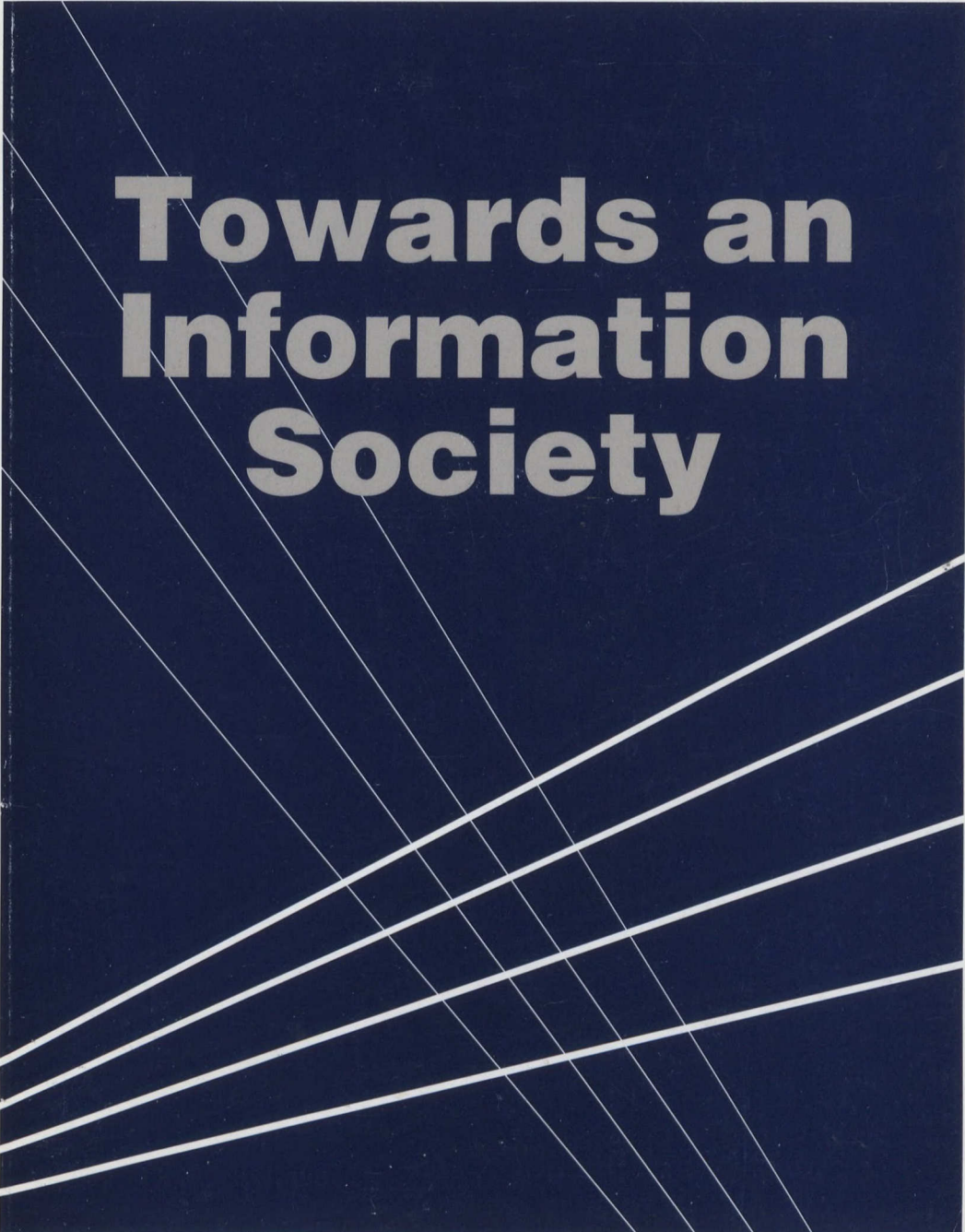nications
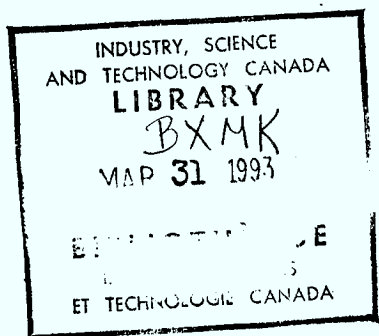
CANADIAN WORKPLACE AUTOMATION RESEARCH CENTRE

# C W A R C

# Towards an Information Society

Communications Canada
Canadian Workplace Automation Research Centre
CWARC

TOWARDS AN
INFORMATION SOCIETY

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# INTRODUCTION

Any introduction to the information society must begin with the changes that underlie new information technologies (NITs). These technologies carry us beyond word and data processing as workplace tools, and into such things as videoconferencing and electronic data exchange, the electronic planning diary and electronic mail. The microcomputer, which promotes the integration of diverse functions, has pushed us toward more generalized computer systems and encouraged the development of communications networks in all areas of economic life.

However, business firms and society in general will find it difficult to adjust to the changes brought about by large-scale adoption of NITs. In this report we attempt to: (1) describe the changes already occurring — and which NITs may emphasize — in an increasingly global economy; (2) shed some light on the long-term consequences of these changes; and (3) summarize the interrelationships between information and society, and the multifaceted social transformations they are causing.

This report is a multidimensional, macroscopic analysis of the changes resulting from the so-called *information revolution* and is intended to clarify the long-term consequences of these changes. The close connections between economic growth and cultural sovereignty, closely linked to NITs, is one of the issues examined. As background to the specific issues raised by the relationships among technology, economy and culture, which is the main focus of the study, the first part of this document describes the evolving information environment, while the second part sketches the social issues that will have to be dealt with in the political arena if we hope to control the future.

