer was for word-processing and networked applications, such as electronic mail. For the most part, each machine was defined by its functionality. Now, consumer appliances are becoming more generic in nature. Interactive services are received on the computer or television. New telephones are more complex, have memories, and permit the user a wide range of service options. As telephone, computer, and television perform increasingly similar functions, the market will demand appliances which offer adaptive capabilities. For instance, new telephones may permit callers entry to data bases. The caller's verbal order is then processed, and requested information is instantly forwarded to office, home, or school. Married to services-on-tap, common technology may come to have vastly expanded abilities. Technologies such as CD-I players, linked to ordinary telephone outlets, may permit the user to receive additional interact services simply by clicking on the screen menu. In essence, consumers will be less concerned with whether they are buying a TV, computer, or telephone and more concerned with what services the technology can carry or supply.

Community-gearred Networks

Internet

The Internet is not just one type of network, but a global metanetwork made up of many different yet interconnected networks. One can appreciate Internet's highly decentralized structure and global domain by looking at its origins from 1969 and its development since inception in 1983.

The first computer network was established under contract in 1969 to the Advanced Research Projects Agency (ARPA) of the United States Department of Defense. Its original purpose was to aid researchers in sharing information. Once logged on to this network, called ARPANET, contractors from universities, the military, and the U.S. defense department could run programs on remote computers. Soon other functions were added like file transfer, electronic mail, and mailing lists to encourage the exchange of common subjects in communication. During the same period, many other networks were developing independently, and it soon became apparent that inter-network communication standards would need to be imposed if the linkage of these networks were to be encouraged and supported. Once the right protocols or linkage conventions were designed and implemented (as TCP/IP) in 1974, the Internet was able to add more gateways and to connect more networks, while the original core networks remained intact. In 1983, the original ARPANET split off into a military communications network (MILNET), leaving ARPANET for continued research into networking. In 1990, ARPANET itself was decommissioned and its functions largely absorbed by another network that developed as the National Science Foundation Network (NSFNET).

The Internet is now a federation of 12 000 computer networks all over the world, administered by specialists in Reston, Virginia. After being championed by American vice-president Al Gore as a prototype of the Information Superhighway, Internet membership exploded. Some estimate that in five years, 100 million individuals will use "the Net," as Internet is called, for daily communications. Its funding is international, partially by the American and other governments and partially by subscription fee. Paul Gilster's authoritative work, *The Internet Navigator* (New York: John Wiley and Sons, 1993), offers further discussion regarding the history, configuration, maintenance and financing of the Internet.

Corporations and universities buy access to the Internet for their workers or faculty. Various privately owned online services such as America Online, CRS Online, and Compuserve offer their subscribers partial and full access to Internet. Sometimes there can be community "culture clashes," as the Internet is fairly uncensored and permits information and frank discussions that can cause alarm when imported onto more "family-oriented" online services such as Prodigy.

The New Empowerment and Global Perspective Offered by Internet

The complex and sometimes confusing evolution of the Internet, while fascinating, is incidental compared with what the Internet suggests and why it has become a social phenomenon. The Internet has activated and illustrated social imperatives which will irrevocably change our society. On the Internet, an individual can converse freely and uncensored with individuals and groups all over the world. This ability to find and communicate with others in an uninhibited environment, and in a highly personal way, revolutionizes our notions of geographical space, the dimensions of the marketplace, and freedom of expression.

At present, these interpersonal yet global communications are largely character-based, but will soon include voice, sound, image, and video. Internet shows us new dimensions of human communication which alter the way we see the world and our institutions. This perceptual change works to "undress" our institutions, robbing them of their traditional mystique and exclusive power to gather and grant information.

The Internet itself is not free; and subscriptions are usually paid by a university or corporate employer. Still, most users think of it as free or nearly free, and this notion intensifies Internet's hold on the popular imagination. Suddenly, users begin to see that free or low-cost communications not only facilitate personal encounters, but also redefine our limited thinking regarding trade, exports, and knowledge. For the most part, communications companies are narrowly focused on making technology and networks generate revenues. But by creating low-cost global communications, readily accessible to everyone, the world marketplace will grow to dimensions that few have ever imagined.

The Internet provides the way for any individual with an idea, product or service to participate in one vast global marketplace. For a moderate fee, an individual can buy, sell, and network worldwide. In the past, access to international communications networks belonged only to those who worked for government or giant corporations. Now, such access is commonly available and permits individuals to gather information directly, circumventing organizations, institutions, and agencies.

Until recently, Canadian SMEs saw their markets as local. American, European, and even some Canadian market opportunities were remote. This perception was due not only to geographical distance, but also to remnants of a colonial past. By and large, Canadians saw themselves as isolated and cut off from other lands, even from the American market. New trading agreements have worked to alter this perception, but one should not underestimate the influence of the Internet and other communication technologies such as the toll-free telephone number and the fax machine in the rapid breaking down of trading barriers. In particular, frequent communications with cities like Los Angeles, New York, Miami, and Dallas make these American cities effectively part of the Canadian psyche, and not just locations that appear in various well-known television series. This psychological opening will ensure that Canada further develops its trade and export with the United States and other markets.

One should note that the Internet is not the Information Highway, but a component of it. Think of the Net as a working prototype that will evolve into a seamless national and international network by which goods and services flow across the globe. The technology supporting the Information Highway is important, and so is the content which flows across the Highway. But what the Internet does and what it suggests are what the Information Highway must be: a "network of networks" which is expansive and yet flexible and responsive enough in nature to accommodate many different communication needs, as they arise. Like the Internet, the Information Highway must be pliant enough to permit users to create their own forms of communications, such as online electronic fora, which appeared with the invention of the computer bulletin boards.

On electronic networks, users with common interests and concerns can find each other and conduct discussions and debate. Compuserve in 1979 was the first online service to facilitate and nurture this concept by offering a stable meeting place and computing power. Indeed, one of the primary motivations of public interest in the Internet and the Information Highway is the hope of finding new and productive ways of exchange. The great consumer audience, much like a baby chick pecking its way out of a confining egg, instinctively knows of a larger world where it can breathe and grow. The Internet, through practice and suggestion, has continued to respond to public curiosity and enthusiasm for more varied, personal, and strategically useful communications.

Whether the Internet survives in its present form or is absorbed into the Information Highway, it has revolutionized our concept of communications. It has changed how we perceive, send, and receive information. It has permitted individuals working outside of the agendas of government, corporations, and the media to communicate globally. In the past, only an elite had access to such facilities. Now, individuals are free to create an entirely different type of society. The real power of Internet is its ability to manifest societal needs.

Commercial Potential of the Internet

Although intended for only non-commercial use, the Internet has vast commercial possibilities and there is increasing pressure to permit business use. In 1991, the American government committed to spend \$3 billion to turn the Internet into a quasi-commercial entity, the National Research and Education Network (NREN), the basis of the Information Superhighway.² As the Internet has developed, more and more companies have exploited its potential. Today, it is estimated that more than half the hosts connected to the Internet are commercial organizations.³

Commercial ventures at the regional level can find themselves in competition with strong non-profit or non-commercial services which are exceptionally networked. Nationally and internationally, commercial ventures prove more viable, especially if they can

² *The Economist*, December 25, 1993–January 7th 1994, pp. 36–38.

³ Robert Larribeau, Jr., *The Internet Business Journal*, "The Rise of Commercialization in the Internet" Vol 1., No. 1, June/July 1993.

offer services beyond the link to Internet, such as providing timely and relevant news information, or live feed from news wire services. Other services may provide their clients network security, preventing access from the public Internet.⁴

Whether the venture on the Internet is initially commercial or not, meetings and exchanges on the Net often lead to business or commercial relationships. As anyone in business knows, the broader and more detailed the network, the greater the likelihood of forming alliances, partnerships, or garnering referrals. The greater the array of communication tools, the greater the chances of communicating more fully.

The Internet appeals directly to the user's pioneering spirit. The imaginative use of the Internet creates a truly alternate communications network. During crisis or disaster, Net users have risen to the occasion. Immediately after the 1993 earthquake rocked Los Angeles, thousands posted pleas on bulletin boards such as Prodigy and Compuserve, requesting first-hand reports and calling for assistance in getting messages to family members and others. Shortly after the earthquake, up-to-the-minute information flashed back and forth across North America, Europe and the Far East. Within hours, a crisis newsgroup appeared on the Internet titled "alt.current-events.la-quake." Because the Internet is so available, flexible, and spontaneous, it can be quickly mobilized to provide instant global communications in times of emergency.

The Internet was not originally conceived for mass communications. With Internet, technology connected with a deep societal yearning for greater freedom in communications and in other areas. In a very real sense, the larger public simply appropriated a technology that had a rather narrow application and used it consciously or unconsciously to benefit in other activities. Much the same thing had occurred with the personal computer. In the late 1970s, few could foresee the coming popularity of desktop and home computing. And indeed, the desktop has bestowed greater power and productivity (and entertainment) on the individual both in the office and at home. Taken together, the computer and the international network show us a few of the driving forces that make this technology so successful. In general, people want greater autonomy, freedom,

and communicative power. It seems likely that any technology able to cater to those elemental needs will eventually triumph.

CANARIE

Professionals from Canada's research, university, business and government communities have had the foresight to improve Canada's competitiveness by planning the development of the communications infrastructure for a knowledge-based economy. The Canadian Network for the Advancement of Research, Industry and Education (CANARIE) is a non-profit corporation established in March 1993. The purpose of the private sector-led CANARIE is to upgrade existing data networks and to finance research into multimedia communications. Phase 1 of the CANARIE program, now under way, has three primary goals:

- infrastructure involves upgrading CA*net, the Canadian arm of the research and education Internet, to faster T1 speeds (1.5 Megabits per second)
- testing and trials, the creation of a high-speed test bed network to test advanced networking technology and showcase Canadian products
- applications, in which a grant program supports products and service development to facilitate innovation network-related products and applications to market by the private sector.

Total direct and indirect investment for Phase 1 activities will be over \$100 million, of which the federal government has contributed \$26 million. Transmission rates are a critical factor affecting response times, and the CA*net lags behind comparable networks. For example, the American NSFNET will surpass T3 speeds (45 Mbps) in the near future. For global participation, Canada should maintain networks competent in this area.

CANARIE's wide-ranging activities include strategies to encourage Canadian enterprises. It has assisted through funding projects such as Ontario-based MKS Inc. (Mortice Kern Systems) in the creation of Internet Anywhere software, a mass-market product offering easy access to mail and news via the Internet. MKS Inc., Research in Motion Ltd., and the Information Technology Research Centre (a research program at the University of

⁴ Ibid.

Waterloo, the University of Toronto, Queen's University, and the University of Western Ontario) have formed the Internet Anywhere Consortium, which will build upon MKS Inc.'s software. At present, the product uses a modem link-up and operates under Microsoft Windows, but a later version will permit access to the Internet through wireless communication devices.

The Gemini Network

In addition to projects like CANARIE, there are existing networks and technologies which might be used for the same purpose. Gemini Group Automated Distribution Systems Ltd. administers the Gemini network, a national computer network used by Canada's airlines and passenger railway to keep a running inventory of available seats. Gemini is also used by travel agents to book seats. The system's backbone runs from Montreal-Toronto-Winnipeg, with other networks connecting to it. Gemini was created in 1987 by Air Canada and PWA Corporation when these airlines merged reservation systems.

Recently, the network has been at the centre of airline merger controversy, and a federal Competition Tribunal met in November 1993 to discuss whether the network should be dismantled in order to guarantee better airline competition. However, from a purely technical standpoint, the system has been so successful that even CANARIE chairman William Hutchinson has spoken of Gemini's tremendous technological achievements. Also, CANARIE may soon tap into Gemini's expertise for its own building.⁵

FreeNets

FreeNets are free, public-access computer systems, tailored to meet the needs of local communities. Usually they operate through a combination of private and public support, funded by government, business, and other contributors. FreeNets generally rely on volunteers who donate time and expertise to maintain the network and keep information current. They broaden a community's access to local computing resources and provide hooks into the broader world of networking through the Internet;

thus, telecommunications resources are made available to all.

Although relatively new and still few in number, FreeNets are rapidly growing. They have been successful for three reasons:

- the lack of user fees invites participation
- the services are interactive
- the community networks meet community needs.

Canadian FreeNets currently operating include:

- National Capital FreeNet (Ottawa, Ontario)
- Victoria FreeNet (Victoria, B.C.)
- Community Information Access Organization (Trail, B.C.).

Some networks in development are:

- Halifax FreeNet
- Toronto FreeNet
- Calgary FreeNet
- Vancouver Regional FreeNet.

FreeNets as an Equalizer of Opportunity

The main thrust of establishing FreeNets, which is universal access to information, prevents society from evolving into two separate and unequal groups: the information-rich and the information-poor. Technological hardware and software have become more widespread as they became increasingly affordable. But without access to networked information, citizens as users will become technically disenfranchised, denied an active participation in building the future. In the past, the public library provided the main source of information. Today, access to information must be nearer at hand and universal.

The rich, with technological servants to keep them informed of news and business possibilities, can gather information and seize opportunities before all others. A person so equipped is far more likely to rise in the world. In a society which is in a constant state of transformation, citizens must have quick access to information, or they will be placed at a distinct disadvantage in terms of participating in the

⁵ Geoffrey Rowan, *The Globe and Mail*, November 8, 1993.

country's political, cultural, and economic growth. It remains to be seen whether or not FreeNets are the solution to supplying the larger population with essential information. Nonetheless, FreeNets are in response to a real need, one that will become more visible in the next few years.

VBI — *The Globe and Mail* for the Sight-impaired

In addition to present commercial networks, technologies are in place which could be used for commercial or non-commercial ventures. A particularly innovative use of existing resources is a pilot project initiated by Industry Canada.⁶ In the pilot, Globe Information Services contributes *The Globe and Mail* newspaper in electronic form for broadcast to visually impaired Canadians using a technology called Vertical Blanking Interval (VBI). VBI data broadcasting transmits data using a regular television signal. The data, such as a newspaper, can be inserted into an empty scan line of the TV signal and transmitted. A computer with a receiver, attached to a television, can receive and decode the VBI. Reception sites are equipped with a computer, one or more devices for Braille output, large screen printer, or voice synthesizer, and a VBI receiver or teletext decoder.

Copies of the newspapers are automatically saved on the computer's hard disk for a week. After that, they are overwritten with incoming copies. For example, the previous Monday's edition of the *Globe* is replaced with next Monday's edition. With newsprint, the reader often saves the paper for a few days before disposal. The *Globe's* electronic delivery schedule imitates this habit, rather than ignores it. This is another good example of technology that has been prudently designed to accommodate human behaviour.

This VBI sight project is important for several reasons:

- newspaper information is made immediately available to the blind

- it services one of many "niche" markets that businesses frequently overlook, where a real need exists; there are currently 500 000 people in Canada who might take advantage of this technology, as well as a potential international audience
- the VBI has vast network potential.

VBI broadcasting is again discussed in the next chapter in the sections on Distance Learning Institutions and VBI Broadcasting Networks in Canada, in connection with Distributed Learning networks and Canadian businesses exploiting this technology.

VBI is only one example of existing in-place networks which have yet to be fully explored. On their own these networks may not satisfy all of our needs, but taken collectively they may shear millions off the cost of building the Information Highway. These savings could then be poured into the production of revenue-generating content. Canadians are no longer producing content exclusively for domestic consumption. We are producing content for the world. Our markets here will remain small, but the global marketplace is vast. Canadians must produce content for this new and rapidly expanding market. If we do not, we will ultimately lose even our domestic ones.

Networks Transform the Nature of Teaching

In a recent article published on the Internet, Ian Lancashire, Professor of English and Director of the Centre for Computing in the Humanities at the University of Toronto published an essay on the Internet dealing with how the Internet has influenced his work.

⁶ From a December 1992 proposal, in which the Ontario Ministry of Economic Development and Trade, the Canadian National Institute for the Blind, the Federal Department of Communications, and *The Globe and Mail* newspaper agreed to develop and install a field trial to deliver the *Globe* via VBI. Earlier in 1992, the DOC conducted an application trial to broadcast the Montreal newspaper, *La Presse*, via VBI to a target group of disabled persons in Quebec.

...After eight years on the Net, one of the first in the humanities at Toronto with an e-mail address (and at that, my first name), I have certainly been influenced by living professionally on the matrix, reportedly with 20 million other people now. Most days since 1986 I have logged on at least once, and sometimes half a dozen times. These 5000-plus online sessions have changed how I mentally construct the academic life.

"Before Cyberspace," I spent academic terms teaching in classrooms on two Toronto campuses, twenty miles apart, and seeing local colleagues, students, and fellow researchers at odd moments or in formal meetings during the day. Doing research at the Records of Early English Drama project, I was accustomed to collaborative work, but it was mainly at Kalamazoo, at the MLA convention, at annual project meetings, and at the occasional local conference that I could exchange ideas with others, but newsletters, the post, and journals did not sustain the exchange.

The Internet has changed and is changing all that. While I have mainly the same close colleagues at home and abroad, I talk each week with more people outside Toronto and Canada than within. I also encounter a few more colleagues on subjects related to my teaching and research, from exchanges of e-mail, and from exploring hosts in North America, Europe, and Australia by means of anonymous FTP, Telnet, and Gopher. Networking has also affected teaching. An increasing number of graduate students send e-mail messages rather than wait for office hours or appointments. A few undergraduates too shy to talk in large classes articulate — in messages longer and more wide-ranging than their assigned essays — their questions and thoughts in e-mail.

— Ian Lanchashire, *The Internet and English Literature Studies*⁷

Gradually, networks are changing not only our methods of teaching but also our perception of the world. Technology itself participates in this alteration of our view by changing its dimensions, from local to global. In this sense, it acts to instruct both teacher and student.

Networks and Information for Business

Information Marketing

Until the introduction of networks, Canada had resources which could not be fully exploited. An example of such a resource is Statistics Canada, one of the most highly regarded government agencies working in the area of statistical data. The information gathered by StatsCan is appreciated and consumed all over the world. *The Economist* in its September 7, 1991, issue conducted a survey by a panel of statisticians from various countries to rank government statistical agencies in ten largest member countries of the Organisation for Economic Cooperation and Development (OECD). Canada scored the highest, leading the world in terms of the quality of its statistical data. Two years later, the same magazine on September 11, 1993, reported that Statistics Canada in 1992 again ranked best. Unfortunately, both surveys noted that Canada ranks very low in terms of the timeliness of the information: the average speed with which StatsCan publish figures on gross domestic product, industrial production, inflation and the trade balance. While this tardiness permits revisions and therefore may mean greater accuracy in reported results, rapid communication of results (as for economic performance, employment trends, etc.) is vital to a dynamic marketplace. The faster results can be reported, the greater value and relevance they have for the nation, especially for industrial clients.

Statistics Canada is not required to meet urgent deadlines. Perhaps by partnering with various information suppliers in the private sector, StatsCan could well become a powerhouse for the information technology industry, marketing an extraordinary array of information products all over the globe. Already positioned as a premiere provider in statistical data, the agency could stand to generate enormous revenues for the government — revenues sorely needed to pay off the federal debt. Such partnering of government and business creates jobs and works to further establish Canada in the international market (it is also a more productive and popular solution than raising taxes).

⁷ December 12, 1993, to be included in *Works and Days*, a collection of articles on the Internet, edited by David Downing and Jim Sosnoski.

Figure 7 — Industrial Economies Ranked By The Most Trustworthy Statistics



The 13 countries are posted vertically in the order of their overall rating, with top-ranking Canada posted first. For each criterion, countries are scored by their ordinal rank from 13 to 1, with 13 the highest rank. Not all data for each category was available.

Source: *The Economist*, *The Good Statistics Guide*, September 11, 1993.

Canada already has the resources and organizations to grab large shares of the information market. But we must identify these resources, mine them, and promote them on a global basis. Although new technology has meant the decline of certain sectors, it has signaled the emergence of others. In the new order, however, a new assertive mentality is required. Businesses and organizations that wait for a recession to end or a market to open are ultimately doomed in the new, highly competitive world marketplace.

National Strategy for Canada's Information Technology Industry

Canadian organizations play a major role in the development of a national strategy for the information technology industry. The largest ones are the Information Technology Association of Canada (ITAC), the Support and Promotion of Information Retrieval through Information Technology (SPIRIT) system, and the Canadian Advanced Technology Association (CATA). Smaller networks operate in some regions.