The title of the report was not chosen by chance. It reflects the fact that our current knowledge of the information society does not always permit a very clear picture of the processes under way. The general theme was selected for study because the information society is now as clearly visible as the postindustrial society — if not more so. Blaise Cronin summarizes it well:

> "What began life as a sociological construct and then became a feature of futurologists' patois before degenerating into a media cliché has finally achieved respectability through endorsement by economic and political analysts..."[1]

The meaning of the word *information* is very complex. Our discussion therefore pays little attention to the "physical" characteristics of information; instead, we concentrate on its broad "social" aspects.
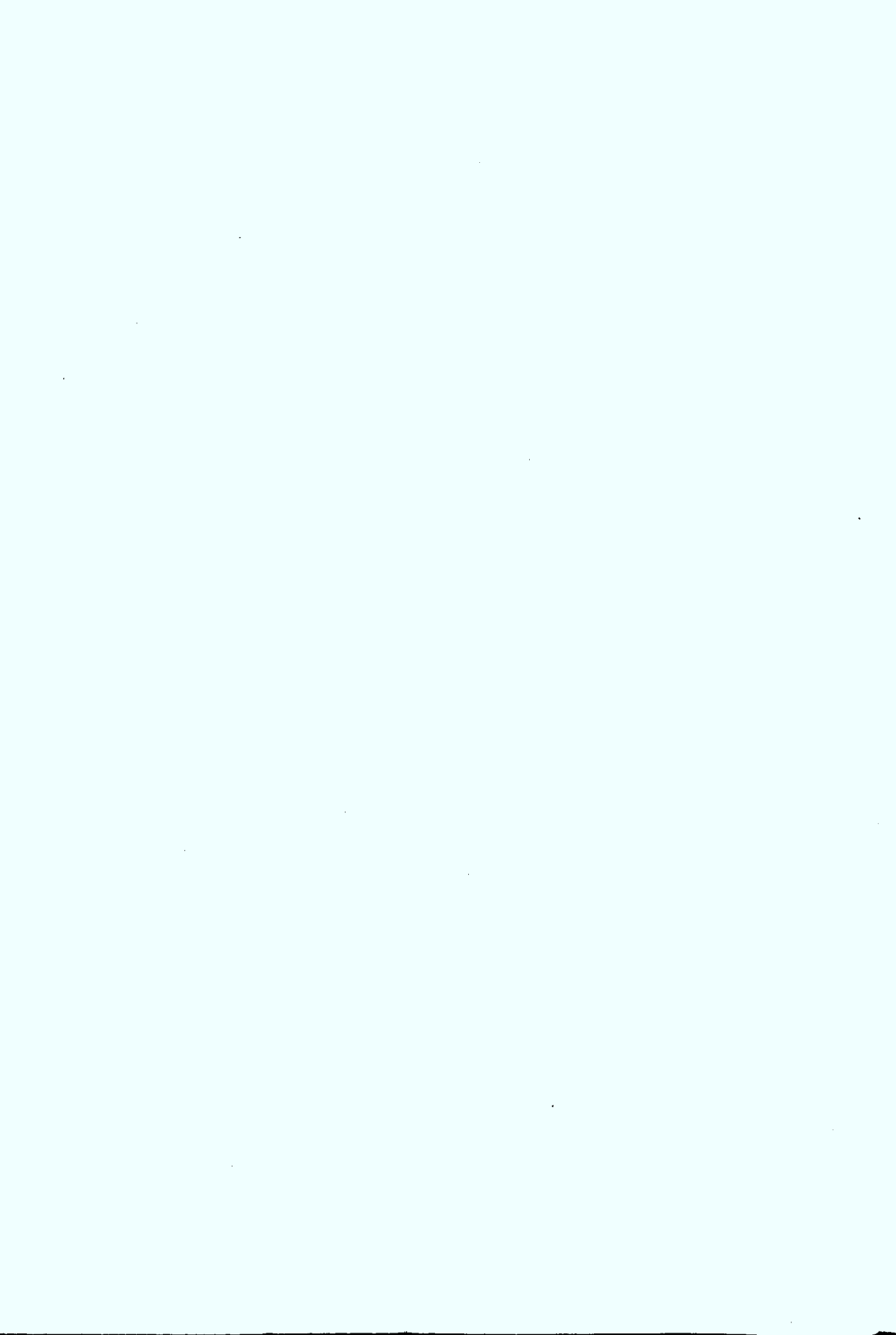
# 1
# THE INFORMATION ENVIRONMENT

*[Tr]* *"Information is everywhere: in a wristwatch, in the pencil that becomes a calculator or an alarm clock, in a gossamer glass wire, in the most common, everyday, mystery-less object, transformed by this artificial[1] intelligence into something that it is not."[2]*

The very concept of information is imprecise and definitions of it range across a whole spectrum of meanings. For some people, it refers to the act of *informing*,[3] the process of gathering and disseminating information. For others, it is nothing less than the fourth essential element for human development, after water, air and fire.[4]

Despite all these points of view, and even given that information has always existed, *information technologies* – those technologies designed to process, store, reproduce and transmit information in all fields of human activity – are clearly new in our time.[5] [Tr] "It can reasonably be argued that the proliferation of information processing equipment affects and will continue to affect the movement of knowledge as much as did the earlier development of new ways to move people physically (transport) and the later evolution of techniques for transmitting sounds and pictures (the media)."[6]

## 1.1   Modern methods for transmitting information

Modern communication transmission began with the newspaper, the first vehicle for transmitting opinions and information.[7] Beneficiary of the first major inventions, the English press enjoyed undeniable predominance at the beginning of the 19th century. It was between 1830 and 1870 that the most important information agencies (such as Reuters and Associated Press), the newspaper distributing industry and most of the great newspapers came into being. Readership increased constantly during this period, owing to population growth, progress in education and the rise of democratic politics.[8] More and more, the press evolved as an industrial and commercial activity, reaching its peak in 1914. [Tr] "This evolution, about the same in all developed countries, was characterized by constant growth both in the number of newspapers and in their distribution, by commercial competition among publishing firms, and by constantly rising costs, which led to a growing reliance on commercial advertising."[9]

*[TR] is used throughout the text to indicate that what follows is a translation.*