ITAC

ITAC's members and affiliates comprise the major voice of Canada's information technology industry. It represents 450 companies, an industry which produces \$43 billion in revenues, 300 000 jobs, and \$2 billion in research and development expenditures. Overall, ITAC seeks to provide leadership on issues affecting the growth and profitability of the industry across Canada. As well, it promotes the effective use of information technology.

In February 1994, ITAC sponsored a two-day Conference called Powering Up North America: Realizing the Information Infrastructure for a Knowledge-based Continent, the first of its kind in Canada. Held in Toronto and well attended by the elite of the information industry, it provided a forum for exchange, debate, ideas, and networking.

SPIRIT

SPIRIT is a national initiative sponsored and funded by member information companies of ITAC and various public sector organizations. To make Canadians aware of electronic information and how it can play a strategic role in enhancing this country's business and cultural vitality, SPIRIT:

- initiates marketing programs
- develops alliances between electronic publishers, government and strategic partners such as telecommunications carriers, software developers and hardware suppliers
- helps schools integrate information access into the curriculum.

SPIRIT facilitates discussion among the information technology community in other ways. In the fall of 1993, SPIRIT held Information Industry Day, a seminar to promote the various uses of electronic information. Executive Director David Shinwell organized the affair which brought together industry leaders for exchange and dialogue.

CATA

CATA is a national trade association which includes advanced technology companies and their customers, research organizations, investors and international enterprises. It provides important communications and advocacy services for the industry. Its orientation is global as it seeks to represent this country's new-economy entrepreneurs. In May 1994, CATA hosted Canada's second major

conference on the Information Highway, Racing Towards Millennium, in Toronto.

ACOA/Enterprise Network (Newfoundland)

The ACOA/Enterprise Network, an initiative undertaken by the Newfoundland and Labrador Development Corporation (NLDC), in collaboration with Atlantic Canada Opportunities Agency (ACOA), fosters business and economic development in Newfoundland and Labrador. The province-wide initiative is directed at communities outside St. John's, to transfer information technology skills to rural populations and encourage an entrepreneurial spirit. Using community-based infrastructure, it seeks to give entrepreneurs access to information. Modeled on established tele-cottages in Scandinavia, a series of telecentres were established at St. John's, Clarenville, St. Alban's, Forteau, Stephenville, Baie Verte, and Trepassey. These centres constitute the primary delivery system of the provided services and are equipped with standard microcomputer applications, business planning and tutorial products, printing facilities, and modem-based contacts to information services, including the ACOA/Enterprise Network's data base.

When those seeking assistance cannot come to the telecentres, project support staff travel to them with laptop computers and modems to access the main data bases. Easy-to-read technical manuals show how to take advantage of the network's resources. A special interface prompts the user, who may have minimal computer skills, to search, retrieve, and send information. Importantly, the ACOA/Enterprise Network was designed not to force those in the rural communities to use and understand technology, but to adapt technology to the clients' needs, and to support entrepreneurs and local business initiatives.

Small communities such as St. Alban's, with a population of approximately 9 000, benefit from such research facilities. In an actual application, a client explored the feasibility of opening a garment-making business. An initial search of the data base revealed that surgical gowns were largely imported. A further study confirmed that local production might better satisfy local needs. The aspirations of local entrepreneurs might appear grandiose when one considers the tiny size of the community. But some of Canada's most successful entrepreneurs have started as local ventures that spotted "niche" markets and then exploited them.

Corinfo (Ontario)

Many do not yet realize how global networks permit business to instantly see and take advantage of market demand. 11 Corinfo, a research and information service in North Bay, Ontario, supplies a striking illustration of how technology, when used and understood, can create product and provide employment by responding quickly and directly to market needs. An example of this expediency follows.

On Friday, January 14, 1994, at 4:00 p.m., a Woolworth Corporation news release announced that it had sold a large percentage of its Woolco stores across Canada to Wal-Mart Corporation, which meant that the large, highly-competitive retail chain would now have a presence in Canada. News of this transaction came as the business week closed but, when 11 Corinfo received word of the sale, it realized that businesses across Canada would soon require more detailed information on the subject, and acted decisively. What follows is a chronology of events as they unfolded.

Date/Time (EST)	Event
01/14/94 (Friday)	
4:00 p.m.	Woolworth Corporation issues news release regarding Wal-Mart transaction
6:15 p.m.	11 Corinfo Research secures copy of news release.
6:30 p.m.	Research team project initiated
01/15/94 (Saturday)	
8:00 p.m.	Research team project completed
01/16/94 (Sunday)	
9:00 a.m.	Created 100 copies of business information package: <i>When Wal-Mart Comes to Town</i>
2:15 p.m.	One-page fax broadcast to selected target group of approximately 450 Canadian contacts (Chambers of Commerce, Economic Development Offices, downtown BIA organizations)
6:00 p.m.	Package available electronically
01/17/94 (Monday)	
9:00 a.m.	11 Corinfo Research phone begins to ring

Using a situational response team of five research associates, 11 Corinfo was able to produce a business information package that was available Monday morning. Because of the weekend, "zero" business hours had lapsed during the creation and announce-

ment of the product. The 49-page package, *When Wal-Mart Comes to Town*, sold for \$220. In fact, the entire research project was almost exclusively online/CD-ROM based. The research included the review of more than 2 300 news articles, annual reports, SEC 10K filings, customer interviews, 34 equity research reports, and 28 commercial company profiles of Wal-Mart Stores Inc. Interest in the topic was so strong that a spin-off two-hour seminar was made available to companies or communities that requested a more detailed presentation on the subject. More than 1 700 have already attended, and other dates are heavily booked.

11 Corinfo responds to, and frequently anticipates, client needs. For example, it has ready-to-go profiles on 16 countries which provide useful information for business professionals. A profile on, say, the United Arab Emirates contains details on geography, people, history, economy, government, size of defence forces, as well as tips for travelers. In addition to these prepared profiles, custom-tailored information on any country can be assembled on demand.

Entrepreneurial Information Providers Wanted

Information is a product that can be quickly manufactured, packaged, and sold. The marketplace has a continuous need for it, and the enterprising business can become an important supplier, harvesting this rich crop, processing it, and reselling it in the blink of an eye. Canadian businesses are learning to recognize and seize these opportunities. Often in information research, costs are low, while the profit margin can range from moderate to high. Response time is crucial, and if a business can provide fast, reliable and useful information, the rewards are great. Location is irrelevant; timing and product is everything. The market has a voracious appetite for information, and Canada is in an ideal supplier.

Government Service Delivered over the Network

Electronic networks permit the cost-effective delivery of many government services. Users are able to access accurate and standardized information in a variety of ways. This section discusses some examples of network-delivered government services currently being developed.

Centre for Information Technologies Innovation (CITI)

CITI in Montreal is currently engaged in a project for satellite offices, which involves Industry Canada, Ontario region. This will implement a series of electronically linked off-site work centres to the west, east and north of Metropolitan Toronto. In the past few years it has been difficult for Industry Canada to attract and keep qualified candidates, especially in the area of spectrum management. Commuting to the downtown Toronto office was one of the main reasons for staff turnover. It was decided to establish satellite offices, which would also work to test new telework-enabling technology.

Such a model might serve for use across government and business, especially when enhanced with multimedia networks. Small satellite offices work to keep government focused locally and, through networks, connected to a central office. This model also reflects the new reality of business.

Wide area multimedia networking is an important objective because of the current changes under way in the social and business fabric of modern society. Business is becoming increasingly fragmented and decentralized, and multimedia communications can provide support for collaboration of corporate workers. This is supported by the fact that on the average a *Fortune 1000* company in the United States operates about 254 individual widely-dispersed sites, of which 54% have less than 20 employees.

— Bohdan O. Szuprowicz, *Multimedia
Networking and Communications*

InfoCentres: Government Services on Demand

The ambitious InfoCentre initiative intends to make government services far more accessible in a cost-efficient and effective manner. InfoCentre sites are now located in Canada Employment Centres, Revenue Canada offices and Income Security Programs Branch (formerly, Health and Welfare) client service centres. In these centres, special interactive kiosks provide government services

directly to the public. For example, a client unfamiliar with government services is guided by computer through a series of questions to determine the appropriate service. Where required, the computer can give limited advice on the subject.

In time, such services can be networked and available in the home via television, allowing citizens close contact with government, no matter the distance. Vital information would be available 24 hours a day, seven days a week. Since most government services dispense the same information repeatedly, introducing this technology is cost-efficient. It also ensures that the information provided to the public is reliable and exactly conveyed. The project's long-range goal is to create a network of Canada InfoCentres.

Who Should Run a National Network ?

There are opposing arguments as to who should own or administer a national network. Should it be run by government or business, or by a combination of the two? Should the network be publicly or privately owned? Whichever point of view wins out, it is well to remember that Canada is rich in existing technological resources. None of these resources should be overlooked, left unexplored, or wasted.

As stated previously, network-delivered services have a transforming effect on society. Soon they will permit entertainment, education, government services, training, and publishing on demand. This will give individuals much more power over their everyday lives than ever before. This may prove liberating, or it may have dire consequences which we cannot yet know. This empowerment requires constant attention and study. Often those in government, business, and education have no real comprehension of the dramatic changes that will spring from a consumer-driven economy. Canada's future will depend to a large degree on a careful monitoring of the social directions that will unfold in the next five years. This research is of vital national importance and a necessary investment as this country prepares for the 21st century.

The Learning Industries

Education ends with death ... or after,
in accordance with your beliefs.

— Peter Ustinov¹

Definitions of Learning Industries: Education and Training

The learning industries include software producers, hardware manufacturers, research and development, and electronic publishers, as well as education and training organizations. These industries use new forms of media like CD-ROM, courseware, groupware, and television broadcast and telephone network, to develop and deliver technology-based learning to the required location, be it home, office, or school. Learning technology may also include satellites, cable, and fibre optics capable of delivering, through interactive multimedia, educational opportunities to individuals or groups.

The two key markets for the learning industry are education and training. Education includes elementary and secondary schools, colleges and universities. Training includes job training, skills enhancement, training upgrades, and other job-related learning. This section examines existing resources, networks, and market potential for educational and training products. An additional factor is the emerging role of distance learning in reshaping every aspect of our society. The learning industries must now address both domestic and international markets. Globally there are increasing demands for technology-based educational and training products, and there are many ways in which Canada can benefit from this vast new market.

Challenges For Canada's Educational System

Canada spends more than \$44 billion a year on formal education which is equivalent to 6.2% of our GDP, ranking fifth among OECD countries....

Despite these high expenditures there is growing concern among Canadians that our educational system is mediocre and off-target.

— **Creating Opportunity: The Liberal Plan
for Canada, 1993, pp. 30–31**

This announcement reflects a serious deficiency with educational programs in Canada, in terms of high administrative costs and ineffectual results. At the turn of this century, our educational system adapted as Canada evolved from an economy with an agricultural base to an industrial society. Now as Canada transforms itself into a technological society, the educational system is again forced into change.

Declining Quality and Rising Costs of Education

Knowledge is now expanding so rapidly that many of the facts and figures learned while at university are obsolete by the time of graduation.² While this country invests about \$48.5 billion annually on education, many Canadians are openly disappointed with the results. The educational system may have adequately served an industrial society, but not a technological one. Available funding for institutional education has actually declined from the 1980s into the 1990s. Government subsidy for university operations has dropped below 80%. Operating income generated by student fees has risen from 13.6% to 18% in the same decade. In the past three years many students scheduled to attend universities did not show up, as they had been unable to raise

¹ Quoted in *The Globe and Mail*, January 11, 1994.

² The figures in this paragraph are taken from *The Impact of Information and Communications Technologies on Postsecondary Education: Report presented to the CERI/OECD*, October 1993, pp. 1–3.

tuition and other expenses through summer employment. With falling enrolment and governments' reduced ability to fund, some universities may close. Educational institutions top-heavy with administrative staff dramatically drive up the cost of education. Many universities may have great resources, but they often go underutilized.

New media learning plays a central role in solving many of the problems which beset our educational system.

Networks Are Necessary to Deliver Education to a Remote and Dispersed Population

In Canada, the Constitution assigns responsibility for education to the provincial governments. However, because this country's population of 26 million is dispersed across nearly 10 million square kilometres, distance learning becomes a priority. Canada, a country once largely isolated by location and weather, must now cope with the reality of a borderless marketplace which stresses integration. For over two decades, electronic networks have proliferated. As a result of this expansion, there have been predictions of the so-called "wired city," a continuously linked environment where various technologies are compatible and connected, permitting seamless communication. This expected integration is fast approaching as computers, television, telephone, and fax machine use becomes more widespread. This integration of networks also amalgamates diverse sectors of the marketplace, affecting everything from fast-paced businesses to the cloistered studies of academic research. The corporate or medical professional can instantly retrieve vital information from distant data bases. Academics who previously made little use of computer technology in education now expect to freely communicate with their colleagues all over the globe via the Internet.

By eliminating the restraints of time and space and making information instantly available, electronic networks have fundamentally altered the marketplace. This section explores how networks have expanded the function and the market for the learning industries.

Lack of Canadian Content in Software Market

While Canadians have existing distance learning networks, they have not yet produced many titles; there is little Canadian content. As more and more educational titles are created in response to consumer demands, Canada's networks will be flooded with foreign-made learning products, particularly American. Eventually, the Canadian educational system will be glutted with foreign entries. Canadians exclusively educated with foreign learning products will be instructed with the information and the implied values of these goods.

Although we do cite some examples of Canadian content producers who have created sophisticated technology-based education programs, their output remains small at a time when American and European manufacturers are rushing to meet increasing demand. Unless we step up our participation and content in the courseware and educational markets, the sense of Canadian identity may be lost.

A Consumer-driven Educational System

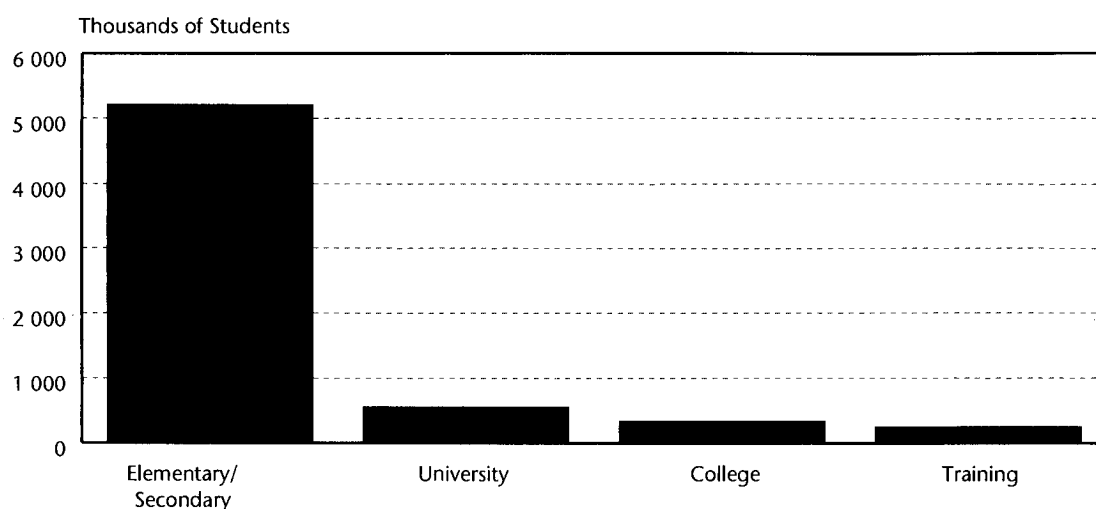
As more educational products become available, education will move outside the traditional schooling system and into the home. Canada's software market will soon be flooded with educational products for networks. Recent figures in *Businessweek* magazine indicate the dramatic growth of this market (see Figure 10, Top Educational Software Titles).

Explosion in the Home Learning Software Market

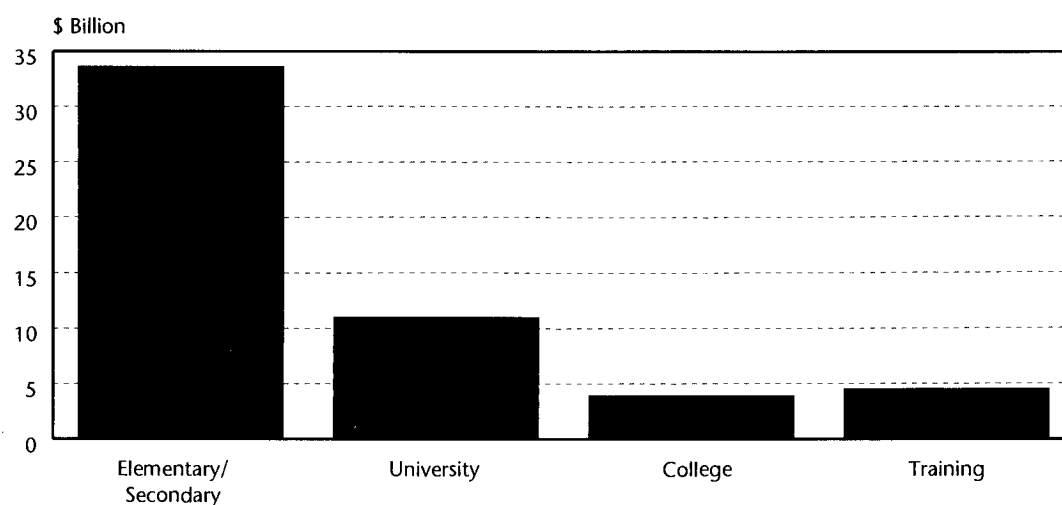
As education and entertainment merge in interactive multimedia presentations, instructional products have been dubbed "edutainment" by the popular press. In 1993, retail sales of home learning programs jumped 47%, to \$147 million. In 1994, sales estimates approach \$250 million and may reach \$1 billion by the year 2000 (see Figure 9, The Growth in Educational Software). At present, there are 700 titles

Figure 8 — Enrolment and Expenditures for Canadian Institutional Education

**Full-time Enrolment in Canada's
Educational Institutions, 1992**

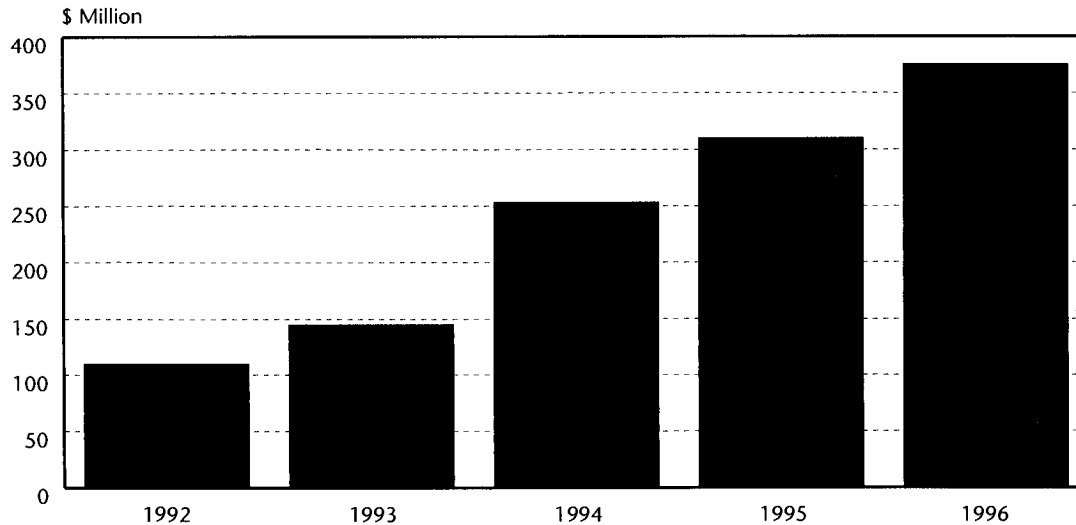


**1992 Annual Expenditures for
Canadian Educational Institutions**



Source: From a report presented in October 1993 to the CERI/OECD entitled: *The Impact of Information and Communication Technologies on Post Secondary Education*.

Figure 9 — Projected Growth in Educational Software (U.S. Consumer Sales)



Source: *Business Week*, The Learning Revolution, February 28, 1994, p. 81.

available now, with an additional 250 coming annually.³ Most of these titles are by foreign (American) manufacturers and may ultimately be networked and distributed to homes and schools internationally. As global electronic networks proliferate, other sources of foreign learning products are emerging on the Canadian market.

Sociological Impact of Distance Learning and Telework or Telecommuting

As fewer and fewer commute to offices, children are starting to see their parents at work in the home. In an earlier agrarian society, children grew up watching father and mother do farm work, helping out with the chores. In such circumstance, children received training directly from their parents. With urbanization, in an industrial society, one or both parents vanished at the start of the day, went off to office or factory, and returned only at dusk. Children knew that their parents were working, but had little real concept of what that meant. In a technological society, once again the home becomes a work

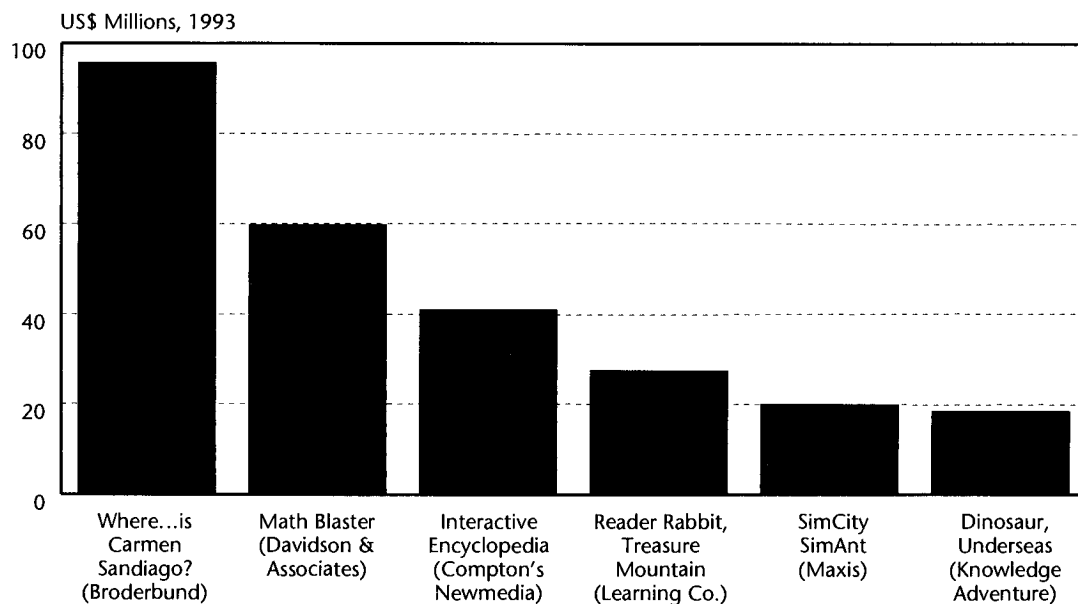
environment, with parents linked to the office or clients via electronic networks. In this environment, children again see their parents at work and may well help out with the chores, directly and indirectly receiving training. The young may also receive schooling at home, with instruction and lessons imported via computer and interactive television. De-urbanization is a distinct possibility, as many will find cities polluted and unsafe. Such developments as these will drastically influence everything from architectural design to transportation systems. De-urbanization is a major trend and one that deserves further study.

Examples of Canadian Educational Products

At present, Canada has the beginnings of sophisticated educational products that can compete on a world stage. Most of these have network potential; that is to say, they could be made available to a mass audience via global electronic networks. Many range from

³ *Business Week*, February 28, 1994, p. 83.

Figure 10 — Top Educational Software Titles



Source: *Business Week*, The Learning Revolution, February 28, 1994.

popular programs to those aimed at a specialized audience. The following are noteworthy examples of what is available.

Sourcebook on Nature and the Environment

The Canadian government has vast inventories of statistical data, documentation, photographs and films on this country's natural resources, everything from forestry, to weather, to mining. These "libraries" contain information that could be translated into popular products to assist in education. Government departments could work with Canadian multimedia companies to produce content that would delight and instruct an international audience.

On/Q Corporation of Montreal, in partnership with The State of the Environment Reporting Branch of Environment Canada, the Canadian Museum of Nature, the National Film Board of Canada, and the Department of Energy, Mines and Resources have co-produced EcoDisk, a CD-I on the subject of the environment. Designed for entertainment or educational markets, the program promotes a greater understanding of how human activities influence the environment by letting users interact with subject areas which include ecosystems, current issues, endangered species, and an atlas.

Travel Guides on CD-I

Also from On/Q, soon to be released under the World of Wonders brand name, Destination: Great Britain is the first in a series of CD-I travel guides that will provide information for planning an excursion (or for consultation while traveling). Extensive detail is available on demand, including first-hand accounts from travelers, reviews, suggestions, and tips. Destinations are explored by activating icons which represent landmarks, tourist attractions, hotels, and restaurants.

Sex Guide on CD-I

A project originating with the Toronto firm Digital Presentations, Inc. has resulted in a surprising innovation in sex education. Dr. Ruth Westheimer's *Encyclopedia of Sex* will be published as a Compact Disc-Interactive (CD-I) title. To be released under the Education and Reference Publishing Group formed by Philips Media, the CD-I program is Philips's first, developed chiefly for the school market. Addressing all aspects of sex, from the most basic biological information to psychological, cultural, legal and religious concerns, the *Encyclopedia* covers sensitive topics with clear and easy-to-understand language,

designed for an audience of both adolescents and adults. The disk features colourful illustrations, photographs, and full-screen, full-motion digital video segments, and is adapted from a 324-page book version with publication by The Continuum Publishing Group in 1994. The CD-I *Encyclopedia of Sex* may well become an essential and valuable component of sex education in schools. This project also shows how technology can be used to create accurate and engaging educational products.

Educational Courseware

Examples of courseware range from the popular to the arcane and scholarly. Each is valid and suggest the adaptability of the new technology to our learning needs. In more erudite areas, the Department of History at the University of Toronto, uses a computer-assisted learning project, *Causes of the English Civil War: The Historians' Debate*⁴ to help students interpret three articles debating the origins of the war. Developed with Hypercard, the tutorial program links informational annotations (definitions of terms, descriptions of events, biographies, maps), providing ready-reference access to the same information the experienced historian automatically brings to bear on these articles. Although a simple example of computer-assisted learning, this project embodies the necessary task of training the student of history, and other subjects, to look for key passages and clues to more complex relationships and their meaning. Students will come to expect these and more detailed elements of instruction to be available via network and on demand. For the first time in history, seekers of the best in education will be able to receive it wherever they live — whether on- or off-campus, in the city, on the farm, or in the tundra.

TACT Content Analysis Software

TACT is a software tool to assist in content analysis of a text. The basic premise for the analysis is that there is a relationship between the themes in a literary work and the vocabulary used by the author in the work. Words or groups of words become associated with particular ideas and, by locating places in the text where these words or word groupings are used, the analyst can locate all

instances where a particular theme or associated ideas are discussed.

TACT is a full-text retrieval system which has been in part inspired by J. B. Smith's ARRAS program. With TACT, the researcher can:

- investigate the vocabulary used in a work
- create collections of words and name these collections
- create themes based on location in the text
- use the structural information (such as the names of the characters in a play).

TACT is Canadian shareware available through the Centre for Computing in the Humanities at the University of Toronto and from the Internet at gopher.epas.utoronto.ca. This example of Canadian technology is now used all over the world, adapted for a variety of uses. TACT can be used for everything from scholarly investigations of classical literature to analysis of the criminal mind when serial notes are sent to the press or to the police.

Multimedia Educational Products

Many interactive multimedia presentations manufactured in Canada have entered international markets. Further examples of Canadian learning products or projects are included in the figure on the next page.

The Electronics Workbench Simulation

As noted in Figure 11, the Electronics Workbench software simulates the environment of a workbench in the lab for circuit design. The designer can add components and hook up lines to the simulated test instruments. The computer program displays voltages and waveforms directly over the on-screen instruments, and is a reliable, inexpensive and safe tool for the design and verification of analog and digital circuits, especially in a student environment.

Approximately 85% of Interactive Image Technologies Ltd. sales are to foreign markets, and almost half of these are made to the United States. In some cases, the use of this software program has reduced both the cost of education and student

⁴ Developed by Professor Barbara Todd and D. Clemis, Department of History, University of Toronto; Shell designed by Mike Stairs, Centre for Computing in the Humanities, University of Toronto.

Figure 11 — Selected Canadian Learning Products and Projects

PRODUCT	DESCRIPTION	CREATOR
Virtual Cities educational software	Links children in three countries as they tour each other's neighborhoods, play ball and make music.	National Film Board of Canada St Laurent, Qc
Discis Children's Books	Text and illustration with dramatic narration, original music and sound effects. Sold in more than 35 countries.	Discis Knowledge Research Toronto, Ont.
Discover the World on Diloo educational software	Children learn real-life skills like using computers, copiers, banking machines.	DIL Distribution Ste Foy, Qc
L'Herbier Marie-Victorin environmental software	Learn about Canadian plants and their dependence on the environment.	Le Groupe Micro-Intel Montreal, Qc
Exploratexte courseware	Learn French as a native language.	Machina Sapiens Montreal, Qc
Le Correcteur 101	Corrects and advises on French language and usage.	
Mecanica	Learn mechanics.	
Silver Dart	Interactive encyclopedia of aircraft; detailed specifications of all planes in the National Museum of Aviation in Ottawa.	Digital Renaissance Toronto, Ont.
Birdsong	Identify bird songs, review evolution of the songs.	Mackerel Inc Toronto, Ont.
Light and Gemstones kiosk	Experience the effect of light on gems and different cuts of gems.	
Home Energy Conservation	Interactive touchscreen shows how to reduce home energy consumption and save home energy dollars.	Kortright Centre for Conservation Downsview, Ont.
Electronics Workbench simulation software	Simulation for circuit design and testing the circuit on electronic instruments.	Interactive Image Technologies Toronto, Ont.
The Bartlett Family Videodisk	Interactive experience of life in Upper Canada in the 1780s. User accesses data base of pictures with annotations in French and English.	
Senior Level High School mathematics (CD-ROM)	2-D and 3-D graphics, Pagemaker files, test bank and Math Explorer software multimedia Hypercard applications.	Instructional technology and Alberta Distance Learning centre Barrhead, Alta.

drop-out rate. In at least one American college, the simulation package helped reduce class time by 15% as well as reduce tuition fees.⁵ Intended as a complementary learning and teaching tool to the traditional hands-on lab and lecture, the program is currently being used in one quarter of all American colleges and universities. Such programs permit the student to work at home. This may offer educational opportunities to women, who often stay home to look after children and are unable to attend schooling that would lead to employment or enhance present job skills.

Computer-aided Language Learning: Torino[®]

It is impossible to ignore the educational potential of computers, especially as a younger generation increasingly accepts them as part of their everyday environment. Computer programs may soon become an integral part of language instruction in every level of the educational system.

Anne Urbancic and Jan Gordon of the University of Toronto worked to create Torino[®], the name of a computer program and fictional town where a student takes on the personality of a member of the fictional community. Originally conceived as an oral interactive classroom activity, Torino[®] exploits the powerful human enjoyment of gossip to teach language. A computerized version on Hypercard provides a writing exercise to assist the student in language learning. Working at a computer screen running Torino[®], a user pays a visit to the registry office of the fictional town, researching background on their character's history, as well as that of the other townsfolk. This exercise, conducted under the auspices of the University of Toronto's Italian Department,⁶ is a small component of the total coursework. The ideas behind this "game" are based on serious and scholarly investigations into the origin, purpose, and use of language.

Educational Networks: The Learning Lifeline

In our rapidly changing world, more will need education but fewer will be able to afford it. Increasingly, as Canadians expect information to be available on demand, distance learning may become the central mode of delivery of educational services. This trend applies to all types of learning. Our work force has become nomadic, working from home, on the train, or from hotel rooms, linked to others via telephone, computer, modem, fax machine, and other technologies. The daily transport of children to school to receive hours of prescribed lessons may soon be eliminated. For students (or their parents) to spend thousands of dollars annually for a college education in a distant city may appear equally outmoded.

Learning is now a lifetime pursuit. The notion that schooling occurs only in one's youth is recognized as outmoded. Guided by teachers, students must acquire the skills to research and solve problems on their own (and for the rest of their lives). Each day, news headlines discuss a technological, medical, or other breakthrough. Information once shut up in institutions is more broadly available. Students as well as workers must have the skills to continually educate and inform themselves.

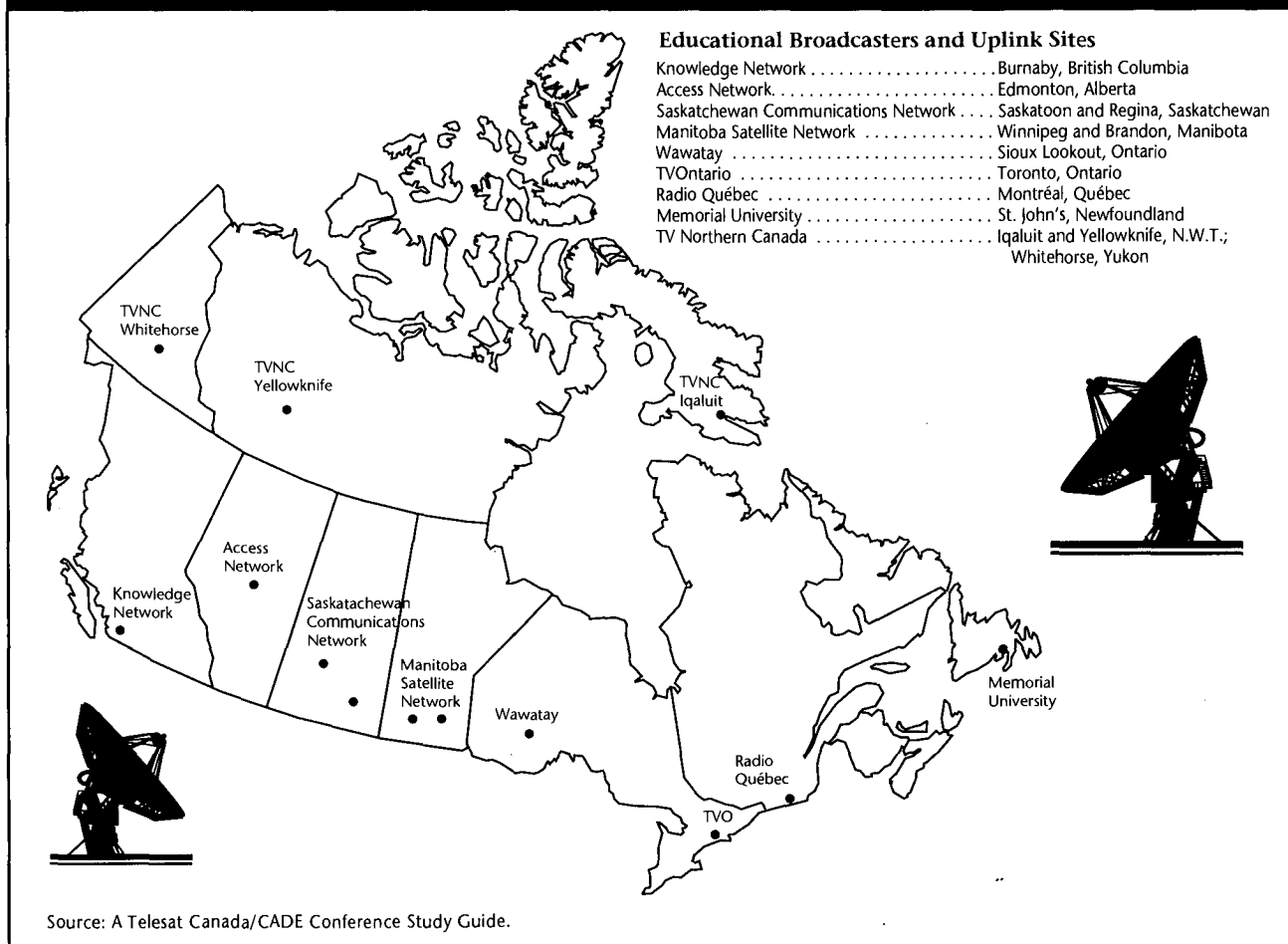
Outside the colleges and universities, workplace-related training may reach expenditures of around \$5 billion annually in the next few years.⁷ Technology-based training (TBT) could create an annual market of \$150 million. The training products themselves can feed a large export, with sales running an estimated 10 to 20 times higher than in the domestic market. TBT funding incurs the same resistance as expenditure on formal education. Government and businesses are not yet sufficiently aware of the effectiveness of TBT, or how to integrate it into our present systems. Further, trainers worry that the introduction of TBT threatens their livelihoods.

⁵ Professor John P. Borris, Department Chairman, Industrial Technology, St. Clair County Community College, Port Huron, Michigan.

⁶ *A Funny Thing Happened On the Way to Torino[®]: Developing L2 Proficiency in the Computer Lab*, Anne Urbancic and Jan Gordon, University of Toronto, Romance Languages, Annual 1992, Vol. 4. Project's Technical Advisor: Geoffrey Rockwell, Sr. Instructional Technology Specialist, Computing and Communications, University of Toronto.

⁷ Anna Stahmer, *Suppliers of Technology-Based Training: Challenges and Opportunities*, Summer, 1992, p. 33.

Figure 12 — Educational Broadcaster and Uplink Sites Across Canada



Legitimate concerns about the validity of technology as an educational tool have always been mingled with the fear that technology brings an erosion of power and creates human obsolescence. However, these anxieties are small compared with a greater danger if we do not exploit TBT and realize its further benefits.

Gone is the time when one could learn a skill and apply it until retirement. Such a notion does not fit today's job markets. To remain competitive with peers in the world markets, the Canadian worker, like workers everywhere, has had to accept ongoing training as an integral part of any career. Canadian companies must now learn to use the technology to be able to afford the costs of this continual retraining of staff.

To deliver training nation-wide, Canada has already begun to exploit an established broadcast network for education.

Educational Network	Location(s)
Knowledge Network	Burnaby, B.C.
Access Network	Edmonton, Alta.
Saskatchewan Commercial Network	Saskatoon and Regina, Sask.
Manitoba Satellite Network	Winnipeg and Brandon, Man.
Wawatay	Sioux Lookout, Ont.
TVOntario	Toronto, Ont.
Radio Quebec	Montreal, Qc
Memorial University	St. John's, Nfld.
TV Northern Canada	Iqaluit and Yellowknife, N.W.T. Whitehorse, Yukon

Provincial Networks for Remote Learning

Most provinces have developed an infrastructure to support the delivery of education and training to all their citizens. The level of service usually includes:

- computer-based audiographic teleconferencing
- computer-aided communications
- electronic data links
- multimedia.

Typically the formation of a successful education network involves three tasks:

- decide which mode of broadcasting is most effective yet affordable with the existing resources and funding available
- collect the technology and make it work
- develop the programming and courses to fulfill the needs of the subscribers.

Computer-based video-conferencing and teleconferencing systems allow classrooms to be transformed into interactive distribution centres. Educational broadcast networks offer good examples of point-to-multipoint public video technology, which permits remote learners to participate via telephone audio conferencing. In general, success of the network projects have been the result of cooperation among the institutions, the telecommunications companies, and the provincial government involved. The educational institutions have recognized the need to make technology further their own goals. This point is illustrated with several examples.

TeleEducation NB

TeleEducation NB is a distance education network formed under the Canada-New Brunswick Cooperation Agreement on Entrepreneurship and Human Resource Development. This project stimulates private and public educational institutions, private knowledge-based industries and training companies to develop and market innovative training products. The network coordinates about 18 community learning centres throughout the province, each set up as an "electronic classroom" with the cooperation of local community and educational institutions. Both students and teachers benefit another way — they pick up expertise in the use of the new technology.

The courses are designed and offered by public and private educational and training organizations. Using New Brunswick's advanced telecommunications infrastructure, the courses can be transmitted to or received from other centres. Online learners can view a calendar of all current distance education activities or consult local facilitators who provide further course information. To encourage community participation, a special Program Development Fund helps defray the cost of implementing innovative distance education projects that will be distributed on the network.

NSECA (Nova Scotia Educational Communications Agency)

NSECA, created by provincial legislation in 1989, sanctions the collaboration of the Department of Education and the Ministry of Transportation and Communications to promote the use of technology for educational communications. The agency has spearheaded four main initiatives in the province:

- Atlantic Satellite Network (ASN)
- educational channels on cable television systems
- Collège de l'Acadie
- Network Nova Scotia (NNS).