The first mass medium to appear, the daily newspaper, coincided with the rise of mass culture in the sense of a *way of life*. "The press did not become a mass medium in a modern sense until 380 years after Gutenberg's invention. On September 3, 1833, Benjamin Day launched the *New York Sun* with the motto 'It Shines For All'."[10] The 19th century was the "uncomfortable nest in which mass culture is hatched".[11] A new social group, the public, is closely linked with the rise of the daily newspaper.[12]

"Before newspapers were produced in quantity, the vast masses of society lived largely in ignorance of the affairs of their country. Before books, education for most people consisted of fables and facts necessary for living passed on by word of mouth. Books became the basis for an educated society. Newspapers became the basis for a politically informed society."[13]

Foremost among the agents of change in the information industry were technical progress in newspaper manufacturing and the invention of the telegraph and other methods for telecommunications. [Tr] "It is also true that since 1973, owing to new offset techniques, small 'opinion' newspapers addressed to homogeneous audiences of limited size have appeared, while large national newspapers have experienced serious difficulties."[14] Consequently, publications on specialized subjects (such as science, technology and entertainment) and for specialized clienteles (such as unions or women) have appeared at the same time as industry concentration has increased. While newspapers often provide a social, cultural and political frame of reference, readership targeting and segmentation are gaining ground.[15] The appearance of NITs will emphasize this trend.

"One consequence of the computer on newspapers is to foster audience segmentation, defined as the strategy of dividing the heterogeneous audience of a mass medium into relatively more homogeneous subaudiences. Until a few years ago, most newspaper companies delivered an identical newspaper to each of their readers. That is no longer the case, thanks to computers that can make up a localized edition of a newspaper for each suburban section in the paper's subscription area; each specialized edition, containing news of particular interest to certain readers, is not only computer-composed, but also is routed to the designated readers by computer."[16]

In this context, NITs have helped to radically transform the newspaper industry. For example, *the Globe and Mail* is transmitted by satellite from Toronto to several locations across Canada and printed on local presses so that it can be quickly distributed early in the morning. This innovation ensures that

the paper can compete in regions where, because of distance, it would otherwise have been out of date long before it was delivered.[17]

The first radio station, conceived by Frank Conrad of the Westinghouse Electric Company of Pittsburgh, did not appear until 1920. But radio got its real start as a mass medium when the American companies AT&T and Westinghouse got the double idea (1) of financing the production of musical programs by selling air time to advertisers, and (2) of mass-producing receivers for general consumption and selling them at low prices.[18]

By the spring of 1922, radio had become popular nationwide and sales of radios, parts and accessories totalled more than $60 million a year in the United States. By the end of 1929, sales had reached a remarkable $843 million (an increase of 1,400 percent since 1922).[19] According to S. L. Del Sesto,

"The radio was more than a passing national fad and an instrument for entertainment and diversion, however; it was also a great advance in communications that helped link all parts of the country into a mass society sharing common interests, values, ideas, and beliefs. Radio would become the moulder of popular opinion and the creator of political support and consensus for national policies. In short, it was reshaping the social fabric."[20]

Evolution towards a mass culture was firmly established by the early 20th century. The radio as a means of mass communication, its content based on an average level of culture, made its message available to everyone. The product of the system was perpetual, never-ending talk, an uninterrupted flow of information.[21]

"Radio and the printed page were not substitutes for each other but opportunities for the news-hungry who used them both. And insofar as following news built a habit, the media supported each other. The same sort of relationship existed between radio sports and attending games, records and attending concerts, radio drama and taking related books out of the library. Indeed, it became somewhat of a cliché among communication researchers to say that media did not displace but reinforced each other."[22]

In the 20th century, even intellectual pursuits have been industrialized.[23] During the period between the wars, phonograph records and moving pictures, products of the end of the 19th century, began to challenge the power of the theatre. Unlike theatre, film introduces a physical distance between the actor and the viewer — the place where a film is produced is not the same as the place where it is consumed. This distinction has led to a revolution in entertainment. [Tr] "Initially, however, the tradition of gathering in a public place

was maintained. Only with the arrival of television — the second audiovisual revolution — would home entertainment become accessible to the public at large."[24] Motion pictures encountered stiff competition from television. However, even though television was responsible for a sizeable reduction in motion picture theatre attendance, it seems that it [Tr] "...gave motion pictures, which became one of the main sources of supply for television programming, an unprecedented shot in the arm."[25] By allowing immediate transmission between production studio and consumer, and thus accommodating such applications as live reporting and sports events, television transformed entertainment consumption. [Tr] "The new medium affirmed its secondary purpose, a more stringent segmentation of the market (falling back on the most faithful and regular audience)."[26]

Television enjoyed its greatest success first in the United States.

[Tr] "In 1950, seven million television sets were sold in the United States, which itself accounted for 85 percent of world sales. That year, 150 manufacturers were producing sets but by 1960, with the market saturated and colour television emerging, this number had fallen to 27. By that time, production was oriented toward the American market, with 94 percent of demand satisfied by the nine largest top-ranking American producers, such as RCA and Zenith."[27]

Television spread rapidly in Japan, as well. By 1969, Japanese sales had grown in value to equal those in the United States, making possible the emergence of Japanese manufacturing. But as early as 1963, Japan, known increasingly for the quality of its products, had set its sights on the American market. Exports grew during the last half of the 1960s and multinational firms were created from takeovers of American businesses: Matsushita purchased Quasar from Motorola; Philips purchased Magnavox; GTE purchased Sylvania; and Sony became an active exporter. As a result, by 1975 American producers controlled only two thirds of their domestic market; the Japanese share had quickly risen to more than 15 percent, and the European share to about 7 percent.[28]

On the eve of the year 2000, about ten firms directly control more than three quarters of the world market for colour television receivers.[*] Industrial concentration occurred in Europe in much the same way it did in the United States, but resulted in a greater reduction in the number of competing firms. Thomson benefitted from industry concentration in France, gradually swallowing up Pathé-Marconi, Téléavia, Claret and Continental Edison, although it continued to use these brand names for a long time. The other major French

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[*]See Appendix I, World Production of Colour Televisions in 1987: Major Producers.