ASN

ASN is a private satellite-to-cable broadcast service. The Atlantic provincial governments and the Atlantic universities now broadcast on ASN about 20 hours of formal courses a week, mainly on the weekend. Students registered with the institution that originates the courses can obtain credit toward a certificate or degree. Outside regular broadcast hours, the ASN also provides download service from a video course library. On occasion, live teleconferences have been arranged linking Nova Scotia classrooms to European students using both national and international satellite systems. So far, ASN is the only private broadcaster in Canada providing this service.

Cable Systems

The agency has also designated an educational channel in the Halifax, Dartmouth, Bedford and Truro cable systems. As with ASN, the channel is used for formal educational courses. Proceedings of the provincial legislature when in session may also share the airwaves provided there is no conflict with the educational program.

Collège de l'Acadie

At Collège de l'Acadie, the latest communications technology has provided a unique and much-needed service to the province's francophone community (about 40 000) in the area of college training. The collège, with over 400 registered students in six communities taking courses via compressed video and audiographics, provides universal access to technical and vocational instruction within the province. Students can converse and exchange documents with students in other centres, while receiving all training in their own home region. The interactive video provides an obvious advantage in the trades courses, where procedures are demonstrated in automechanics, plumbing and electrical workshops.

NNS

NNS was developed in the same time period as a distance education network, linking the 18 community college campuses and allowing access by all of the universities in the province. As with Collège de l'Acadie, all sites are both originating and receiving sites. For the Collège and NNS, the video equipment includes PictureTel or CLI, and the audiographics are handled by VIS-À-VIS. Satellite via Telesat was first considered and found costly and not the best transmission for interactive audiographics. Accordingly, Maritime Tel and Tel (MT&T) was consulted for land-line transmission. After much negotiation, and backed by the agency, MT&T filed the Educational Communications Tariff with the CRTC. Now, the educational service rate is available:

- to any educational institution in Nova Scotia
- at three levels of service: audio, audio-graphics, or video
- at a flat annual fee that is uniform throughout the province.

The 25 combined Collège de l'Acadie and NNS sites pay very low rates, thanks to practices like using off-peak hours and blanket service commitments. MT&T provides the bridging equipment for the service and fully maintains the system. Although both networks have access restricted through the designated learning centres and community colleges, they are part of MT&T's own network. The agency retains control over the scheduling of the bridge, 24 hours a day, through a personal computer.

The audiographics system was decided by consensus involving all the major players in the distance learning network. Content scheduling follows rough guidelines developed by the province and agreed to by the institutions. Economy of operation is foremost, so that resources are allocated only as much as the application demands. With more post-secondary educational institutions per capita than any other province, Nova Scotia sees its development of education with technology as a potentially significant national and international export commodity.

Future projects for NNS and Collège de l'Acadie include:

- adding audiographics to NNS
- increasing the workstation numbers to the service
- increasing the cooperative learning between the educational institutions and the private sector
- increasing cooperative ventures in other provinces responding to requests for course delivery by both networks outside Nova Scotia.

SchoolNet: An Educational MultiNetwork

SchoolNet is a cooperative initiative of Canada's provincial, territorial and federal governments, educators, universities, colleges, and industry. Its goal is to link all of Canada's schools electronically to the Information Highway. Officially launched in October 1993, SchoolNet was to link up 300 schools across Canada through CA*Net/Internet during the 1993-94 school year. The project proved extremely popular. Within three months, 600 schools had come on-line, accessing SchoolNet services more than 100 000 times.

SchoolNet has set out to achieve some important national goals:

- provide national and international education resources to Canadian teachers and students, regardless of location
- stimulate learning
- develop students' network skills, which will be a vital key to their future employment
- provide Canadian information technology, software, and multimedia businesses with new market opportunities.

Not a network in its own right, SchoolNet links educational networks across Canada, most of which are established and operated by provincial ministries of education. On SchoolNet, students and teachers can access:

- a guide to 100 best Internet science and technology resources
- 350 scientists, engineers and advisors from around the globe
- a career-entry selection guide
- an electronic, national press news feed from Southam News
- library catalogues and data bases from around the world
- teacher-designed networking projects
- scavenger hunts.

Students using SchoolNet develop interpersonal and social skills for use in a technological world. Users of SchoolNet will find that they acquire a far-reaching network of like-minded individuals. Through this network, they may establish long-standing relationships. When students enter the job market, these relationships can provide current information about available work or personal references. In a highly competitive market, employers look for people they know, or who have friends who will speak for them. A student with an extensive personal network stands a much better chance of hearing about a job opening and getting an interview.

Distance Learning Institutions

There are a growing number of distance learning institutions across Canada. Here are some examples.

Open Learning Agency

Formed in 1988, the Open Learning Agency (OLA) in British Columbia consists of the Open University, Open College and the Knowledge Network. They offer degree, certificate, and general-interest programs, and work cooperatively with British Columbia's three universities and 15 colleges to coordinate the development and delivery of distance education activities.

The Knowledge Network is the education telecommunications authority for the province with the added responsibility to provide electronic delivery systems for educational institutions in British Columbia. The Knowledge Network operates a KU band satellite to a cable broadcasting system, which delivers almost 100 hours of instructional and general interest programming per week. A 40-port full-duplex audio teleconferencing bridge also allows the OLA and provincial colleges and schools to unite students and instructors for interactive audio tutorials. Some community colleges have added computer-based audiographic units for multipoint voice data and visual graphics.

OLA will add slo-scan video, VBI, computer conferencing, and online CBT to the Knowledge Network, as well as expand the number of electronic learning centres in business, education, and the general community.

Community Campus Network in British Columbia

The Community Campus Network (CCN) is a network of OLA regional and local sites joined together by an information system, communication links, support services, and a common goal — to have all the learning opportunities from local, regional, provincial, national, and international sources reaching the remote communities in British Columbia. The primary objective of CCN is to create learning centres throughout the province, each acting as a “local campus” of every university and college. For economy, centres use current facilities such as libraries, schools, community colleges, and workplace sites. Some sites allow students to fax in assignments and participate in group activities and international conferences over the network. CCN will provide a local “gateway to the world” for people wishing to upgrade skills and acquire knowledge.

The CCN has served to:

- provide consulting to industry, community organizations, and education institutions wishing to develop on-site learning centres
- coordinate the registration and credit process for those accessing programs from a variety of sources

- install satellite receive dishes to access programs from around North America; these programs will be distributed live, or recorded and rebroadcast to Learning Centres at optimum times for student/worker viewing
- establish a turnkey studio facility at OLA to develop cost-effective, live video education and training programs.

The services are available to:

- educational institutions
- business and industry
- government agencies
- health care
- engineering and technology
- Chambers of Commerce
- Integrated Services Digital Network (ISDN) distance learning trial in British Columbia.

In cooperation with the Vancouver School Board, the OLA delivers adult education programs via the ISDN communication links and British Columbia-developed interactive multimedia technology. A bridge conferences in the ISDN audio and data channels between the four adult learning centres offered by the Career and Community Education Services division of the Vancouver School Board.

Objectives of the project are to:

- showcase ISDN communication capabilities and British Columbia-developed multimedia technology in post-secondary distance education
- forge a cooperative relationship between school districts, distance educators, and the private sector in research into new education technologies
- identify other applications for ISDN and multimedia delivery in distance education programs
- provide BC Tel with feedback on ISDN performance, and on BC Tels service and support of ISDN.

Perhaps most significantly, the ISDN project forced us to re-evaluate our entire perception of distance education. Traditionally, distance education allowed us to span great distances and serve remote communities. But this project has demonstrated that distance education can also serve an urban environment. Surprisingly, when students were given the option to attend face to face classes, a short bus ride away, they preferred the ISDN sessions.

— **Betty Mitchell, Manager, Schools Program Services and Teleconferencing⁸**

The Open Learning Agency has an extraordinary range of pilot projects which deal with aspects of distance learning. Although these projects are not explored in this report, those interested in innovative applications of distance learning would benefit from knowledge of the OLA.

Telemedicine and Educational Technology Resources Agency

The Telemedicine and Educational Technology Resources Agency (TETRA) has been established to make the distance education resources of Newfoundland's Memorial University available to the private sector. Currently, the Telemedicine centre at the university operates a 190-site audiographic teleconferencing system in 100 communities in Newfoundland and Labrador. The "receive" sites include all provincial hospitals, community colleges, university campuses, 50 small rural high schools, a number of nursing clinics on the coast of Labrador, and a variety of government offices. A user consortium, consisting of health, education, government, and community groups, participates in approximately 5 500 programs per year.

TETRA also facilitates application trials for new compressed video applications and high-speed diagnostic medical data transmissions. The basic approach is a multimedia delivery with videotape, audiotape, and audioconferencing using telewriters as required. A variety of single-purpose remote testing units are used in some patient care. Occasionally, TETRA uses the "original" format of one-way video

⁸ Introduction, *The ISDN Distance Learning Trial, Final Evaluation*, prepared by Don Black, Open Learning Agency and Linda Harasim, (Burnaby, B.C.: Simon Fraser University, October 1993).

or two-way audio satellite conferencing for a large audience, as for the recent Women in Business and the Alternatives to the Fisheries conventions.

Saskatchewan Communications Network

The Saskatchewan Communications Network (SCN) is an educational network, consisting of:

- the Training Network, which delivers live, interactive credit and professional development programming
- the Cable Network, which distributes educational television programming via satellite from the University of Saskatchewan to provincial cable companies who in turn broadcast to subscribers.

SCN uses existing resources in both studio production and receive site facilities. In the interest of economy, one transponder is used with a channel multiplexing system that interleaves two separate signals in one transmission, each at 30 images per second (standard television images are sent at 60 images per second). At each receive site a decoder is required to extract the desired signal. The decoder reconstructs each video signal and displays it at a rate of 60 images per second. A central computer controls the multiplexer and individually addresses each decoder. Thus two separate courses of study can be transmitted to separate classrooms and at different remote locations.

In the 1991–92 academic year, the network delivered 21 post-secondary courses and six secondary courses to the 3 000 students across the province. Programming is received in 54 SCN centres, housed in Regional College and Saskatchewan Institute of Applied Science and Technology (SIAT) facilities, and at 18 high school classrooms across the province.

SCN is also available to agencies, departments and businesses who have a need to provide training and upgrading to a dispersed audience. Some examples of the diversity of the programs are highlighted:

- The Saskatchewan Alcohol and Drug Abuse Commission (SADAC) provides seminars for teachers, counselors, social workers, and health care professionals
- The Canadian Bar Association has disseminated legal precedents to its lawyers

- Rural Development, a government agricultural agency, has planned a workshop for farmers on wills and estate planning.

The universities' instructional model depends on strategic alliances. The Office of Extension Credit Studies provide the overall coordinating role to ensure the collaboration among all members of the team. Lectures conducted by a professor may be televised to as many as 300 students at about 50 sites. Students are supported by tutors or proctors and can interact with the professor via telephone and fax. Discussion groups are an integral part of the course. Specific sites phone in their results or opinions while other sites can challenge and rebut. This approach has helped create an "electronic community" where students get to know each other through interactions on the network. The history class brings the past to life by researching and presenting live costume re-enactments. Together with slides, maps, and videotaped guest lecturers, students agree that these are valuable contributions to the learning process.

As a further example of the team approach, the professors are selected as "master teachers," noted for both scholarship and dynamic teaching style. Instructional designers from the Division of Extension together with media producers from the Division of Audio Visual Services consult with faculty to exploit the television medium. Now in its eighth year offering credit course via satellite, this educational model has proven effective for learning at a distance.

Disseminate Information	⇒ Translate to Context	⇒ Incorporate as Knowledge
TV lectures	TV lectures	Discussion
Reading assignments	Course guide	Assignments
Course guide	Discussion	Examinations
Discussion	On air interaction Telephone consultation	

The SCN has implemented a pilot project to distribute educational video tapes to all the school sites by using VBI broadcast — a lot faster and less expensive than mailing video cassettes. The VBI is used to download a directory of available material to each school. Teachers and school librarians use an automated voice response system to order tape selections along with the target VCRs. Each school has a VBI receiver and multiple VCRs. During unused satellite time, addressed VBI communications

activate specified VCRs in the designated schools and the video is played and recorded locally. At completion, the VCRs are turned off and the cycle is repeated for the next video selection. Data are transmitted at such high speed that 1 600 VCRs can be individually activated in one second. For important educational or new information over video, SCN automatically activates the participating VCRs in every school to record the information for local use. This method of distribution can apply to the total 800 schools in Saskatchewan.

SCN has further projects to:

- develop a multi-sensory, multimedia delivery
- expand the secondary program to fulfil the needs of small, rural high schools
- establish a multiple delivery system to serve workplace training needs and specialized professional upgrading
- use video compression technology to further increase delivery capacity and decrease processing computing costs.

SCN recognizes that even with the new technologies, the focus must be needs assessment, program development and production, scheduling, technical support, and network support training.

Manitoba Satellite Network

Manitoba's population is 70% urban. The initiative of the Manitoba Satellite Network (MSN) program is to develop a one-way video, two-way audio satellite television network linking sites throughout sparsely populated rural and northern Manitoba for high schools, post-secondary learners and professional groups. Enrolment continues to decline in small rural high schools, increasing the need for distance education courses via satellite and teleconferencing.

MSN activities include:

- enhancing 62 distance education projects (mostly teleconferencing and pre-taped video delivered courses) undertaken by the Department of Education and Training
- supporting the advent of the First Year University Distance Education (FYDE) project started by Manitoba's three universities in 1990
- supporting the training needs of government departments.

Approximately 6 000 Manitobans have participated directly in the network activities, including 800 high school students, 400 FYDE students and 1 400 public sector employees. More than 20 groups have developed over 500 network programs, broadcasting over 500 hours in a year.

Contact North — Telephone Application

In October 1986, responding to the need for distance education in northern Ontario, the Government of Ontario announced a four-year pilot project called Northern Ontario Distance Education Access Network (NODEAN) which led to the creation of Contact North. The mandate of Contact North was to:

- improve immediate access to formal educational opportunities at the secondary and post-secondary level
- establish a long-term capacity to improve access to other training, information and educational opportunities
- meet ongoing and emerging educational needs of residents in remote communities
- ensure that special needs populations, such as native people and francophones, have full access to the resources in the network
- create a test-bed to evaluate the effectiveness of various technologies in delivering distance education
- create expertise in the design and operation of technologically enhanced distance education programs resident in northern Ontario and capable of application to other jurisdictions.

The new Contact North (Contact Nord) network has two components:

- the network of electronic classrooms and support personnel
- Northern Distance Education Fund (NDEF) to which the post-secondary institutions can apply for the redesign of degrees, certificates or diplomas from the classroom to the distance education format.

Within the government, two committees manage Contact North. The larger committee has seven ministries and agencies on it, one of which is TVOntario. Contact North sites operate telewriter systems using VBI from the TVOntario signal. To

network the remote sites, each regional coordinating centre has an audio conference bridge capable of linking 20 sites and computer software supporting e-mail, conferencing, and multimedia. TVOntario broadcasts some video courses, supplemented by interactive audio conferences and print materials coordinated by Contact North.

In 1990, the Ontario government made Contact North an ongoing program. The government has contracted with four institutions, Cambrian College, Confederation College, Lakehead University, and Laurentian University, for the delivery of the Contact North program. Contact North has become increasingly technologically sophisticated, now using educational video conferencing between Sudbury and Thunder Bay. At present, the network involves 92 Ontario communities and is expanding.

VBI Broadcasting Networks in Canada

What Is VBI ?

Vertical Blanking Interval is the black stripe seen when a television picture loses vertical hold and rolls. It is an integral part of the National Television System Committee (NTSC) television standard and makes up the first 21 scan lines of each screen. This unused part of the bandwidth is available for data transmission. (For example, line 21 of the VBI is widely used to deliver closed caption information.) Since VBI data are an integral encoded part of the video signal, they are available everywhere the television signal reaches and will pass transparently through all carrier media. Many Canadian broadcasters are currently exploiting this technology to deliver data along with their television signal, either for their own internal applications or on behalf of third parties on a fee-for-service basis.

VBI data broadcasting was developed as teletext, a technique in the early 1980s to utilize lines 10 to 20 of the VBI to transport virtually any type of digital data along with the television signal. The technical industry standard for VBI is known as North American Basic Teletext Specification (NABTS). Compliance with NABTS ensures that the transmission and reception equipment from any suppliers will work together. VBI data broadcasting with a capacity of 180 000 baud means that data can be delivered simultaneously to an unlimited number of reception sites. Individual data streams, each up to 19 200 baud, are transmitted to packet multiplexed format to utilize the available bandwidth.

Advantages of VBI Broadcasting

The major attraction of the VBI transmission medium is that it is already paid for, because data are carried over existing infrastructure. No additional transmission equipment or power is needed, even when the number of receiver sites is increased. A data insertion system (\$35K) supports VBI at the television network "head end," and an inexpensive VBI data or graphics receiver captures the VBI data at each site (about \$500). VBI data broadcasting is especially appropriate for applications that require:

- multipoint reception
- broad geographic coverage
- swift delivery.

Comparing Telephone Transmission and VBI Broadcasting

Characteristic	Telephone	VBI Broadcasting
Transmission mode	Point-to-point. Reaches only one site at a time.	Point-to-multi-point. Reaches all enabled receivers at multiple sites simultaneously.
Communication modality	Two-way audio.	One-way audio-visual.
Cost to expand service to more subscribers	Landlines required; cost proportional to number of sites.	No additional cost.
Transmission coverage	Landlines required.	Signal reaches all areas covered by television broadcast (pervasive).
Flexibility and security	Point-to-point; tapping and other eavesdropping possible.	Only designated receivers can access a specific transmission.
Data integrity and reliability	Subject to mechanical condition and continuity of connection.	With forward-error correction, transmission is superior.

The VBI receiver can deliver addressed data directly to many types of devices, like:

- data base, text fields, or software delivered to the computer
- text/graphics overlay at cable heads or display units
- document hardcopy on a printer.

The primary limitation in VBI data broadcasting is that it is a one-way transmission system. However, there are many applications which have the majority of data transmitted one-way and low-volume return

communication. A hybrid solution would have VBI carrying the bulk of data one-way and a modem link carrying the limited return.

Norpak Corporation in Kanata is the leading supplier of VBI data broadcasting systems and receivers. Norpak has partnered as a software developer with several system integrators to develop applications and turnkey solutions in a number of areas.

In 1991 the Department of Communications concluded that satellite and VBI networks will be the preferred technologies for data broadcasting over wide geographic areas, with VBI favoured because of lower receiver costs. Where addressed text and/or graphics overlay are required, data/graphics VBI receivers combine this capability with free data communications at very low cost. VBI broadcasting is well established in Europe and is being rapidly implemented in North America in national, regional and specialty Canadian television organizations.

One of the major advantages of this technology is the reach or accessibility of the signal. Vertical Blanking Interval data broadcasting via a major national broadcasting network is capable of reaching essentially 100% of the businesses and households in North America "over the air."

In addition, the broadcast signals are widely available via cable television (89% of Canadian households) and virtually everywhere by satellite.

This existing transmission network offers the most pervasive national geographic coverage of any communications medium available, including the telephone network.

— **Jeff Bond, Portfolio Manager, Marketing and Public Relations, Communications, Ministry of Economic Development and Trade (Ontario)**

Here are some of the applications Canadian broadcasters have implemented using VBI communications.

Radio-Canada/CBC

Radio-Canada (CBC's French-language service) transmits unique applications simultaneously over the same VBI using packet multiplexing VBI technology. The signal provides access to over 98% of Canadian territory and presents a significant opportunity for

both the CBC and the many potential users. The CBC is exploring partnership opportunities to manage and market a national data broadcast service.

Road Weather Information System

Road Weather Information System (RWIS) was developed jointly by the Ontario Ministry of Culture and Communications, the federal Department of Communications, and the CBC. Under RWIS, up-to-date weather information is distributed to the Ministry of Transportation of Ontario (MTO) patrol yards across Ontario. This information is used by local offices to plan and execute winter maintenance work crews most effectively. (The MTO spends over \$100 million annually on winter maintenance.) At each site, the weather data from the CBC signal are accessed either off-air, over cable, or via a satellite dish. Each VBI receiver captures the weather updates and delivers them to a local workstation. The result is multimillion-dollar savings on maintenance costs and road safety. Potentially, 350 MTO sites can be serviced over the winter season.