producer, Philips, took over Radiola and Schneider. New companies, often organized as vast integrated multinational conglomerates, are now operating in the broadcasting industry. The formation of these large communications firms was encouraged so that European firms could compete with their American counterparts more effectively. [Tr] "In addition, by eliminating national ownership requirements and obstacles to the free flow of television programs, the Council of Europe's European Convention on Transboundary Television and European Community guidelines on 'Television Without Borders' will probably facilitate the formation of large multimedia firms."[29]

Until recently, television has developed within a strictly national framework. But according to J.-L. Renaud, this control and regulation environment has been disintegrating over the last ten years as more surface frequencies become available and new media, such as cable and satellite, come into use. [Tr] "The appearance in Italy of national networks belonging to Silvio Bertlusconi and the launching of Channel Four in Great Britain, of Canal Plus, la Cinq and M6 in France, and of RTL Plus in West Germany are primarily the result of increased or reconfigured surface broadcasting capacity."[30]

Telecommunications satellites now have a role to play in European transborder television. For example, channels fed by Astra have opened the market to low-cost domestic television sets as well as the use of cable networks in Europe. The emergence of satellite distribution has provided the necessary impetus to accelerate the installation of cable in several countries.

> [Tr] "In 1989, out of 126 million European homes with television, slightly more than 20 million received programs over cable networks; 800,0700 were connected to a 'mini-cable' system, also known as community antennas, to receive television programs by satellite (SMATV); and 800,000 were equipped with household reception devices."[31]**

In addition, certain industry trends encourage vertical integration. For example, television distributors are becoming more and more involved in program production; this is the case with cable companies like Time-Warner. There is increasing speculation that the Sony Corporation, since taking over Columbia Pictures, will use the latter's films to produce programs for its videocassette recorders.[32]

*See Appendix II, Cross-ownership Among the 50 Largest Audiovisual Firms.*

**See Appendix III, Television Channels Initially Planned for Satellite Distribution (1990).*

[Tr] "Still strong from its video cassette player experience, and having purchased CBS in 1986 to consolidate its domination (with Philips, the inventor, by an agreement signed in 1980) of audio compact discs, Sony purchased Columbia in 1989. In so doing, it added 2,700 films to its potential catalog and may have opened the way for high definition television (HDTV) using video cassette players not subject to broadcasting standards....The example looked to Matsushita like a good one to follow. In November 1990, it purchased MCA to add Universal's prestigious film collection to its competitive arsenal."[33]

Thus, the middle of the century witnessed the emergence and growth of a major information and entertainment industry encompassing publishing, music, film and television. Over the last decade, the traditional information industries have grown faster than the Canadian Gross Domestic Product (GDP). "Revenues (in current dollars) for these four industries have grown from nearly $4.5 billion in 1977 to over $11 billion in 1985, almost a three-fold increase in the market value of the information products they sell in less than a decade."[34]

With the rise of the media industries, which Dallas Smythe[35] has called "consciousness industries", culture and the economy are more and more interrelated. Culture is taking on the form of a consumer product, subject to the rules of the open market. [Tr] "Conquerors of time, taking communications to the limits of the universe, newspapers, radio, film, television, mass-market books and magazines are the culmination of the long development of communication techniques."[36] The notion of cultural industries, used for the first time in 1947 by Adorno and Hokheimer of the Frankfurt School, came into its own only toward the end of the 1970s.[37] The development of the mass media followed the classic industrial model, first with respect to physical equipment, then in the way production and distribution were organized.

[Tr] "Production in the mass media industry was organized according to the model common in other industries — rationalization followed by economic and technical concentration. A few large radio and television networks and a few motion picture studios quickly came to account for most physical facilities and practised division of labour, which led to standardized production."[38]

In 1988, five major Canadian private television networks controlled most of the private television stations, including rebroadcast transmitters. [Tr] "The largest of these networks is CTV, which has five affiliated stations. The other networks are Global Television, Quatre Saisons, TVA and the Atlantic Satellite Network. There are also some private stations affiliated with the CBC (the public broadcaster) and various independent stations, mostly in large metropolitan areas."[39] This last group of stations is made up of provincial broadcasting

agencies in Alberta, British Columbia, Ontario and Quebec responsible for producing and broadcasting primarily educational programs for regional audiences.

There were 96 television stations in Canada in 1988, not counting rebroadcast transmitters. Almost all of them belonged to four major companies - Baton, TéléMétropole, Selkirk and Western Broadcasting - which generated about 60 percent of total revenues in the industry. The 24 largest television stations provided 75 percent of this industry's operating revenues in 1987, although the Canadian television broadcasting industry is less concentrated than it is in most European countries.[40]

In the United States, there are about 1,000 commercial television stations, of which 650 are affiliated with and receive programs from one of the three large networks (NBC, CBS and ABC). [Tr] "There are 350 independent stations (not affiliated with a network), a number that tripled between 1980 and 1988. Despite a constant decline in audience ratings, the three major networks still provide most of the leisure-time programming."[41] As of the end of 1988, stations affiliated with the three major networks accounted for close to 63 percent of the total audience; there were also about 340 educational television stations, most of which were affiliated with the public network PBS.

In the field of news dispatching, a few international wire services — Associated Press, United Press International, Reuters, l'Agence France-Presse and Kyodo — have a near-monopoly. It is the same with filmed news: five major services alone produce all filmed news from developing countries and half that from the Western world.[42] [Tr] "Thus, for example, most American films are distributed through subsidiaries of the *major companies*, who make them available to French theatres."[43] In the European audiovisual industry as well, American films make up, depending on the country, 50 to 80 percent of the market. More than 70 percent of the fiction programs shown by European Community member countries are imported and more than half of these imports come from the United States.[44]

Communications Canada reports that almost all cultural products consumed by Canadians, except for theatre, come from other countries. Seventy-six percent of the books sold in Canada are imported; 97 percent of projection time is devoted to foreign films; 89 percent of sound recording industry profits go to 12 firms under foreign control that market mostly imported popular music; and finally, despite several decades of efforts to regulate television broadcasting, more than 90 percent of the dramatic presentations on television are not Canadian.[45] The same trends are apparent in the video industry, where only 30.8 percent of the $530 million in sales finds its way into Canadian pockets.[46] [Tr] "The products of American multinationals have overrun

Canadian and Quebec markets to the point where we consume more foreign than domestic products."[47]

The management of cultural industries has led to new practices in the area of creative arts and cultural production. [Tr] "But these practices also extend to the management of information production, just as they do to cultural works in general, to entertainment and to high or learned culture. The development of multimedia firms, active simultaneously in printing, radio, film, television and the plastic arts, has been an outcome of this trend."[48]

Lohisse argues that the communications industry must reconcile two contradictory tendencies, toward standardization on the one hand and toward product differentiation on the other, and invokes a production/consumption dialectic in which the audience creates the product but the product creates the audience, as well. He draws a distinction between *particular content* and *common content*, the first chosen by a portion of the total audience based on particular interests, the second associated with the search for distraction and amusement. [Tr] "Whether for fun or entertainment, the content arouses instinctive, generalized pleasure not concerned with personal development or a particular background but with immediate satisfaction, to be enjoyed here and now, not stored up."[49]

This opinion is similar to that of Habermas, who argues that mass culture sells by addressing the need for relaxation and distraction among a clientele whose cultural level is relatively low.[50] In fact, according to critics and historians of American television, any effort to please the majority of the public, taking account only of what people have in common and not of what makes them different, reduces the range of available programming and reduces it to the lowest common denominator.[51] Television thus "loses its direction" and operates according to undifferentiated content.[52]

Almost all of the average Canadian consumer's leisure time is taken up by the media: a person passes the largest part of his or her time away from work consuming the products of the mass media — television, radio, newspapers and magazines, in that order.[53] The American experience shows that time spent watching television will even increase as more and more programs become available. "According to certain researchers, this will tend to polarize viewers, with a majority limiting itself to watching 'more of the same' while a minority takes advantage of greater program variety."[54] The proliferation of channels may help to reinforce cultural ghettoization by encouraging each group of television viewers to isolate itself with its own kind of favourite programs.[55]

In addition, viewing time could be devoted to a number of diversified activities arising from the possibilities offered by new television-related

industries: video (tapes, cassettes, games); cable distribution services (broadcast or interactive services); direct satellite television; videotext (teletext and interactive video); personal computers with compact computing power supporting software for personal use.[56] These new possibilities will undoubtedly change the entertainment industry profoundly in the 1990s. [Tr] "Owing to the combined effect of 'deregulation' policy, technical innovations and the proliferation of channels, we may witness what the very conservative report of the European Broadcast Union itself calls the 'crumbling of the public broadcast monopoly' and, perhaps, the total collapse of public television."[57]

Although the "video revolution"[58] did not really get under way until 1980 — until then the video recorder[59] was used mostly for recording television programs and the market for prerecorded cassettes grew slowly — it nonetheless holds great promise for the future of cultural industries.[60] While some see growth in the video industry as increasing the film industry's competition, others argue that the people who make up the market for videocassettes do not have the same characteristics as movie-goers; their tastes fall somewhere between television and film, and are quite different from those of the movie-going audience.[61] The use of video recorders may therefore give rise to a "new type of television viewer", able to choose among the multitude of available products and to use broadcast networks making more and more use of interactive video.

The first videotape recorder was introduced in 1956 by the research unit of the American company AMPEX. This recorder, which sold for $75,000, was intended primarily for professional studio use. American experiments in producing "Instavideo", video players and videodisks were equally inconclusive.[62] The most spectacular success stories come from Japan. Sony developed the first videocassette machine (the U-matic) in 1971 and the first videotape recorder (the Betamax) in 1975. This latter system had to give way, however, to the JVC Video Home System (VHS), as did the Philips V 2000 system. By 1977, its sights already set on the European and American markets, JVC had developed an international business strategy.[63]

"The video recorder appears to be the major link in the 'audiovisual chain' of tomorrow, which will include the videodisk player, connections to several networks by coaxial or fibre-optic cable and access to databases, not to mention the household microcomputer."[64] Where television had bred a merely passive consumer of trivialized images, we may now witness the emergence of the "rational viewer".[65] Canada enjoys a substantial lead over most countries with respect to videotext systems, pay-per-view television,[66] cable networks[67] and target-broadcast satellites.[68] "The beginning of the 1980s was a new dawn for the media, with substantial changes occurring both in network technology (satellites, cable and cable broadcasting, computer telecommunications) and in

reception technology (video recorders, videodisks, teletext, video transmission, random access television)."[69]

In 1987, 1,163 cable networks were registered with the CRTC; of these, 159 were in various stages of development and not operational. The 1,004 others were owned by 498 business firms. This industry, however, is characterized by heavy concentration as well: [Tr] "The five largest operators serve about 80 percent of all Canadian subscribers."[70] Another major industrial group, pay television and telematics, is authorized to operate in this industry. In 1982, the CRTC authorized cable operators to offer pay television services to their subscribers. [Tr] "Two regional monopolies — a general English-language pay television network and a French-language pay television service — are currently authorized. In 1987 there were 1.1 million subscribers to pay television, compared with 6.3 million for basic cable service."[71] In the United States in 1988, about 8,000 cable networks were in operation, serving some 45 million subscribers.