Visuaide 2000

Visuaide 2000, a non-profit organization, has spearheaded an initiative to make daily newspapers accessible to the visually impaired by combining VBI communications with other state-of-the-art technologies. On a daily basis in the pilot project, Montreal's *La Presse* is converted by computer to a format suitable for the visually impaired. This electronic version is inserted in the VBI of Radio Canada's network signal for distribution across the country. Each reception site is equipped with an IRIS reading workstation and a VBI data receiver. Once the daily update is received, the user can "read" the newspaper using either the voice synthesizer or the Braille display option.

The speedy dissemination of information made possible by the technologies used in this project means that society can now take a giant step forward on behalf of its members, who because of physical disabilities, have trouble at present gaining access to the type of information contained in the printed newspapers

— **Gilles Pepin,
Director of Visuaide 2000**

CTV

During the 1988 Winter Olympics, CTV used VBI data broadcasting for internal distribution of time-sensitive information including program scheduling, event results, and electronic messaging. CTV currently uses VBI for automated access to the commercial news services of both the CBS and ABC television networks in the United States. These services are carried on the VBI of each network's respective signal or distribution across America, and are fed directly to CTV's news computer to provide a key resource for *CTV News* and *Canada AM*.

Hydro Québec

Over the past two years, Hydro-Québec, the provincial electric power utility, has used VBI in its energy management system for peak load shedding. Installed in several hundred sites across the province, Hydro-Québec plans to expand the proven system to over 8 000 sites.

Radio Québec

Radio Québec uses VBI for remote operation of 17 transmitter sites. Telemedia transmits a "news wire" directly to a dispersed network of printers, using Radio Québec's VBI to control programming equipment at multiple sites.

Knowledge Network

The British Columbia Forest Protection Branch (FPB) uses VBI to equip its Knowledge Network with forest fire and emergency response information, broadcast to about 100 sites across the province including FPB locations, forest industry firms, park offices, local fire departments, and remote fire sites (transmitted continuously at 19 200 baud, carrying lightning and weather information). It has much higher capacity than land lines, and more remote coverage.

Television Northern Canada

Television Northern Canada (TVNC) is a new public/educational television network established to advance educational benefits and protect and enhance the heritage, culture, and language in Canada's North. TVNC in conjunction with the Department of

Communications and Northern Native Broadcasting Yukon, installed a VBI data transmission system to pilot distance education and government telecommunication applications. Yukon College is delivering course material and other educational information to community colleges. The Department of Indian and Northern Affairs plans to use the VBI to distribute electronic data base information to band offices.

Virtual Reality on the Networks Distance Learning

Distance Learning

With a new type of computer software called virtual reality, children in Canada, Italy and the United States were recently linked via satellite to explore and interact with each other's typical urban environments. The students played in front of a chroma key wall, facing a large screen monitor, while a video camera sent information of their activities to a computer. Mirrored on the monitor, the students were able to interact with each other and with computer generated images, in a virtual commons concept. This 1992 Virtual Cities project is an initiative of the National Film Board of Canada (NFBC), in cooperation with the Toronto-based Vivid Group and Telesat Canada. The unique human interface technology was developed in Canada as the MANDALA SYSTEM™, by the Vivid Group of Toronto.

The National Film Board is currently evaluating human-machine partnerships in cooperative learning which encourage participation and interaction. Investigations into virtual reality systems for learning environments continue in the areas of:

- three-dimensional imaging
- dramatic storytelling
- networking.

A wide variety of virtual reality technologies are evolving. Some require the user to operate in special eyewear, gloves, and other apparel. As the technology becomes easier to use and cheaper to acquire, virtual reality promises to foster new educational and entertainment platforms. Conceivably, students from all countries may one day attend one central virtual university, a university existing only in cyberspace. Students would access it from their homes, via television or computer.

Cybersex

The largest adult recreational market for virtual reality technologies will be erotica. Users will be able to participate in adventures beyond anything *Leisuresuit Larry* has ever tangled with.⁹ Companies which cater to the cybersex market will design and deliver virtual pleasure domes for an international clientele. This potentially multi-billion-dollar industry will dramatically influence human sexual behaviour and custom.

Technology-based Solutions to Training

Because of restructuring and changing technologies, training and retraining is now a necessary part of government and business. Still, the cost of live instructors and teaching materials, as well as the work time lost while employees undergo instruction, makes training a constant drain on resources. Ontario alone spends approximately \$20 billion on education and training.

This represents a significant portion of total provincial revenues, but is viewed as a necessary expenditure. The cost of traditional education and training has been steadily rising, but the quality of the results is currently in question. Conventional instructor/classroom techniques are not adequate to meet the needs of societies which are increasingly technology-based and technology-dependent....

Both in the U.S. and the European Community, technology itself is used widely to educate and train the work force. The U.S. currently spends approximately \$2.5 billion on technology-based training, while EC member countries spend slightly more and expect to double this spending in three years.

— *Agenda for Action: A Strategy for the Development of Ontario's Computing Sector*, December 15, 1993, pp. 52-53

According to *Agenda for Action: A Strategy for the Development of Ontario's Computing Sector*, Ontario invests relatively little in computer-based learning tools. Still, there are many developments in Ontario in the area of technology-based training. In Toronto, The Rogers Communications Centre at Ryerson Polytechnic University, and members of the Interpersonal Skills Teaching Centre from Community Services are developing a multimedia educational aid for course-based and individual learning in interpersonal communications skills for health care professionals. Designed for students and professionals in health care, the computer program will use simulation, illustration and interactive participation. In one episode, it guides the user through the case of an elderly heart-attack patient and the team of professionals providing care and guidance. The caregiver can explore the often-subtle components of human interaction: differences of perceptions, assumptions, stereotypes, jargon, gesture, and the need for self-awareness in communicating effectively. A video depicts a routine meeting of health care professionals. At any point, the user can click on an icon and listen in on each character's private thoughts during the meeting. At present, the project is undergoing user testing at Ryerson. Versions will be made available on CD-ROM.

This technological format lends itself to teaching communications skills in a variety of professions. Different videos can be developed for other types of professionals. These could then be used to assist training in sales, marketing, or customer services. Using technology for staff training is already proving effective at the Municipality of Metropolitan Toronto's Self-Study Learning Centre. Using CD-ROMs and other presentations, city employees interact with various programs, learning everything from how to improve customer service to memory enhancement techniques. Many of these programs include video re-enactments of business situations and transactions, and the viewer is allowed to choose the most appropriate or useful response. Plans are now under way to more fully integrate self-learning with traditional training methods.

⁹ *Leisuresuit Larry in the Land of the Lounge Lizards*, popular adult computer adventure game involving the sexual escapades of the title character.

International Training and Management Company (IT&MC), a Toronto business, is a full-service, exhibitor training company working to enhance the performance of people and organizations at trade and consumer shows. IT&MC already has a range of exhibitor products such as a video to help with pre-show briefing or in-house training sessions, as well as a 242-page book for exhibitors on show planning, selling, and follow-up. Companies like IT&MC could benefit from the production of multimedia products and services, permitting the sale of their expertise to a wider audience. But to create products requires investment, and many small businesses lack the resources to do so. In the case of IT&MC, government is an important client. In situations where government is the prime client or a major user of a company's products or services, government itself would benefit by directly partnering with the business. This would allow such a business, through government investment, to create products it could sell to an international market.

The creation of technology-based training tools also facilitates the growth of other industries, such as multimedia. The largest consumers of training products and services might do well to consider becoming a manufacturer or supplier of these same wares. In the area of training, there is a wide range of existing and potential products and services that await technological distribution. Multimedia products can assist (and in some cases replace) the need to repeat the same or similar information to new clients. The creation and sale of these products may also prove highly profitable.

Investment by corporations and government in the creation of technological training elements would facilitate the growth of Canada's multimedia industry. Both business and government would benefit, as they would share in the profits. Government could then re-invest in its multimedia partner, or in a complementary business. Such a strategy would encourage a variety of related industries, create employment, and act like an engine to manufacture and expedite Canadian product to global market. The distribution of such technologically based training products would also profile Canadian technological skill and industries. With the arrival of the world marketplace, market-oriented strategies make sense for government. Careful partnering can generate revenues, industries, and promote Canada internationally. Over-reliance on taxation as the central means to raise revenue is both a practical and philosophical deadend. Government must

explore new approaches and solutions to respond to a fundamentally different world.

Job-related Distance Learning and Video-on-demand

University Lectures and Courses

The University of Ottawa, Carleton University and Stentor, the alliance of Canada's major telephone companies, have joined forces to test video-on-demand (VOD). The trial permits students at both universities to use the public telephone network to directly access libraries of video productions. From personal computers on campus, users can consult a menu, selecting from over 60 hours of video material, including pre-recorded university lectures and National Film Board of Canada productions, then instantly watch them on screen. This is the first VOD trial where users directly select and start videos from an on-screen menu, without phoning a human operator. The user has full-remote VCR control features, such as to pause and replay the video sections.

If this experiment proves useful, the lecture will have been liberated from the classroom, and students could import instruction at any hour. Furthermore, this trial may lead to the creation of other learning environments. As an example, an on-campus class may link up with other students, living great distances from the school or university ("distance learning"). Students, connected by visual and voice link-up, could participate fully in discussion and debate. In other words, our educational system would no longer be confined by time and space. Rather, schools could optimally reach out to those that needed their services.

Once Canadian universities are fully networked, students may be in a position to "assemble" a university education, drawn from courses and lectures from the all across the country. Students in the United States and Europe may also import classes from Canadian universities, via network. One of the effects of networked education may be to streamline the costly administration of educational institutions. Rather than attending one or two universities to get a diploma, students may simply take appropriate courses from any number of institutions, until they accrue a designated total of credits. The Information Highway promises to make an international education commonplace within a few years.

The Electronic Village

In September 1993, the University of Ottawa began teaching an undergraduate course in nursing using computer conferencing. The registered nurses, scattered across Ontario, use asynchronous communications provided by The Electronic Village™, the primary service of Réseau Interaction Network, Inc. of Orleans, Ontario. The Electronic Village is a system designed for ease of use and with distance education as its focus. A participation feature identifies the number of unread messages for the user and the date of last connection. The system is accessible from any regular telephone line in Canada. In January 1993, the Electronic Village launched a new interface based on the needs of the Creating a Culture for Change project of the Ontario Teacher's Federation. The system operates in both languages from all computer platforms (Macintosh, DOS, Windows, ICON, etc.) and, at present, has over 2 800 registered users. Users are responsible for membership and content. Software development incorporates users comments, wants, and needs.

Medical Education, Service Standards, and Remote Diagnosis

Plans are also under way to expand the VOD trial in Ottawa to pilot VOD-based interactive multimedia education for physicians. The partners in development include:

- Stentor
- Mentor Networks Corporation (an organization which provides on-demand network delivery of interactive digital media education, training, and communications services)
- the Royal College of Physicians and Surgeons of Canada's Maintenance of Competence Program
- Ottawa Civic Hospital, a teaching hospital for the University of Ottawa to conduct the trial.

Health care via the networks promises great strides in education, training, coordination and integration of services, on-line consultation, and review of records, as well as the monitoring of patients in hospital or convalescing at home.

Intercom Ontario

Supported as a field trial by a consortium of public and private partners, Intercom Ontario hopes to offer subscribers a diverse and useful suite of services. This broad-bandwidth network communicates multimedia objects such as speech, music, pictures, movies, television programs, computer files, text, hypertext, animation, and games directly among users and content providers, who may operate from their home computer or personal digital assistants. Further network testing into Intercom goes on at the Cultech Collaborative Research Centre at York University.

Learning Industries and Networks

Useful examples and models for the learning industries can be found in other companies. The global giant Caterpillar Inc., known for building tractors, off-highway trucks, diesel engines, and hydraulic excavators, uses technology in innovative ways to supply its own intra-corporate needs as well as those of clients. Although its history is clearly identified with heavy farm and industrial equipment, Caterpillar uses state-of-the-art network technology to maintain its competitive edge. Multimedia catalogues permit dealers around the globe to see what they are ordering, verify the right accessory for a particular piece of equipment, and check its compatibility with other parts. Caterpillar can also supply its dealers worldwide with a photograph for local advertising, and supply it to them in a requested format, storing the image on CD or sending it electronically via network.

Companies can also work with educational institutions to preserve and restore a community's heritage, creating new cultural products and services from old ones. At present, the Caterpillar Inc. Image Lab, in an arrangement with Bradley University in Peoria, Illinois, is helping to copy and preserve the university's entire collection of vintage photographs on a Photo CD system developed by Eastman Kodak Company. The Caterpillar lab scans photographic images into the computer and "writes" it onto a Photo CD, with each CD holding 100 images. Once stored, the damaged images can be restored and permanently preserved. Soon, it will be possible to network the collection, making it widely available.¹⁰

¹⁰ *Journal Star*, Peoria, December 12, 1993.

Astonishing collections, housed in storehouses, are often overlooked. The Municipality of Metropolitan Toronto Archives contain government records, as well as collections donated by individuals and organizations which document the city's history and other urban topics. These items include correspondence, audio and video collections, architectural and engineering records, cartographic records, and an extensive photographic collection. Metro council minutes are also archived. Similar collections, which exist in many cities across Canada, could be digitized and networked so that young and old could study and appreciate the evolution of urban life in this country. If these archives were joined in a national network, students across Canada could examine urban growth in the east and west, compare architecture in Edmonton with that in Halifax, observe transportation developments in Winnipeg and Fredericton, and study the evolution of emergency services such as ambulance and firefighting.

For the first time, a person sitting at a computer can call up information on urban centres across the country, observe in detail the differences and the similarities of towns and cities across time. This overview of Canada as it has developed might express more powerfully than any agreement or accord how a people have staked out a nation, a "community in time." (A project which involves the Canadian Heritage Information Network (CHIN) and the book publisher of Fitzhenry & Whiteside, Ontario, may act as a prototype of such a venture, and is referred to in the following section.)

The Courseware Publishing Market in Canada

In concert with the Council of Ministers of Education, Canada (CMEC), Industry Canada has initiated six projects to open new educational markets for Canada's publishing industry and bolster its financial future. The projects will assist Canadian publishers and producers to maintain their expertise in the application of new communications technologies to new markets. The producers and publishers work in the area of product development and marketing, while the provinces and territories decide content.

Here are six projects undertaken.

Project One

Visual Data Base of Canadian Dwellings through Time

Book publisher	Fitzhenry & Whiteside, Richmond Hill, Ont.
Courseware producer	Canadian Heritage Information Network, Ottawa, Ont.
Lead province	Ontario
Supporting province	Quebec
Project details	Develop a CD-ROM visual and textual digitized data base (photos, artists' reproductions, etc.). Over 500 images of Canadian dwellings from early indigenous peoples and settlers to modern times.

Project Two

Data Base for Senior High School Mathematics

Book publisher	Nelson Canada, Scarborough, Ont.
Courseware producers	Professional Computer Services Inc., Regina, Sask. Microaide Computer Training Ltd., Regina, Sask. Proform Development Corporation, Saskatoon, Sask. Display Systems International Inc., Saskatoon, Sask. Monitor Developments Ltd., Regina, Sask.
Lead province	Alberta
Supporting province	Manitoba, British Columbia
Project details	Develop a series of easily customized courseware modules to meet the common needs of senior high school curricula in the prairie provinces

Project Three

Francais, langue seconde

Book publisher	Mondia, Laval, Quebec
Courseware producer	Nadeau, Longpre et Bergeron, Montreal, Quebec
Lead province	Quebec
Supporting province	Ontario
Project details	Creative manipulation of an animated character to move through classroom, streets, and stores to make transactions and earn points based on memory and mastery of French.

Project Four	
Sciences physiques	
Book publisher	Mondia, Laval, Quebec
Courseware producer	Services generaux de formation et d'animation
Lead province	Quebec
Supporting province	Ontario
Project details	Innovative technological approaches to simulation of atmospheric movements, seasons and meteorological phenomenon.

Project Five	
Creating an Enterprise Culture Learning	
Book publisher	Breakwater, St. John's, Newfoundland
Courseware producer	IDON Atlantic, St. John's, Newfoundland
Lead province	Newfoundland
Supporting province	Prince Edward Island
Project details	Develop a series of courseware products, each building on the other, to support the Enterprise Education program in Newfoundland.

Project Six	
Information Resources and Communications Tools for Collaborative Learning	
Book publisher	Beach Holme, Victoria, B.C.
Courseware producer	Softwords, Victoria, B.C.
Lead province	British Columbia
Supporting province	Alberta
Project details	Develop a versatile cross-curricular atlas data base which allows students to communicate on-line or through e-mail with other students, or experts at other schools or institutions within and outside Canada.

On-the-job Training

DVS Communications Inc.

Newbridge Networks Corp. of Kanata, Ontario, manufactures and distributes standards-based networking products for local area networks (LANs) and wide area networks (WANs) for an international market. Static electricity in the manufacturing

environment can do invisible damage to the products, so all employees must be given special training in regard to static control. Traditional training courses have proved too costly and ineffective. Responding to this problem, DVS Communications Inc. of Ottawa, a company specializing in design, development, and delivery of interactive multimedia solutions created an easy-to-use Windows-based program. Employees work through modules of the program and are automatically scored.¹¹

Centre for Information Technologies Innovation

The project called Deversys supplies environment emergency response teams with a decision support tool to make them more effective. The objective of the project is to help diagnose a damaging event and implement clean-up methods, particularly oil spills on the St. Lawrence River shoreline. The system allows the capture of, the access to, and the updating of information on environmental resources and shoreline conditions. Resources and clean-up priorities are also supplied to the user to allow better planning and followup of restoration activities. The knowledge-base system helps standardize the decision-making process. Periodically, the rule base is reviewed and may be updated.

Users include:

- Environment Protection Directorate intervention teams of Environment Canada, region of Quebec
- Canadian Coast Guard (Transport Canada)
- Quebec Department of the Environment
- Members of the Canadian Institute of Petroleum Producers (CIPP)
- Musee Maritime Bernier
- Systemcorp. Montreal (contract from CANARIE).

Systemcorp (an Advanced Learning group)

Systemcorp specializes in multimedia training and performance support systems, designed to help employees master new workplace technologies. An expert design team offers a complete range of services and tools to complement integrators, management consultants and training providers. The team participates in needs assessment, designs and

¹¹ Hum, The Government Computer Magazine, September 1993, pp. 46-47.

implements solutions, and develops the courseware and the interactive video productions. For the multimedia-based training, Systemcorp produces Broadcast Quality visuals, including interactive three-dimensional animation and simulations, that are essential to good training.

In the support environment, Systemcorp's Performance Support System (PSS) supplies appropriate instructions for the user at the right time during the actual task. The PSS has gained international acceptance in monitoring and assisting productivity at such companies as IBM, Dow, AT&T, Intel American Express, and Amdahl, Martin Marietta, US West and Pomus Companies. The Systemcorp solutions are less instruction- or lesson-centred and more learner-centred. Training time up the learning curve is frequently halved. Subscribers are reported to acquire knowledge on their way to meeting their goals, with more enthusiasm and more independent pursuit of further material.

In 1991 Systemcorp researched the human-computer interface specifically aimed at courseware, just-in-time training and performance support. Communication disciplines and all related natural mapping methods were researched, validated, and incorporated. The result is a training environment that is intuitive, meaningful, user controlled, and that creates understanding. Hardware costs are moderate since the CD-ROM format is a standard, and new video compression techniques bring high-quality video lessons to the PC.

Supporting the Networks with Canadian Software

Many Canadian companies have developed tools that are necessary to operate from a node in the networks.

SMART Technologies Inc.

SMART Technologies Inc. of Calgary make the SMART 2000, a data conferencing system for distance learning and training. The Front screen version of this system is a touch-sensitive whiteboard, IBM-PC,

SMART software, phone line or network, and a projection system. In distance training, instructors control their presentation directly from the touch-sensitive SMART board in front of the classroom. This big screen has a graphic user interface (GUI) that is also ideal for trade show presentations. Students can input their ideas and questions back to the instructor by making notes, highlighting and annotating on top of the projected images. Any image can be captured from an application before a presentation with the SMART Notepad, a fully functional Windows application. During a conference, these images can be played back in a prescribed order. Any of the connected locations can draw or highlight these images with different coloured pens. These altered images can be saved and printed at any time.

The SMART 2000 makes use of telecommunications networks already in place in most countries. A new Kanji version of the system has enjoyed success in Japan, and sales are described as buoyant.¹² In 1994, total company sales are expected to triple to \$8 million. In January, the company signed an agreement with Intel Corp. of Santa Clara, California, the world's largest semiconductor maker, to jointly develop document conferencing software products.