> [Tr] "In all, the five Multiple System Operators (MSO) owning several cable networks account for close to 50 percent of all cable subscribers, an increase from 33 percent in 1984. The cable industry is therefore relatively concentrated here, in that major distributors such as Telecommunications Inc. and Time Inc. own a part of such cablecasting networks as Turner Broadcasting System Inc. At the same time, the major networks are offering more and more programs on cable."[72]

While direct satellite television does not yet exist, its development is probably imminent.[73] Since this technology extends the frontiers of broadcasting and encourages the growth of transnational television, its emergence may drastically change television broadcasting networks and cast doubt on the relevance of national industries and monopolies. [Tr] "In addition, direct satellite television will emphasize the international dimension of communications, thus possibly improving knowledge and understanding of other nations' cultural heritage, ideas, hopes and dreams, and contributing to the development of a European culture."[74] But recent data indicate that, despite the appearance of new actors on the scene, and despite satellite's potential for creating a European audience, television consumption is based more than ever on national programs.[75]

> [Tr] "Viewers from all European countries prefer programs in their own language that reflect their own culture. The few commercial satellite channel suppliers with pan-European ambitions are rapidly

*See Appendix IV, Cable Television in Western Europe*

losing steam, as is illustrated particularly well by the decision of SKY Television to close its European offices and concentrate on the British market. Europa TV, a project of several public broadcasters supported by the Commission of European Communities, collapsed one year after its inception in 1986. Today, satellites are used primarily for distributing television services to domestic markets. The economic unit for the audiovisual industry is not the unified European market of 126 million households equipped with television sets but the national market."76.

In addition, the major networks already seem to offer enough programs to satisfy television viewers. [Tr] "It is no doubt highly unlikely that current or future subscribers will be willing to pay additional charges for enlarged cable bandwidth, unless innovations can make the products offered stand out more clearly from the rest. In this respect, 'a la carte' television may change the situation."[77] The European audiovisual industry is therefore undergoing profound changes, changes that affect three major, increasingly interrelated areas: intensified competition in television, growth in the video market and the crisis in the film industry.[78]

With the rise of the new media technologies,[79] cultural industries are bound to undergo substantial changes. [Tr] "Because of the recession, capital is seeking out new areas of society for profitable investment. It sees culture, like the information industries it has partially forsaken, as possible areas for embarking on the 'modernization' of Western economies."[80] Cultural industries are thus extending their activities into the field of communications while, at the same time, the new technologies penetrate the field of culture.[81] McLuhan, for whom "the medium is the message", was among the first to draw attention to the existence of the new media and to demonstrate the importance of addressing the issue globally.[82] In the same sense, cultural industries are taking a more international orientation, a trend that is emphasized by successive waves of mergers and acquisitions on the international scene.

[Tr] "Their appetites whetted, conglomerates active in primary and secondary industries have increased their investments in cultural industries. Thus Coca-Cola owns Columbia Pictures and Tri-Star Pictures, while Gulf+Western Industries Inc. owns Paramount Studios, the publishers Simon and Schuster and Prentice-Hall, and Famous Players Ltd., one of the largest Canadian cinema chains.

"Even within the cultural industries, several firms have been energetically expanding and diversifying their holdings. Take, for example, CBS (television broadcasting, books and periodicals), MCA-Universal-Putnam (records, films and books), McGraw-Hill (books, electronic information services, business periodicals and

television broadcasting), RCA-NBC-General Electric (television broadcasting and records) and Warner Communications (films, records and books)."[83]

At the same time, international markets for culture are growing. This trend will become more pronounced with the globalization of the economy. [Tr] "Radio and television used to be seen as toys endowed with a certain industrial potential; today, in the context created by new technologies such as satellites, fibre optics and microchips, they are at the very heart of economic life."[84] However, if the industrial era saw the development of mass production, the present era is one of made-to-measure,[85] a trend already under way in the print media and television industries. More specialized, fragmented information is replacing all-purpose information. Adopting new media and services does in fact appear to induce user segmentation, as is shown by the example of conventional media since the introduction of cable television and services on demand.[86]

But, while the variety of communication vehicles and contents should, in theory, help to increase market segmentation, the age of mass markets is probably not over.

[Tr] "What is likely to occur is a gradual shift to a dual market, as the current organization of the phonograph record market suggests: a mass market, of international scope and oligopolistic structure, surrounded by a number of limited, focussed markets, national or local in nature, served by smaller firms. These smaller markets make up, both in terms of users and of renewal of forms and ideas, a necessary complement to the main market."[87]

Recent decades have witnessed the invasion of a range of communications technologies into daily life:[88] cable television, video and audio cassettes, video disks, video games, compact disc players, new kinds of telephones, personal computers, and so on. These new products and services, supplied by new firms occupying a growing part of the information market, draw attention to issues of television content and the need to create new programming.

According to predictions, a combination of cable television and computerized data processing systems will provide direct access to a wide range of information. [Tr] "Knowledge is and will be produced to be sold, and is and will be consumed to be transformed into a new product, in both cases, to be exchanged. It no longer exists as its own end; it has lost its *set value*."[89]

The gradual disappearance of the boundary between mass-market television and traditional computer technology will give rise to a "multimedia"

computer environment in which a user can receive a television program on his or her computer screen, record it on a video disk, and then send it by modem and fibre-optic cable to an outside correspondent.[90] The integration of telephone and television into the new information technologies will also make a range of services more accessible in the home.[91] Individual and collective communication vehicles (radio-video, telephone, fax, televideo, F.M. and so on) are proliferating.[92] Much is at stake for the electronics and computer industries. For example, the growing market for high definition television (HDTV) represents a potential of U.S. $6 billion in television sales by the year 2010. Moreover, the reliance of this technology on semiconductors doubles the economic stakes.[93]

In 1970, the Japanese public television company NHK (Nippon Hoso Kyokai) established a consortium for developing high definition television equipment. Today, the developers of HDTV number among them Japanese, French, Dutch and American companies. The Japanese presented MUSE (MUltiple Sub Nyquist Sampling Encoding system) to the International Radio Consultative Committee (IRCC), the standardization body of the International Telecommunications Union, in Dubrovnik in 1986. But D2MAC had been recommended as a standard by the European Broadcasting Union that same year (thanks to strong support from Germany and France, as well as from the Philips and Thomson companies), and MUSE thus found itself competing against the HD-MAC proposal.[94]

The Japanese demonstrated their equipment at the Olympic Games in Seoul in 1988. At the IRCC meeting in 1990, the selection of a standard was once again put off, while the U.S. Federal Communications Commission has postponed its own choice until 1993-1994. This battle over standards is delaying the appearance of HDTV transmitted by satellite. [Tr] "Tired of waiting, Sony and Matsushita began marketing their first high definition televisions in December, 1990."[95] Europe, however, will have to wait until at least 1995. The most important issues involving components seem to be video signal compression — where the United States, Japan and Europe are pitted against one another — and flat screens, where the Japanese seem to be ahead. [Tr] "Television in the year 2000 will be quite different from television as we know it, even television improved by satellite. Television will become an audio-video processing station in a telecommunications network."[96]

A more radical change will take place when television becomes an economical family "supercomputer" providing a vast array of interactive video and graphic services for recreation, communications and education over switched fibre-optic networks.