Visual Interactive Technology

Northern Telecom has developed Visual Interactive Technology (VISIT), an interactive multimedia video desktop application. In the pilot project involving the Alberta Distance Learning Centre (ADLC), Apple Canada, Alberta Government Telephones, Northern Telecom, and the county of Lacombe, four schools conducted courses by two-way video. The VISIT video system integrates telephone and desktop computer with video, supporting:

- high-speed file transfers through the public telephone network
- any Apple Macintosh II or IBM-PC running Windows, with complete interoperability between any combination of these.

In a typical scenario, students from remote locations can join in the VISIT session and simultaneously design and edit a shared document.

¹² *The Globe and Mail*, April 11, 1994.

VIS-A-VIS

WorldLink Telecommunications Inc., of Mississauga, Ontario, has created VIS-A-VIS multimedia desktop conferencing for the PC. No proprietary hardware is required, just a mouse and a modem. Optional peripherals like document scanner, high-resolution colour monitor, electronic white board, screen projector camera, video coder decoder for full-motion video, are all standard hardware components that can be acquired from local suppliers. In the simplest case, two or more PCs communicate over LAN or packet-switched network. Using an optional data bridge software, VIS-A-VIS supports any combination of LAN, synchronous, asynchronous, and ISDN networks (with speeds from 2.4 kbps to 64 kbps). Each data bridge can support up to eight simultaneous conferences with a total of 32 participants. Data bridges can be linked together to provide service to even more parties.

VIS-A-VIS technology is ideal for more interactive classes. Instructors are encouraged to use techniques that promote brainstorming, role playing and case studies. Classes can reach the less populated sections of the state to smaller groups at remote locations.

I have to do more upfront preparation for my teleconferencing classes, but the investment in high-quality visual material means the classes run very smoothly, and students have good material to take away after class. The visuals can be scanned images, still-camera images or graphics developed using paint and drawing software. The same materials are also useful for my on-campus classes.

— A professor, University of Illinois

With Illinois predominantly an agricultural state, one VIS-A-VIS application has allowed farmers to bring up crop problems to local branches of the university and the photographs are transmitted to an on campus specialist. The diagnosis can be reached between the two remote parties — farmer and specialist. Farmers are reportedly delighted with the quick response and expert attention they receive using this new technology.

The potential for VIS-A-VIS technology for business is high for employers looking to train or retrain employees. The universities have the trained instructors and subject expertise needed by business. Courses can be delivered right to the corporate headquarters at scheduled "best" hours.

First-Class Software

SoftArc Inc. in Scarborough Ontario "Global-Area Communications" has created First Class offering multiplatform e-mail, electronic conferencing, bulletin board service (BBS) functions, GUI support across the network or modem, context searching, CD-ROM access, sending faxes or messages, and links to other First Class servers or mail systems, and send and receive Internet mail.

GeoAccess

GeoAccess is a service based on open system concept integrating a geographic information system (GIS) and a graphical interface across different platforms, operating systems, and computer networks. The GIS is built upon the CANARIE Information Superhighway infrastructure. A data management system called Geoserver provides Canadian businesses with powerful GIS processing and distributed data bases.

This GIS network development benefits Canadian SMEs that cannot currently afford a GIS service to enhance their competitiveness. The initiative can also help reduce government spending by providing the service to industry and by merging currently dispersed and redundant sources of information.

Conclusions for the Development of the Learning Industries

The Canadian educational market, over which the provinces have jurisdiction, is small and fragmented, preventing large-scale production of educational products. A national strategy is required to meet the challenge of this market. The federal government can assist, through its traditional support of distance learning. As well, it can foster the development of content for educational and training networks. Otherwise, these networks will soon be flooded with foreign products and services and the result will be the loss of national character and identity.

The learning industries operate in a global market. Canada has some of the finest educators and technologists in the world. We have the expertise to create educational and training products that would serve our domestic markets from coast to coast. These same products would also provide exports for vast foreign markets. A unified effort among federal and provincial governments and business is necessary to take advantage of the new world market. Canadian content, while specific to our culture, is universal in its appeal. For the preservation of our sovereignty and prosperity, the manufacture and export of learning products must become a priority.

Cultural Industries on the Networks

Global networks will have a profound effect on Canada's cultural life. They will permit our cultural products and services to travel all over the world. Most likely, Canadian culture as we know it will be permanently altered by the flood of incoming foreign entertainments, especially American.

This section discusses how electronic networks contribute to the creation and distribution of cultural goods. Examples are provided of networks that have become a component of traditional cultural industries such as publishing, music, and film. In particular, product descriptions show how technologies such as multimedia have effectively merged these separate industries into a single large one. Further, this section points out the importance of intellectual property in the cultural industries and the critical need to discuss copyright law and enforcement.

Networks Influence Production, Distribution, and Marketing

Cultural wares are most often made in a collaborative environment. Film and video production, sound recording and publishing all require numerous skills at different stages, an extended assembly line of pre-production, production, and post-production work involving specialized labour. Film making brings together script writers, directors, prop makers, editors, art directors, technicians, composers, and a score of other professionals. Production might take place over years, in different cities, and require coordinating the time and efforts of hundreds of artists and technicians. Now, because of electronic networks, more and more of this can be done on computer. Information — from a list of investors for the project, to video footage of a possible location for the shoot, to clips of the finished film — can travel back and forth among production team members who live thousands of miles apart.

Film, Video, Radio and Television Programming

Film and television production, vital components of the content industries, generate revenue and provide jobs. They also create international networks which bring projects and employment into Canada. The film community, especially in Toronto, has close relations with Hollywood. Though often unreported, these relations help maintain Canada's profile with the international film community and promote this country as a place to make movies.

Film and television production in Ontario in 1993 topped 1992's record-breaking level by 3.5%, reaching a total of \$337.8 million, according to year-end figures compiled by the Ontario Film Development Corporation (OFDC).

Canadian production remained virtually constant at \$268.8 million this year, compared to \$267.9 million last year, while foreign shooting was up 18% to \$69 million from \$58.5 million.

— Ontario Film Development press release, December 31, 1993

Electronic networks will continue to transform the video and film industries. In Canada, the film industry has developed since the 1970s, with expertise growing in every area of production. Comprehensive files of locations ideal for movie-making, once translated into digitized information, can be made available via electronic networks to producers in Canada or Hollywood instantly. Other information necessary to movie production such as a directory of professionals, (everyone from costume and set designers, sound technicians and actors to financial advisors) could also be made available through a central data base.

The nature of film-making is also changing as more and more production is done inside the computer. In films such as *Jurassic Park*, much of the prop making involved computer animation, building the dinosaurs on a computer screen. New television

programs such as Warner Bros.' *Babylon 5* make extensive use of computer graphics to create settings and special effects (and also uses computer networks to promote the show). Using networks which connect computer screens, prop designers can work collaboratively when in fact they live great distances apart. While creating landscape backgrounds — a desert, a frozen tundra — they might debate whether the hero of the film, an animated character, should have wider or thinner legs. Once a decision is reached, character and environment might be instantly flashed to the film's director for approval. In this way, a whole film might be designed, assembled, and animated from inception through to completion. Once produced, the film might be instantly sent to theatres, digitally displayed on a giant screen or made available to homes all across North America via telephone, cable, or other networks.

Well-known directors or major Hollywood box-office celebrities could soon approach a giant phone or cable company for partnership, produce a film, and distribute it as pay-for-view video-on-demand. The film makers would then keep the lion's share of the money that would have gone to a studio. Microsoft's senior vice president for advanced technology, Nathan Myhrvold, predicts that a single film could gross \$1 billion "at the set-top" in the foreseeable future.¹ Last year, horror writer Stephen King put his short story "Umney's Last Case" on the Internet a month before its publication in his book *Nightmares and Dreamscapes*. More and more, networks will be used as a "hook" to involve consumers in upcoming promotions of cultural events. Clever marketing might involve clues to a murder mystery supplied via electronic network prior to a film's release, or secret information regarding personalities in science fiction movies, characters who have by now attained cult status.

Special effects such as "morphing" or transforming one person, place, or object into other, are increasingly possible using inexpensive software. Using an ordinary camcorder, a video artist can record images, digitize this information, and download it into a computer where it can be further edited and mated with music. Video clips, shot by eyewitness observers with their handheld camcorders, are now part of regular news programs. As these video camera grow more sophisticated, it will be increasingly difficult to tell the difference between video and film.

Once information is digitized and entered into a computer, it can be endlessly manipulated, altered, and enhanced.

Eventually, film production may splinter into a variety of art forms. Writers and artists will work more and more closely with software companies (such as Alias of Toronto and SoftImage Inc. of Montreal) creating story environments that may more resemble a circus than a movie. Networks may create access to an international amusement park, one which exists nowhere but in virtual reality. Recently, SoftImage was acquired by Microsoft Corporation for approximately US\$130 million. SoftImage is a developer of high-performance two- and three-dimensional animation and simulation software. Among other things, this software is used for post-production editing and the integration of images, text, sound and special effects.

SoftImage is only one of many Canadian companies which produce software valued in the millions of dollars by the general market, yet Canadian banks often rate this same software as having little or no monetary value. Although the high market value cannot always be justified, the public realize that software will play a key role in the future. Often, this is only a vague hunch, but as the information highway expands, the hunch is fast becoming a reality.

Canadians Play an Important Role in Creating American Culture

Canadians are right to fear cultural domination by Americans. It is difficult for a small country to compete culturally with a major power.

The American entertainment industry has always had a large component of Canadian talent, both behind the scenes and before the cameras.

— David Plant, Toronto Film Liaison Office

Canadians assist in the creation of American mainstream culture, and our influence is nowhere more evident than in the production of popular American films.

¹ *Fortune*, February 7, 1994, p. 130.

Norman Jewison started his directing career in the 1960s with a Doris Day comedy, *The Thrill of It All*. Ivan Reitman scored huge box office hits in the 1970s and 1990s with *Animal House*, *Ghostbusters*, and the more recent *Groundhog Day*. George Cosmatos, who this year made the Wyatt Earp western *Tombstone*, directed the first of the cycle of Rambo films in 1985. Keanu Reeves, Saul Rubinek, Martin Short, Michael J. Fox, and in particular, the late John Candy achieved steady work in mainstream features after establishing their performing careers in Canadian media. The Canadian-born writing and producing team of James Orr and Jim Cruickshank have created a chain of box office hits for Disney Studios that includes *Three Men and a Cradle*, *Father of the Bride*, *Honey, I Blew Up the Kid*, and this year's *Sister Act II*.

Publishing

Technology has made itself felt in nearly every aspect of cultural products and services, but publishing has been utterly transformed by computers and networks. Before, magazines and books were written and designed on paper, going through endless and laborious revisions before reaching the printer. Now writers compose on computer and send their work anywhere in the world via electronic networks. Manuscript production commonly takes place in stages, across great distances. For example, a philosophical booklet published annually, called *Overheard in Seville*, *Bulletin of the Santayana Society*, is jointly edited at both Texas A&M University in College Station, Texas, and at the University of Waterloo, Waterloo, Ontario. It is formatted, composed for typesetting, and printed in Waterloo, and published and distributed by Texas A&M. Collaborative work on editing, text, design, and publication occurs via electronic network.

No-waste Revolution in Publishing: Print on Demand

Technological corporations find that the most innovational ideas come from their customers. Clients concerned about content are apt to search for new ways to apply the technology. In turn, the supplying companies grow more attentive, adapting their technology to customer requirements.

Cost Savings For the Publisher

Xerox Canada Ltd. has developed the Documents On Demand digital imaging system. Patterned after similar systems at a few American universities, such as Cornell and Harvard, the Docutech Production Publisher can scan, store and retrieve manuscripts digitally, then print and bind them as books. Course materials can be revised, bound, and ready for students within 24 hours. Once entered, any document including images can be recalled and edited as necessary. The final text is typeset rapidly, pages stitched or bound with a thermal adhesive tape. At present, this technology ranges from C\$150K to \$350K, but the system pays for itself rapidly by helping publishers avoid costly overruns.

If Docutech units are linked by network, books can be sent in digital form, transmitted across country or around the world, and printed on site. Distribution of this kind avoids shipping costs and lowers manufacturing costs. Historically, Canadian publishers have invested in many books that did not sell in sufficient numbers to warrant a profit, or which sold to too narrow a market. But, now, with print-on-demand technology, rather than release too many copies of a book, publishers can economically and quickly print limited amounts at any time to supply immediate demand. Technological gains frequently offer the learning industries and publishers opportunities to cut losses and expand their business. Publishers can also become more entrepreneurial, offering a wide array of services to a much broader clientele. The global network can be used to help promote the books, further expanding the market.

Print-on-demand technology is especially suited for government documents. If properly networked, government reports can be produced upon the specific request for the information. Too often, papers are filed away, their valuable contents neglected. If centrally available, they could be ordered electronically or via a toll-free number. In this instance, government could set an example by demonstrating the importance of creating information and ensuring its proper distribution.

Print on Demand At McMaster University

The Titles bookstore at McMaster University in Hamilton, Ontario, uses DocuTech to produce custom coursepacks, (supplementary reading needed for a particular course) developed by faculty members and packaged for sale to students at \$20 to \$25.

Eventually, we will be able to order books "on screen" directly from the publisher. From there, it's only a matter of time before students will be able to do research in the library without ever having to leave their dorm rooms.

— **Bob Crawford**, manager, Titles bookstore,
McMaster University

Xerox's DocuTech and DocuPrint can be found at other Canadian institutions such as University of British Columbia, University of Toronto, Western, Centennial College, and Memorial University in St. John's, Newfoundland.

Copyright Protection for Network Distributed Publishing

At present, writers and publishers must rely on the seller to adhere to copyright agreements. Copyright is a central issue and will become increasingly debated as technology makes it easy to receive information from many sources and reproduce it at will. Writers who retain copyright to their work may sign contracts with booksellers who operate print-on-demand technology. Writers could then be paid directly, circumventing traditional publishers altogether. In the future, whenever a book is sold, computers will automatically calculate the royalty to the author or publisher, and instantly deposit the amount in the appropriate bank account. In other words, there may be an "intelligent cash register" which not only tracks and manages inventory, but also divvies up monies at the point of sale.

In this regard, the McMaster bookstore called Titles obtains copyright permission from authors and publishers for the Docutech reproductions using extended technology. The bookstore is one of the first to negotiate a site license with CanCopy, a non-profit group that negotiates licenses for copyright clearance.² Using special software, staff at Titles can enter the name of a publisher to check for a standing copyright release on the material. If clearance is required, the computer automatically faxes a copy request form to the publisher.

Publishing Merges with Other Forms of Communications

...Content is talent — delivered in digitized form.

— **Jeff Berg**, International Creative
Management³

Major publishers like Paramount and Random House have set up new media divisions to explore new forms of publishing using various technologies. For example, Random House recently published its unabridged dictionary in book and CD-ROM format and sold both as a promotion in 1993 for US\$100. The book format has its advantages, but the book weighs 13 pounds while the CD-ROM is only a few ounces. Random House also joined forces with Brøderbund Software, Inc., a leading developer and publisher of consumer software for personal computers, to produce and market story-based multimedia software for children. Fodor's Travel Publications, a division of Random House, and Worldview Systems, the leading supplier of "just in time" destination information, have entered into a joint venture to establish a single source for comprehensive travel information. Up-to-the-minute news on the performing arts, sports, restaurants, shopping and night life will be distributed via online services, personal Digital Assistants, audiotext and fax-back services, as well as through interactive media products. To satisfy customer demands, information will become more and more "custom-tailored."

Paramount Communications Inc. has created the Paramount Technology Group, based in Palo Alto, California. This business unit was set up to integrate new technologies throughout the company's entertainment and publishing operations. A "Media Kitchen" acts as a centre for product research and development. In May 1993, Paramount Interactive was created to provide a gateway to the home market for interactive digital products, which include Paramount's entertainment and educational properties, as well as publishing and media resources. "*Busytown*," a multimedia CD-ROM title which animates the characters of children's author Richard Scarry, is an example of the unit's product list.

² *University Manager*, 2 (4) [1993]: 20.

³ Cited in *Wired* magazine, March 1994, p. 99.

"MovieSelect," an interactive software available on CD-ROM, features more than 44 000 titles. Utilizing an artificial intelligence-based expert system to analyze and suggest movies based on user input, it can produce a personalized list of movies to rent from a video store. As a user's preferences and tastes evolve, the software adapts and responds with a more sophisticated list, one to accommodate new interests. "MovieSelect" suggests how "intelligent systems," mated with multimedia products, will become a common fixture of consumer products and services.

To survive and prosper, publishers must look to alliances with technologically related firms and adapt to new ways of publishing, as well as providing products. In this century, because of the increase in tourism, travel books and information became an important market. Publishers must continue to keep an eye on emerging markets, as lifestyles change and evolve further. They may soon find that a lightweight, pocket-sized computer or television, in the shape of a book, imports available text from a data base. Only a few years ago, the concept of a portable telephone seemed like science fiction. Now, it is a common tool for business professionals.

With increasing frequency, film, video, text, graphics, and sound are being stored in digital form. Recent technological developments permit this information to be distributed and reproduced on demand. Printing and recording machines will soon be available in retail stores that permit the rapid reproduction of this digital data into books, videos or compact discs. In selected Blockbuster Entertainment Corporation outlets, customers are able to preview computer software, audio books, and video games, and even have them reproduced on the spot. Soon, machines will reproduce music CDs.⁴

Innovative use of multimedia technology has suggested new ways of advertising and marketing that will profoundly influence the content industries. In May 1993, *The Financial Post 500* magazine distributed Decision MAKER, an advertising diskette which showcased eight Canadian companies, helping the user compute answers needed to make informed purchasing decisions. Produced using the PXL software engine by Pixel Productions of Toronto, over 200 000 copies were distributed across Canada. The project was a success and the magazine will

repeat it this year in its 1994, 30th Anniversary Issue. Increasingly, there will be experimentation in advertising form and delivery. Whenever possible, advertising will be interactive and work with popular technology. Advertising in all its manifestations will develop distinct "personalities," which "think" and respond to customer questions and concerns.

Publishing used to be almost exclusively a paper-based industry. Now, books and magazines are the more visible products of publishers, but these can be supported and enhanced by the unrestricted elements of farflung networks. For example, publications like *Omni Magazine* have opened up the traditional magazine format. Recently, *Omni* launched *Omni Online*, an online service to complement the magazine. This electronic environment permits topics discussed in the periodical to be further extended, developed, and commented upon. In the first few weeks, *Omni Online* had more than 100 000 "visitors." Those who log on the service can read bulletin boards, visit a "reading room" which archives material from past issues, or participate in games, debates, and forums.

In the near future, paper publications may be permanently wedded to electronic backup. Magazine and book publishers will provide additional information and services to subscribers electronically. These services will also be used for the publisher's marketing purposes. Unrestricted by the electronic format, publications of every type can include bulletin boards where readers meet to exchange ideas and information. As the electronic possibilities become more and more apparent, publishers will come to see how global networks can promote their products, as well as open new markets.

InfoLab

Traditional businesses have started to realize the necessity of exploring and exploiting new media, including electronic networks. Some have established units to investigate new media, applications and possibilities. Southam InfoLab of Hamilton, Ontario, was created in 1991 to ensure that Southam Publishers continue to competitively mass-market information products. InfoLab creates prototypes of information products and explores means of producing them. Located on the premises of *The*

⁴ *The Globe and Mail*, January 22, 1994.

Hamilton Spectator newspaper, the lab is grounded in the everyday life of the paper. Equipped to create two concurrent multimedia projects in-house, there are also plans to develop digital or desktop video ventures in the near future. While gaining experience in multimedia creation, InfoLab has established strategic alliances with key players in the industry, positioning itself for production.

InfoLab also trains Southam journalists in new media. An intern program begun in 1993 allows journalists to study in the lab for periods ranging from several weeks to months. This permits writers to become informed about the new technology, to appreciate its use, and to develop new skills. The journalists also carry new perspectives back into their old environments, thus facilitating change.

In October 1992, InfoLab and *The Hamilton Spectator*, along with the help of community leaders, added 24 community-based conferences to CompuSpec, the newspaper's electronic bulletin board system. With home computers and modems, users can leave messages for one another on a variety of topics including media issues, performing arts, sports and disability issues and information. As of January 1994, there were 5 000 users on the system. InfoLab is interested in developing information products for the Newton, a handheld, pen-based Personal Digital Assistant (PDA), manufactured by Apple Computers. The lab has entered into an agreement with Apple to be an information provider for its wireless network.