[Tr] "In this respect, it should be noted that the personal computer has benefitted from progress in video. Some even talk about its transformation into a 'multimedia' tool capable, through laser disks

and imaginative software, of providing all the visual possibilities of television with an improved interactive capability. However, some difficult technical problems remain to be worked out."[97]

The most immediate problem for the television industry seems to be potential competition from new, "mutant" forms of video distribution. Fibre optics, also, will have a direct impact on the cable industry. [Tr] "A new series of fibre-optic MA equipment, which has appeared since last year, should modify the construction and operation of cable systems. The principal advantage of fibre optics for the cable industry is that there is less fading."[98] Interactive video services, such as video on request, could be a major source of renewal.

The potential for cable network growth may lie primarily in telephone and data communications, and in other types of network services traditionally offered by telecommunications firms and suppliers of value-added services.[99]

By making possible a wide range of services, broadband communications networks have tremendous possibilities. The various ancillary network services can be grouped as follows: information and text services, transactional services, operator services, and public telecommunications.[100]

[Tr] "Static media (newspapers, books, photographs) and dynamic media (radio, film, discs, television) will give way to dynamic, interactive media."[101] The broader-based technologies would not create a larger clientele, however, but would intensify use. [Tr] "The proliferation of programs, networks and receiving devices will increase the time and expenditure people devote to audiovisual leisure activities.[102]

Patrice Flichy draws a distinction between industries dealing in cultural products (such as discs, books, film and video) and "stream" industries (television, radio, print media), similar to the new information industries, which inform, educate and entertain at interface between culture and information technology.[103] We can, however, forge a link between these traditional cultural products and the new information industry. Many experts predict that the emergence of the new information industries may bring product diversity to an end, as differences between film, television, print media, computer games and interactive services, all increasingly distributed or produced by multimedia firms using *multi-product* marketing strategies, will tend to disappear.[104] These new products and services have aroused a great deal of concern:

"The changing situation is bringing about a gradual alteration in the way we think about the property element in information and entertainment, and about the cultural demarcations between genres. At one level, the change consists in a series of publishing devices and promotional arrangements; at deeper levels, it must alter our

ideas about what constitutes a 'book', what separates an 'academic work' from a popular one, indeed what body of data should properly be considered a book by an 'author'."[105]

## 1.2 New information services

With the more widespread use of NITs[106] comes an increase in the amount of information to be managed and, as a result, the growth of an industry of information as a new consumer product.[107] Considering information as a process of data acquisition and transformation, Jacques Perrin[108] reported in 1984 that in industrialized nations, data handling accounted for between 40 and 50 percent of the value added from transborder information flow.

A number of new products — text, numerical data, sounds and pictures that can be recorded, saved and exchanged electronically — are now emerging in this new information industry.[109] These products take the form of databases that make coded information available in the numeric language of computers. Access to this information using microcomputers is complete and immediate. According to E. Rogers, the main events shaping the electronic era were the appearance of the vacuum tube in Palo Alto, California in 1912, the transistor at Bell Laboratories, the microprocessor in 1971 and the first telecommunications satellite, Westar I, in 1974.[110] Developments in computer* and telecommunications** technology have increased the significance of transborder data traffic, since computerized files and telecommunications networks[111] have made vast bodies of data and information available in real time to users at a distance. In addition, the new media have given rise to a *videocommunications* model characterized by a uniform communications language (that of computers) and greater interactivity.[112]

Since the information field is so vast, information services are generally divided into two classes: those intended for the public at large (such as electronic publishing, public databases, electronic libraries, games and cultural information) and those of a private or confidential nature for specialized professional or commercial use (such as statistical, financial, strategic or economic analysis services, private surveys, scientific and commercial databases). A number of firms and agencies have begun to supplement or even replace printed media such as newspapers, magazines and specialized journals with commercial databases as the source of their specialized information.

*See Appendix V, Major Discoveries in Computing.

**See Appendix VI, Important Dates in Telecommunications.

The number of databases, providing information on all areas of human activity and in all subjects from the stock market to horoscopes, has been estimated at 3,000. In fact, the new information industries (software and data processing) have grown more rapidly than the GDP: sales grew by a factor of 7 between 1974 and 1985, from $300 million to $2.1 billion in current dollars.[113]

[Tr] "While at the dawn of modern times, information was paid for based on its useful value or its contents, with more widely available postal service and later on the telegraph, telephone and mass media, the price for transporting information has been set independently of the meaning of the information. Information was then seen as having an objectively quantifiable volume, measured in bits."[114]

The market for databases was originally made up of professional clients (such as business people, researchers, managers and those in the liberal professions) prepared to pay for information that gave them time savings and productivity improvements.[115]

"The best known Canadian vendor is I.P. Sharp Associates, a world-class computer time-sharing firm that distributes over 100 electronic databases concentrating on economic indicators and that operates in some 20 countries around the world. Major U.S. database distributors include DIALOG Information Services (a subsidiary of the Lockheed Corporation), Dow Jones News/Retrieval and CompuServe (the two business information vendors with the largest number of subscribers), and Mead Data Central, which dominates the market for on-line legal information services. A similar service is offered in Canada by QL Systems."[116]

Private Canadian electronic information producers sell primarily to private firms and deal principally in economic, financial and legal information and in news. Information services are provided using a variety of means: cable (Videoway), telephone (Alex), mixed networks (Consortel) or private systems connected to the telephone network (Terfodor and N&N).