The InfoLab provides hands-on training for those within Southam Publishers while enforcing the need to listen and respond to Southam's customers. This experiment assists in the development of products and services, even as it works to transform the larger organization, broadening its view and connecting it to the new world marketplace.

Sound Recording

Sound recording in particular will be profoundly altered by networked technology. Once stored as digitized information, sound can be sent anywhere electronically. When the day comes that sound (or music) is received by the home computer and stored on hard disk, it will constitute a revolution in production, marketing, and distribution of the sound recording industry. For example, a large corporation such as SONY might hire a popular singer/musician

to record a series of songs. Mass production and distribution to the marketplace of CD-ROMs or cassette tapes can be eliminated, as this music could go directly from the recording studio, onto the network, or at least to an online computer service, for eventual playback or downloading to the home computer. Just as with electronic publishing or electronic messaging, where text can be retrieved from files or sent directly via the electronic mail, so likewise will sound, image, and video be delivered to the consumer.

The sale of music is the sale of intellectual, not physical, property. The music industry does not rely on the sale of record albums, CDs, and cassettes tapes but rather on the sale of what is stored in or on them. If these media should prove unnecessary to store and play music, all that remains is the music, which is the creation of the artist. Only the copyright protects intellectual property. Unfortunately, our copyright laws are vague and do not adequately address the technological phenomenon of instant reproduction. Therefore, the central issue for the sound recording industry in a technological society is copyright law, copyright interpretation, and copyright protection.

Increasingly, it will be possible for artists to market their music directly. Perhaps music will be stored in data bases where it can be ordered and sold electronically. A band may produce its own video and distribute it globally, with an order form at the end of the video so that viewers can buy the complete album. Soon, it will be possible to send and download a band's lifetime work in a few moments onto a home computer. The problem again is the copyright. Once the music is received, it may be possible to reproduce it endlessly. However, methods are emerging for "marking" soundtracks, as well as other transmitted information, so that they can be traced back to their source. Such "fingerprinting" of manufactured goods may well become a means to fight copyright violation. Lower prices may also act to reduce copyright violation. As prices drop, consumers may buy the original, rather than try to make or obtain a copy. After all, if recordings can be inexpensively and quickly replaced via network there will be no further need for the consumer to create vast digital home libraries.

Trends and Speculations in the Information Highway

This section notes how electronic networks have precipitated major social, economic, and cultural trends. It discusses how networks have influenced Canadian attitudes toward their institutions, especially government. It also speculates on the need to develop a reasoned response to the consequences of technological effects.

Everyone Is a Broadcaster and Entrepreneur

The rise of global networks has affected our traditional view of broadcasting. In the air, space on the electromagnetic spectrum is limited. For orderly use regarding broadcast purposes, regulation is required. In Canada, the Canadian Radio-television and Telecommunications Commission (CRTC) regulates what is broadcast, mostly from the viewpoint of content. A broadcast has these standard attributes:

- It is point-to-many-point, or one to many.
- Information is broadcast "blindly" to a general population, that is to say, not to any particular address.
- These broadcasts occur in real time, the general intended audience receiving the content in the same instant.

The *Telecommunications Act* governs point-to-point broadcast, in which one person may transmit information to anyone. The *Broadcasting Act* covers point-to-many-point, as is the case with a radio or television station broadcasting to many viewers.

However, new technologies such as fibre optics and data compression may permit an infinite amount of information to be transmitted, largely removing present restrictions. Furthermore, as the public becomes more proficient in the production of content and technology makes it easier to distribute all types of data, many of our concepts of broadcasting will change. For instance, it is now possible to transmit an electronic message to an addressee, with copies sent to others. These messages are usually character-based, but soon electronic mail may become more

complex and include images, video clips, and sound. In other words, one person may produce an electronic message that looks more like a music video than e-mail, and send it to one other person or to thousands. This transmission of data might be called a mailing, but in fact it is a type of broadcasting. It can be argued that this is not broadcasting because the data are being sent to a specific address. Still, with computers, it is easy to compile a vast "address list," and everyone on this massive list could receive information or programs. Thus, in a general sense, an individual might be considered a broadcaster.

Conversely, a broadcaster, such as a cable TV company might not be a broadcaster if a subscriber phones up and requests a movie for home viewing. In this case, the cable company or broadcaster permits the transmission. Some do not consider this broadcasting, because the cable company knows who is receiving the program and simply responds to a customer's request. It is clearly point-to-point.

These developments in the nature of broadcasting will have a profound effect on organizations such as the CRTC, which attempts to control broadcast content. Certainly, regulating content will become more difficult. Even if the CRTC influences general broadcasting, information can still work its way almost instantly around the world. There will be nothing to prevent individuals from sending movies back and forth to each other as compressed data, regardless of the subject matter. Even now, people routinely fax business forms, newspaper articles, cooking recipes, and job advertisements back and forth globally. This free-form distribution, undocumented and massive in scope, might be described as a communal distribution of information, as prevalent as gossip. Though distribution may constitute copyright violation, to enforce copyright law might well prove futile. As communication networks become universal, whether information is broadcast or not may prove irrelevant. Through one form or another, data will be circulated. Whether these data are broadcast to the same audience at the same time, does not matter when the audience, not the broadcaster, selects the viewing time. This is a complex topic, and one which deserves to be explored further. For now, it must suffice to say that

technological development causes us to question our notions of regulations and their enforcement.

Distance Management

In the near future, distance learning will revolutionize all aspects of education. It will also transform industries and the nature of the labour force. Those who must orchestrate the activities of hundreds of workers linked to a virtual office must be trained in managing workers scattered across great geographical distances, or distance management. Managers will have to be trained in new management skills, ones which may differ significantly from traditional procedures. Teachers conducting virtual classrooms will require special management skills, many of which they will share with training instructors. Knowledge and experience of distance management will be of strategic importance to business and education. Canadians should expand their expertise in this area, capture it in the form of products and services, and make it the focus of export ventures.

Technologically, Home Is Better than School

Technologically, schools are often less equipped than the average home. Many classrooms do not have telephone outlets (phone jacks). Appliances such as up-to-date personal computers, television sets, and VCRs are scarce or lacking altogether. Commonly, the average Canadian household is better equipped than many classrooms. Using the telephone, watching videos, or interacting with educational computer programs at home enables a student to import and review timely information. Moreover in school, teachers are often unsure of how to integrate technology into instructions, and have trouble deciding what information to show or how to present it. As it becomes increasingly expensive to modernize and maintain school buildings, there will be greater pressure to deliver education directly to the home.

The Entrepreneurial Spirit Becomes Universal

Technological developments also influence our concepts of self-employment and entrepreneurial ventures. More and more employees work at home, electronically connected to a central office. In the United States, *NBC News* on March 22, 1994, reported estimates that by the year 2001, 30 million Americans will be "telecommuting" from their homes or other sites rather than actually commuting to work. After the 1993 earthquake in Los Angeles, many employees were forced to work at home because of severe traffic congestion. Linked up to the main office with computer, telephone, modem, and fax, employees worked productively, avoiding hours of stressful commuting. Unions worry that employees working at home will toil in isolation, creating a dispersed labour force that is hard to organize. This is a legitimate fear, but it should also be noted that by using technology strategically and inventively, an individual can initiate projects, subcontract work out, and create jobs for others in the process.

Technology can be accepted passively or it can be used proactively. Thousands sit by the telephone every day, hoping that some potential employer will return a call. Assertively used, however, the telephone is a powerful tool to gather information, establish relations, and create projects. Working at home, connected via electronic network to a virtual office will make some feel isolated. Others will find working at home liberating and will use networks inventively to organize, rally, and persuade. More and more, individuals must develop an entrepreneurial mentality, marketing their skills not just locally, but internationally. Canadian workers, linked to global networks, will begin to see that they can buy from and sell to customers in Japan, Europe, and across North America. As electronic networks become part of the home environment, more and more will find it advantageous to network globally, initiating opportunities rather than waiting for them to occur.

"Two Solitudes": Geographical Canada and CyberCanada

Divisions of government jurisdiction arise out of proximity and need. Municipal government administers to local needs, provincial government to the larger province, and federal to the whole geographical country as defined by our borders, both within and surrounding Canada. Until now, time and space defined the world in which we lived, our economy, resources, government, communications — in short, almost every aspect of our existence. But more and more, we live a dual existence. First, we work and play in a geographically defined country called Canada. However, with the proliferation of global electronic networks, we also live in CyberCanada.

CyberCanada does not exist as we normally conceive of the term country. It is a community created from networks and the thousands (ultimately, millions) of citizens who log onto the network. Also, it is the data that flash back and forth across the land, day and night, regardless of the hour. In many ways, it is a largely uncensored region, where information — largely unmonitored and unjudged — is communicated. CyberCanada is a freeport which falls outside our normal perceptions and judgments.

To date, networks such as Internet permit the flow of information, mostly unchecked. This flow is intended to facilitate discussion and promote free exchange. The deeper reality is that it is next to impossible to stop free exchange of such information. In fact, there is no agency or device that could monitor the voluminous correspondence. And once placed on these networks, information can be automatically broadcast from changing sites, so that attempts to shut down one broadcast site would not terminate the flow of information, whether it is productive or destructive in nature.

In our everyday world, the co-existence of Canada and CyberCanada cause increasing confusion as laws and regulations are passed which govern one country but have little or no effect in the other. Information which is banned by courts in Canada may be readily available in CyberCanada. In a hierarchic management, information must flow from the top down. However, in CyberCanada, the same information may arrive from many sources, and from every level. By utilizing worldwide electronic networks, it is possible for those at the bottom of an organization to be much better and more quickly informed than management. Control of information depends on control at the

source or at the point of reception. In fact, governments are less and less able to control either.

What has evolved are two separate countries, with different sensibilities, and distinct "manners" and "languages." One has borders, laws and customs; the other is borderless, and in the process of evolving certain procedures and etiquette. We should pay close attention to this emerging national dichotomy for many reasons. CyberCanada will be the source of new jobs, industries, and trade. This forming country will also profoundly alter our perception of the world, our wealth, and our cultural identity. How CyberCanada will influence Canada is an open question. But whether Canadians are fully aware of it or not, they hold dual citizenship in these two "countries."

Information on Demand Creates Power Shift in Canadian Society

In the past, society standardized education, the workplace and the timeclock by creating a factory-like environment for school, the corporation, and industrial assembly line. At school, studies commenced and ended with the ringing of a bell. In their adult life, workers served their bosses in prescribed apparel, began and stopped work, and even ate at prescribed hours in exchange for a steady wage. Information, goods and services were available at prescribed times.

With the Information Highway, all this is changed. Frequently, employees work at home, connected to the office or to a team of employees over great distances. Apparel is optional and work hours flexible. Information is seconds away, available anytime. Moreover, the average citizen now expects this information and assumes the power to summon it. The individual's control over his or her personal environment has direct consequences for the society as a whole.

Only a few years ago, there was a lineup every Friday at the bank. Now, deposits and withdrawals can be made at any hour at an automatic teller machine. At home or at a hotel, it is easy to call up a movie on television by entering a code on the telephone. Using a VCR, entertainment or training programs can viewed at any hour. Individuals now design their own information environment, which makes them less reliant upon traditional authority for instruction and guidance. As entertainment, education, training, and other information become

available on demand, the standardized environment falters and with it, many aspects of traditional authority. Routines, once externally administered for both young and old, are seen as less and less productive. More and more, it is left to the individual to create his or her own routine.

Many institutions do not fully understand that citizens now expect to have access to information that was once controlled by authority, or even that electronic networks have in fact made information universally accessible. In 1993, in Ontario, the courts imposed a publication ban on information relating to the Karla Homolka trial. However, the trial was reported in other countries, and reports in certain American publications were available to Canadians via electronic networks. Many in the government and the courts appeared unaware of how extensive electronic networks are in Canada, or how swiftly information can be conveyed undetected across borders. By issuing public bans on information, or legislating regulations which are in fact unenforceable, traditional institutions reveal themselves as out of touch with the nature of modern communications.

The idea of the courts issuing a publication ban was a possibility based on times gone by, on the assumption information was transmitted in hardcopy form — newspapers, books, magazines, etc. But in an electronic age, with the movement of information in an electronic world, it's almost an impossibility to regulate or control. The idea that jurors haven't seen or heard information to prejudice a case may not be the case.

— Ron MacSpadyen, information consultant, 11 Corinfo¹

Wired magazine in its April 1994 issue (p. 29) estimates that one in four Canadians know the banned facts of the case. As the American publication *Wired* observed: "In the Teale-Homolka case, the ban was not so much broken as rendered irrelevant by the voracious online community...". Consumer technology (the video camera, fax machine, and online electronic networks) permits

individuals to capture and transmit information on an unprecedented scale. This development robs hierarchic organizations of their power to control the flow of data and, in general, erodes their status and authority.

Canadians are said to have lost faith in their institutions and that such faith must be restored. In fact, what has happened is more disturbing. Many find their institutions irrelevant and they express this in a particularly Canadian fashion. Americans have long demonstrated their anger at high taxes in many vocal and direct tax revolts, even voting various tax-cutting measures into law. In this country, citizens have a more discreet approach. Over the past three years, Canadians have created a massive black-market economy in which tens of thousands of business transactions, conducted mostly in cash, go unreported — thus robbing government of needed revenue. Stopping short of an open tax revolt, they created an underground economy by avoiding payment in the first place. Unfortunately, once people have crossed a line, it is difficult to restore the status quo.

We're too polite to kill anything outright. Instead, we just cut off the oxygen and watch the beast die.

— John Douglas, theatre and radio dramatist

Rather than engage in confrontation, Canadians have increasingly "dropped out" of their traditional society. New technologies have facilitated this disengagement, providing the individual with the means to become more self-reliant. Institutions, including government, have not really understood this phenomenon, but Canadians who in the past meekly deferred to authority now do so less and less. Without faith in our institutions, and the revenues this faith generates, Canada's institutions will falter. One of this country's greatest challenges will be to see if our institutions can find a new powerbase, one which addresses the emerging needs of a technological society.

¹ Cited in *The North Bay Nugget*, December 9, 1993.

The Consequences of "Easy"

...If you look at what the person whom we called "secretary" does in a company today, and what kind of creativity that job requires compared to what it was before the use of computer technology, it is completely different. Everybody types up their own documents now, and everybody's being freed up to do the things that really challenge, that really allow them to come up with new ideas.

— William Gates, chairman and CEO,
Microsoft Corporation

Usually, technology makes performing certain tasks relatively easy: sending an electronic message, fax, or voice message are all very common and performed routinely and easily. However, today's corporate worker is assailed by a high volume of incoming and outgoing communications, not to mention face-to-face dialogue. Although the computer and other technologies have made it easier to communicate, there has been little serious response to the consequences of making things easy.

Just because the faucet pours Niagara,
doesn't mean you can drink any faster!

— Harried corporate manager,
returning to his office to find 50
unanswered voice messages

Too often, instead of giving government and corporate workers more time to come up with creative ideas and solutions, management and staff simply react to the latest emergency. This has created an increasingly alarming scenario: in a knowledge-based society, few have time to think. As a result, the secretary's job — which included the vital task of sorting through communications, prioritizing and responding to phone calls and correspondence — has now been shifted directly onto management, along with their regular duties. New tools such as electronic mail, fax machine, and voice messaging permit incoming communications to increase exponentially, generating a whirlwind of requests, reminders, and inquiries. The effect resembles opening every window and door in a house during hurricane season. Corporate staff work in a state of stress and exhaustion. Compounding this effect is the phenomenon of intangible products and services, which do not lend themselves to easy measurement. In turn, workers cannot readily see the benefit or

outcome of their efforts. Management complains that productivity is down and must come up. But terms like "down" or "up" make little sense in the absence of accurate criteria. In short, it is difficult to define terms like "productivity" when one can barely define the product being manufactured or what the product is really doing once it has been sold.

As work loads increase, so do fatigue, stress, and psychological anxiety. Lacking any meaningful points of reference, workers find it hard to gain perspective of their labours or take pride in them. Today's worker might easily identify with an equally absurd race to nowhere.

...The Queen went so fast that it was all [Alice]
could do to keep up with her.... The most curious
part of the thing was that the trees and the
other things round them never changed their
places at all: however fast they went, they
never seemed to pass anything.

— Lewis Carroll, *Through the Looking Glass*

In a new technological age, we need new criteria to measure what we are doing. Computers and networks can increase productivity only if we know what productivity is, and if we learn to use technology in a productive way. To compete in a global market does not necessarily mean we must increase pace or put in longer hours. More likely, we may have to slow the pace of production and put more thought into devising meaningful strategies. Is it really productive for a member of management to put in a frantic 60-hour work week, with a schedule which leaves little time for critical analysis of the work being done? Or to schedule an endless stream of meetings without allotting sufficient time for those attending to digest the ideas and information discussed?

These are vital questions which should be explored in other studies. Individuals must define their jobs and decide for themselves what they can and cannot do. The electric light bulb made it possible to work and play after sundown, and illuminate our cities throughout the night. Now, with global communications it will be easy to work and play all day and all night. However, we must decide whether we want to do this as, increasingly, traditional barriers of time and space are swept away. It is left more and more to individuals and society to decide what we can bear or should not bear. Like any tools, computers and networks can be used for

good or destructive purposes, and their influence can be beneficial or pernicious. People are often so enamoured (or fearful) of new technology that they do not consider that they have power to decide these matters.

In a real sense, technology is like a cloth or fabric. Using imagination and skill, it can be designed to make a beautiful, comfortable, and sturdy garment — or it can be used to fashion a strait-jacket. As our technological age gets under way, the time has come for the wearer to decide the nature of the wardrobe.

The Highway of Dreams

My dream has been guessed!
And now it will happen —
And all my people will share it!
— John Douglas, *The Unguessed Dream/
The Story of Canada in the Words of
Those Who Lived and Died Here with
Uncalled-for Remarks by Outsiders*

Freedom of thought and speech means little without a climate which permits freedom of action. Without it, ideas, talents, and vision often perish, walled up within the mind and heart. Even in a liberal democracy such as Canada, individuals not affiliated with a business corporation, university, government, military, the press, or other bureaucracies find it difficult to sell their skills, raise capital, or implement their talents. Without attachment to these organizations, individuals are often disenfranchised from the larger society. Even in an open society, citizens within organizations and institutions often engage in self-censorship, watching what they do or say to protect their livelihood. Especially during difficult economic times, people are fearful of job loss. The combination of self-censorship and a constantly implied threat of punishment can create an oppressive climate — an atmosphere so all-pervasive it becomes the operative norm.

We judge success by visible accomplishments. What we do not see, however, are the things which are never allowed to develop in the first place. Rarely observed are the social forces which automatically screen out, consciously neglect, or intentionally suppress ambition and enterprise. It is a comfort to believe that the best in society struggle and finally rise to the top. It is much easier than acknowledging the loss of creative initiative and individuality.

Electronic networks, including the global Internet, offer outlets for “grassroots” aspirations. These networks have ignited the popular imagination, expressing a central and universal yearning. Each individual craves the opportunity to take his or her special voice, product or perspective and manifest it in the world beyond borders, restraints, and “gatekeepers.”

The Information Highway gives an individual arms to reach out globally with unprecedented scope. “Arms” of glass fibre, wave-guides and digital code permit a bookseller in Halifax to find buyers in Singapore. They permit a person in Calgary, answering an ad on a bulletin board, to find a person in Vancouver and share interests and experiences. They allow a businessman on Georgian Bay to find clients in Europe, Mexico, and large American cities. Electronic networks let students in Perth, Australia, conference with a student in St. John's, Newfoundland, and College Station, Texas. For anyone with a dream, the Information Highway creates infinite possibilities. Taking us beyond the right of expression or freedom of speech, the Highway affords us a broader platform where ideas can be freely implemented. In this, it suggests a new and emerging order.

The Highway holds out the promise that an individual can reach for, and find, and claim a place as real as any country — a place where one person can, through enterprise, contribute skills and insight to the world. In a very real way, the promise of the Information Highway is the same one settlers must have felt when they traveled up the St. Lawrence to the Great Lakes, and beyond. They saw possibilities in the grey cliffs and green forest in a time before laws and borders. And, at night, they sensed a promise in the unhindered view of stars and a space for dreams.

It is this promise of a “dreaming space” that will ensure the success of the Information Highway. The Highway will come into being because of a general desire for a deeper, more complex freedom. For the first time in history, individuals — relieved of the confines of time and space — see a chance to take hold of their destiny. Individuals can form farflung networks where what they contribute will find its way to a place where it has value. For the first time, a person can freely choose his or her neighbours and workmates from an infinite landscape, can work where they wish rather than toil in the confines of an office. It is this possibility of an alternate world that will ensure the completion of the Highway.

It is often said that no one can stop an idea whose time has come. In the case of the Information Highway, it might be said that no one can stop the notion that ideas can be realized. The Highway is the apparatus which will permit this.

Electronic networks have created a global marketplace. They are now a necessary path for commerce, trade, and export. These networks, essential to our economic life, have revolutionized our concepts of time and distance. Irrevocably, they have overturned commonly held attitudes, assumptions, and beliefs — generating new perspectives and dreams. Practical in design, the Information Highway has an almost magical dimension: an avenue to take us to the future and provide the landscape. Ostensibly built to satisfy the needs of industry and science — ultimately, this highway will transport our dreams, and assist in their refinement.

Recommendations

1. **International technological standards must be established. All technology used in the creation and delivery of consumer-oriented products and services must be made compatible.** For over a decade, the incompatibility of various technologies, particularly computer technology, has hindered the growth of the world marketplace and economy. Consumers are frustrated by the startling array of mismatched technologies. Now, as the marketplace is consumer-driven, government and corporations must work together to make compatibility an urgent priority.
2. **Government and business must invest in identifying existing resources.** Too often, major resources lie unused or misunderstood. Canada has moved from an industrial age into a technological one, and yet institutions and corporations still employ outdated criteria and perspectives. Existing resources, properly identified and applied, will dramatically increase employment and productivity. Improved perspective of resources-in-hand is a powerful instrument in job creation and enhanced productivity.
3. **Government should encourage the production, distribution, and consumption of Canadian content through incentives, not regulation.** It is more practical and productive to create and market content, rather than attempt to control or restrict consumer demands.
4. **Government should assist in the centralizing of information on the content industries.** Information on companies, as well as their products and services, should be made available via electronic networks. These data should be used in the ongoing promotion of Canadian industry.
5. **Government should consider partnering with Canadian businesses to create products and services.** These products, which are sold around the world, actively demonstrate the skills, talents, and resources of the Canadian content industry. The sale of these products will generate revenues as well as profile Canadian business.
6. **Government, business, and educational institutions must keep the Information Highway flexible and adaptive in design.** The lifeblood of the Information Highway is digital data. Because digital information can be stored in numerous formats, and transmitted over a variety of networks, the Highway could take many forms. Whenever possible, existing technologies and networks should be identified and used, such as VBI. This will dramatically reduce the cost of building the Information Highway.
7. **Those who work in the content industries, especially the cultural and learning industries, must receive ongoing education and training in technology and technological innovation.** Government and business should cooperate to provide this education and training, which will work to modernize these industries and make them more competitive. No matter what form this instruction takes, it must be continuous and regarded as an integral part of these industries. Government funding of the cultural and learning industries should be contingent on the active participation of these industries in this ongoing process.
8. **Government and corporations should actively promote and encourage the learning and teaching of language, especially our national languages.** Whether spoke or written, language is the basis of thinking and of articulating ideas, concepts, and expertise, which in turn is the foundation of our new knowledge-based economy. Scientists, computer engineers, and other professionals may use a highly technical, even artificial language in their work. But for the most part, we rely on everyday language to understand, debate, develop, and apply the discoveries of scientists and technologists. The larger our vocabulary, the easier it is for us to discern, to understand and describe subtleties, to refine our perceptions, and express ourselves. Therefore, it is central to Canada's economic future that citizens be taught to read, write, and express themselves verbally. Essential for thought, language itself produces

knowledge, which is the basis of the new economic order. In effect, language is the coin of the realm.

9. **Provincial and federal government, along with industry, should produce state-of-the-art, technology-based teaching systems for domestic and international markets.** New technologies such as multimedia, expert systems, and computer animation can be used to create teaching presentations on subjects ranging from literature to geology to mathematics to history. These teaching systems could combine lectures, simulations, interactive workshops and testing. Computers and interactive television are powerful teaching instruments for distance-learning. Canada has the technology and the expertise to create the sophisticated systems that would establish this country as a world leader in the field of education. Their manufacture could create a multi-billion dollar export industry, as well as showcase Canadian software developers.
10. **Government should reappraise its present methods of research and policy development.** In this period of great change, research must be relevant and ongoing in order to develop meaningful policy. Furthermore, in

a technological society, the nature of research has changed and can no longer be based entirely on past models. Government, business, and universities should join forces to fund individuals who scout for innovatively applied technology, as well as speculate on how this technology might play out in the larger market. This gathered information should be broadly distributed. Scouts should operate as free agents, outside the isolated agendas of government, corporations, and educational institutions, ensuring an uninhibited view of the market and the larger society.

11. **The way government is organized must be based on the new integrated nature of industry.** In the past, government created its jurisdictional or administrative domains based on a particular industry. Now, most industries are either interrelated or approaching full integration in the global market. Government departments and agencies can no longer neatly separate these into sectors. Certain areas of government must be fundamentally redesigned to cater and respond to the new fact of integrated industries.

List of Electronic Networks and Services

Networks and Online Services	Telephone
America Online	1-800-827-6364
CANARIE INC. (Canadian Network for the Advancement of Research, Industry and Education)	(613) 660-3634
CompuServe	1-800-848-8199
CRS Online (Bulletin Board)	1-800-563-2529 or (416) 213-6000
Delphi	1-800-695-4005
GEne	1-800-638-9636
Ottawa Freenet	(613) 788-3947
Prodigy	1-800-776-3449
SchoolNet	(613) 991-6057
Toronto FreeNet	(416) 568-9944

Multimedia Associations, Market Researchers, and Companies

The following associations and businesses are active in the multimedia industry. This list, though not complete or exhaustive, serves as an introduction to the industry.

Association	Contact	Activity
International Interactive Communications Society (IICS), Toronto Chapter c/o Tayson Information Technology 275 Comstock Road Scarborough, Ont. M1L 2H2	Peter Richardson, President Tel.: (416) 288-0550 Fax: (416) 285-4395	Promotes use of interactive communications in business, industry, education, the public sector, consumer applications, and in the arts. Increasing the skills, knowledge and professional standards of its members.
International Multimedia Development Association P.O. Box 1139, Station Q Toronto, Ont. M4T 2N5	Adam Froman, President Tel.: (416) 233-2227 Fax: (416) 234-9482	Profile and publicize multimedia developers and specialists. Industry networking.
Marketing	Contact	Activity
Software Studio 9 Hawthorne Place Suite 6R Boston, MA 02114 U.S.A.	Catharine Arnston, President Tel.: (617) 227-2906	Strategic marketing for software and multimedia. Canadian and American clientele. (Created Multimedia Alliance Directory which lists Canadian and New England multimedia companies.)
Print-On-Demand	Contact	Activity
Xerox Canada Ltd. 5650 Yonge Street North York, Ont. M2M 4G7	Alan L. McCann Systems Reprographics Marketing Tel.: (416) 733-6971 Fax: (416) 733-6498	Print-on-demand technology. DocuTech Production Publisher scans, prints, and binds documents on demand. Clients include Canadian universities.
Trade Show Specialist	Contact	Activity
Multimedia Trade Shows Inc. 7 - 70 Villarboit Crescent Concord, Ont. L4K 4C7	Bruce Cole, President Tel.: (905) 660-2491 Fax: (905) 660-2492	Staged <i>Multimedia '93/Exposition and Forum</i> and <i>Multimedia '94</i> in Toronto.
Market Research	Contact	Activity
Computer Technology Research Corp. 6 North Atlantic Wharf Charleston, SC 29401-2150	Brian Lindgren, Editor Tel.: (803) 853-6460 Fax: (803) 853-7210	Publishes various reports, e.g., <i>Multimedia Technology: Combining Sound, Text, Computing, Graphics and Video and Multimedia Networking and Communications</i> , by Bohdan O. Szuprowicz.
Multimedia Intelligence 6 North Atlantic Wharf Charleston, SC 29401-2150	Brian Lindgren, Editor Tel.: (803) 853-6460 Fax: (803) 853-7210	International newsletter on multimedia. Corporate clientele.

Market Research	Contact	Activity
Frost & Sullivan/Market Intelligence 2525 Charleston Road Mountain View, CA 94043	Amy Arnell, Public Relations Manager Tel.: (415) 961-9000 Fax: (415) 961-5042	Publishes various reports, e.g., <i>World Multimedia Hardware and Software Markets/Finally a Definition.</i>
International Data Corporation (Canada) Ltd. 950 – 36 Toronto Street Toronto, Ont. M5C 2C5	Debby Currey Tel.: (416) 369-0033 Fax: (416) 369-0419	Publishes various reports on multimedia.
11 Corinfo Research and Information Services 100 College Drive North Bay, Ont. P1B 8L7	Ron MacSpadyen, Director, Marketing and Business Development Tel.: (705) 474-7853 Fax: (705) 497-1455 Toll Free: 1-800-363-8353	Business information: market research; information seminars. International clientele. Reputation built on fast, effective information delivery.

Company	Contact	Activity
Advanced Information Management Inc. (AIM) 33 Alderney Drive Suite 550 Dartmouth, N.S. B2Y 2N4	John Hudson, Multimedia Director Tel.: (902) 461-2525 Fax: (902) 465-2301	Delivers marketing and communications solutions to business. Specializes in interactive multimedia presentations.
Alias 110 Richmond Street East, Suite 401 Toronto, Ont. M5C 1P1	Andrew Wright Tel.: (416) 362-9181 Fax: (416) 362-4696	Internationally known, has produced animation software used in the making of major Hollywood films, such as <i>The Abyss</i> and <i>Jurassic Park</i> .
Animatics 126 York Street Ottawa, Ont. K1N 5T5	Patti Church Tel.: (613) 235-9000 Fax: (613) 233-7157	Offers multimedia consulting, hands-on training, and customer support. Produces interactive multimedia products for communication, education, and entertainment.
Apple Canada 80 Micro Court Markham, Ont. L3R 5G2	Andrew Scoular, Multimedia Marketing Manager Tel.: (905) 477-5800 Fax: (905) 513-5871	Excels in computer visuals. Offers a wide variety of hardware and software for work in multimedia for graphic designers and artists.
ATI Technologies Inc. 3761 Victoria Park Avenue Scarborough, Ont. M1W 3S2	Andrew Clark Tel.: (416) 756-0718 Fax: (416) 756-0720	Manufactures wide range of graphics, multimedia and communications products. Largest market share of any graphics board manufacturer.
Blue Owl Multimedia Publishing Inc. 186 St. George Street Toronto, Ont. M5R 2N3	Maurice Tarlo, President Tel.: (416) 960-8366 Fax: (416) 960-9478	Electronic publishing firm. Develops, produces, and distributes generic training programs, specializing in MPEG digital video.
Commodore Business Machines Ltd. 3470 Pharmacy Avenue Agincourt, Ont. M1W 3G3	Tom Shepherd, Director of Marketing Tel.: (416) 499-4292 Fax: (416) 494-9755	Pioneered multimedia development. The Amiga computer is specially designed for film and video production.
Corel Systems Corp. 1600 Carling Avenue Ottawa, Ont. K1Z 8R7	Tel.: (613) 728-8200 Fax: (613) 728-9790	Provides PC graphics software, optical disk products, and systems. Corel Draw software is used throughout the desktop publishing industry.
Digital Eclipse 275 Slater Street Suite 1002 Ottawa, Ont. K1P 5H9	Gene Carson, Director of Marketing, Business Development Tel.: (613) 594-4770 Fax: (613) 238-4857	Develops multimedia applications for use in information, training, and public space kiosks.
Digital Presentations Inc. 71 Berwick Ave. Toronto, Ont. M5P 1G9	Mathew Diamond Tel.: (416) 481-2394 Fax: (416) 481-8025	Corporate communications. In 1990, received a National Research Council grant for the development of multimedia applications.

Company	Contact	Activity
Discis Inc. 410 – 45 Sheppard Ave. East Toronto, Ont. M2N 5W9	Sarah Langdon, Media Relations Tel.: (416) 250-6537 Fax: (416) 250-6540	Very successful multimedia publishing of children's classics.
electra media 201 – 145 Front Street East Toronto, Ont. M5A 1E3	Aurel Langlois Paul Chato Tel.: (416) 361-6161 Fax: (416) 863-0528	Specializes in corporate communications. Wide-ranging interests and talents in multimedia design and presentation.
Réseau Interaction Network Inc. 1651 Country Walk Drive Orleans, Ont. K1C 8E2	Nôel Thomas, President Tel.: (613) 830-6533 Fax: (613) 837-8472	Created the Electronic Village, an infrastructure for delivery of services. Government and university clients.
IBM Canada Ltd. 3600 Steeles Avenue East Markham, Ont. L3R 9Z7	Angela Forgione, Multimedia Marketing Representative Tel.: (905) 316-3791	Provides an extensive range of multimedia products and services, as well as customer support. Major player in future development of multimedia.
IBM Canada Ltd. Ultimedia Developers Program 701 West Georgia Street Vancouver, B.C. V7Y 1G1	Joanne Galand, Creator Relations Tel.: (604) 664-6863	Creates multimedia solutions according to the client's needs.
Interactive Image Technologies Ltd. 700 King St. West Suite 815 Toronto, Ont. M5V 2Y6	Joseph Koenig, President Tel.: (416) 361-0333 Fax: (416) 368-5799 Sales: 1-800-263-5552	Produces and markets educational products internationally. Majority of sales to United States and Europe.
Kodak Canada Inc. 3500 Eglinton Avenue East Toronto, Ont. M6M 1V3	Ed Berry Tel.: (416) 766-8233 Fax: (416) 766-5814	Provides a variety of tools for the transfer of images onto computer or TV screen for viewing and editing.
MicroPlacement Inc. 1200 – 1200 Bay Street Toronto, Ont. M5R 2A5	Gary L. Yentin Tel.: (416) 960-3834 Fax: (416) 960-8791	Specializes in multimedia consulting and conference management.
Microsoft Canada Inc. 320 Matheson Blvd. West Mississauga, Ont. L5R 3R1	Linda Carnell Tel.: (905) 568-0434 Fax: (905) 568-1527	Provides a wide array of multimedia products which are both instructive and entertaining.
Multiple Images Inc. 201 – 489 Queen Street East Toronto, Ont. M5A 1V1	Michael Keefe, Director of Multimedia Tel.: (416) 368-6728 Fax: (416) 368-0253	Provides corporate multimedia, consumer CD-ROM publishing, and interactive TV production. Major corporate and government clients.
Oberon Productions 2 Berkeley Street Suite 500 Toronto, Ont. M5A 2W3	Luda Tovey Jeff Potter Tel.: (416) 863-1733 Fax: (416) 863-0480	Designs and produces interactive multimedia programming, specializing in CD-I technology.
On/Q Corporation 395 Dowd Street Montreal, Que. H2Z 1B6	Michael Palmer Vice-President, Marketing Tel.: (514) 393-3500 Fax: (514) 393-3222	Develops custom multimedia applications in Interactive Video, Digital Video Interactive, and CD-I. Corporate and government clients; Canadian museums.
Perceptix Inc. Suite 1014 111 Richmond St. West Toronto, Ont. M5H 2J5	Henry Campbell, President Tel.: (416) 365-1704 Fax: (416) 365-7463	Distributes and develops interactive learning products for education.
Philips Electronics 1755 Woodward Drive Suite 333 Ottawa, Ont. K2C 0P9	Chris Coates Tel.: (613) 225-6603 Fax: (613) 225-6985	CD-I technology, products and services.

Company	Contact	Activity
Pixel Productions 547 – 67 Mowat Avenue Toronto, Ont. M6K 3E3	Rachael McAfee, President Tel.: (416) 535-3058 Fax: (416) 535-2794	Uses emerging technologies for information packaging and presentation in applications for education, training, marketing, communications and public access. Corporate, government, and educational clients.
Pixonix Inc. 3 – 196 Sunnyside Avenue Toronto, Ont. M6R 2P6	Nikki Yokokura Tel.: (416) 537-1068	Specializes in educational software development and consulting.
Professional Staging Techniques 6580 Kestrel Road Mississauga, Ont. L5T 1Z9	David Furlotte Tel.: (905) 670-7540 Fax: (905) 670-7549	Specializes in staging, consultation, and programming.
Roland Canada Music Ltd. 346 Watline Avenue Mississauga, Ont. L4Z 1X2	Tel.: (905) 890-6488 Fax: (905) 890-7036	Wide array of software used in the creation of music created and enhanced on computer
SoftImage Inc. Corporate Headquarters 500 – 3510, Boul St-Laurent Montreal, QC H2X 2V2	Peter Crombie, President Tel.: (514) 845-1636 Fax: (514) 845-5676	Produces software used in the creation of film and animation. Example: effects in movie <i>Jurassic Park</i> .
SoftImage (Midwest) Chatham Centre, N.W., 8th fl, 1901 North Roselle Road Schaumburg, Illinois 60195	Phillip Moy, Regional Manager Tel.: (708) 490-6450 Fax: (708) 924-8359	Software used in the creation of film and animation. Software used in the blockbuster movie, <i>Jurassic Park</i> .
Virtual Entertainment Group Vivid Group 317 Adelaide St. West Suite 302 Toronto, Ont. M5V 1P9	Richard Sharp, Marketing Tel.: (416) 340-9290 Fax: (416) 348-9809	Specializes in virtual reality. International list of clients, corporations, museums, and educational institutions.

Glossary

Artificial Intelligence (AI)

An umbrella term incorporating the study of ways in which computers can be made to perform cognitive tasks normally performed exclusively by human beings.

Chroma Keying

Facility to replace selected colours in a video image with others to allow the creation of different scenes against the background. Some video boards contain such capabilities. Also known as colour key.

Computer Disk-Interactive (CD-I)

A multimedia delivery platform standard introduced by Philips and Sony and targeted at consumer and school markets.

Compact Disk Read-Only Memory (CD-ROM)

An optical form of disk storage that uses a laser rather than a magnetic head to read information from the disk. The laser scans the disc and detects the appearance of minute pits on the disk which represent the binary data.

Content Industries

- publishing (books, periodicals, newspapers; data bases; etc.)
- film and video (feature films, shorts, industrial or non-theatrical films)
- sound recording
- broadcasting (television and radio)
- video game industry (Nintendo, Sega, Atari, and others)
- computer software industry (not all, but significant portions of courseware, computer games, CD-ROM-based products)

Cultural Industries

As defined by the 1987 Department of Communications report *Vital Links*, the cultural industries are: film, book and magazine publishing, radio and television, and sound recording. This definition includes other art forms and cultural agencies.

Consumer-driven Market

A marketplace led by the wants, needs, and buying power of consumers, not the decisions and power of suppliers.

Digital Information

Data and the context of those data, stored in binary (numeric) code.

Department of Communications (DOC)

Also named Communications Canada. Recently abolished, with staff going to Industry Canada and the Department of Canadian Heritage.

Expert Systems

A computing system which mimics or simulates certain aspects of human logic, such as inference and reason. It is usually based on the experience which is gathered from a human expert or experts in a specific area or field of knowledge. (This knowledge is often in the form of guidelines we follow in our reasoning or rules-of-thumb).

Integrated Services Digital Network (ISDN)

A set of digital telecommunication network interface standards consisting of a signalling channel and a number of 64 kbps digital transmission channels based on fibre optics with a greatly enhanced transmission capacity that are used to provide circuit switched connections for handling video images and applications such as videoconferencing.

Knowledge-based Economy

An economy dependent on information, knowledge, ideas, and expertise, the manufacture and distribution of these.

Multimedia

A type of presentation that involves the directed control of several forms of communication, such as text display, graphics, still imagery, animation, sound, and music. A multimedia presentation is a composite using many audio-visual sources and allows the discriminating viewer to proceed at a desired pace and with some level of interaction.

With television, for instance, the viewer is passive and cannot control the media events or pace within a given program. With multimedia, the viewer can control the order and speed of the presentation. In certain cases, the user or viewer can import information from various sources and merge them into a new assembly or package, thus creating a new presentation, product or service. Multimedia is also an essential tool in the creation of cultural products and services.

Virtual Reality

Also known as artificial reality, cyberspace and telepresence. It involves the use of computers to simulate real environments with which a user can interact.

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