In addition, the exchange of computerized business transaction data is an electronic information service of increasing interest to Canadian firms. Through the EDI (electronic data interchange) protocol, businesses using differing computing equipment can *electronically* send each other business documents, perform commercial transactions, and the like.[117] According to the California company Input, computerized data exchange will account for sales of $1.9 billion between 1987 and 1992, with predicted annual growth of 88 percent.[118] The president of the EDI Council of Canada (an association of more than 300 firms) has claimed that this country is catching up to the United States with

respect to the EDI standard. The Council estimated that 600 Canadian firms already used EDI in 1988, at which point they would be converting to EDI at a rate of 500 percent, compared to 40 percent in the United States. With the free trade agreement, EDI should play a major role in commerce between Canada and the United States.[119] Following a proposal made public jointly by the Chambre de commerce du Montréal métropolitain and the EDI Council of Canada, EDI World Institute was recently established in Montreal. According to the EDI Council of Canada, growth in EDI usage over the next two years will range from 25 percent for commercial documents to 150 percent for direct payments.[120]

Jim Rohmer has presented an overview of what he considers to be the principal trends in industrialized nations with respect to changes in the workplace.[121]

"Two powerful economic changes are behind this. The first is the drive to automate manufacturing. ... Systems automation is quickly becoming the only way for them (big manufacturing companies) to make a profit; ... a study by GM in 1981 showed that half of the money it spent on factory automation went for communications.

"The second change is happening in the new workplace of the people the factories no longer need. The jobs done by office workers acting as individuals have been automated (by, e.g., word processors), but office communications have hardly been automated at all. This matters a lot for productivity."[122]

The development of artificial intelligence has also touched private business. The American software firm McCormick and Dodge, of Boston, may soon be marketing a system under which computers can react to vocal commands for administrative purposes.[123] Expert systems and interrogation in natural language will be used more and more in management and information systems.

According to Bruno Lanvin, the computer market is currently undergoing fundamental qualitative changes: in the United States, between 1980 and 1987, the share taken up by hardware decreased from 55 to 42 percent while that taken up by systems (notably software) increased from 18 to 37 percent.[124] In Canada, 633 firms are active in software development and marketing. However, among the 25 most important firms in the Canadian software industry, 11 American-owned companies account for 48 percent of total sales of $902 million.[125] This trend is similar to that prevailing in cultural industries, which are also largely dominated by American firms.

Although the microcomputer revolution of the last decade has not brought about the electronic or paper-free office, more extensive use of word processing and desktop publishing has without question changed the appearance of printed documents. The field of information storage has even seen the emergence of "digital paper" for storing information, which serves the same purpose as CD-ROM and other hard optical memory formats.[126]

Another innovation, a new home and office device combining personal computer, compact disc player, fax and telephone, is now available in Japan. More than 10,000 of these FM TOWNS have already been sold in the consumer electronics market. The business world is the next target.[127] In addition, portability is gaining in popularity among microcomputer users. The portable computer market grew by 36 percent in 1990 and another 36 percent in 1991, even though annual growth in the overall microcomputer market is only 18 percent. The market for portable computers is thus growing twice as fast as the personal computer market in general.[128] However, the U.S. portable computer market, still embryonic, accounts for only 7 percent of personal computer sales.[129]

The Psion Organizer III, manufactured by the British firm Psion, is a pocket-sized personal computer. With a library of more than 200 programs, it is as much a true all-purpose microcomputer as any desktop or portable model.[130] In the same vein, Northern Telecom is carrying out a market study on a wallet-sized cordless telephone for use at the office, at home or in traffic.[131]

At the same time, Canadians are turning to the cellular telephone at the rate of from 6,000 to 8,000 new subscribers each month.[132] All the advantages of integrated office automation are available in a vehicle equipped with a cellular telephone, fax, microcomputer and modem; firms are more and more likely to set up such mobile branch offices to manage transactions in real time. With the conversion of the telephone system to numeric technology, telephone companies will be able to offer a variety of voice and data transmission services and will have available a means to manage the network effectively and economically.[133] BCE Mobile, operator of a cellular telephone network, intends to establish an international presence, mainly in Europe and in developing countries.[134]

One very popular innovation, the facsimile (or "fax"), was widely adopted in a very short time: in the United States, 190,000 faxes were sold in 1986, 420,000 in 1987 and 700,000 in 1988. But the standard of high-performance Japanese companies, with one fax per 22 employees, is still a long way off.[135] Several experts predict that faxes will become even more widespread, both at work and at home. Bell Canada has been installing public faxes at a number of locations in metropolitan Montreal. In the United States, there were 750 public faxes in 1986, 10,000 in 1988 and probably 30,000 this year.[136] About 30

public faxes are being installed throughout Quebec; within a year this number will probably reach 200.[137] In the near term, these self-service fax facilities, available for the most part in hotels, airports, courthouses and shopping centres, are intended for a business and professional clientele. In fact, between now and the year 2000, faxes will probably become household items, as common as the microwave oven or the VCR. At present, 218,000 Canadians are fax subscribers.[138]

The increasing use of portable personal computers, cellular telephones, electronic mail and facsimile is fundamentally changing the organization of work. A new concept, telecommuting, is becoming popular with many workers; in the United States, there are now about 20,000 people working full time in this way.[139] The first building designed for telecommuting, constructed in the United States in a suburb of Seattle, accommodates employees from many different companies communicating with their respective central offices using telephone, telematics and occasionally even video.[140]

Computerization will have a considerable influence on the development of new information and consumer entertainment services. "Within this office 'cross-subsidization' of cultural industries, there are three main developments bringing new forces into cultural industries: the extension of office products for home use, complementary office and consumer market support for new product development and corporate jockeying over product and service development."[141] For example, services oriented to the mass market are experiencing significant growth. [Tr] "Consumer information services such as teleshopping, sports news, hobby information and electronic bulletin boards accounted for $77.8 million, or 5 percent of the total, in 1984; this is expected to increase rapidly to some $470 million, or 13 percent, by 1989."[142]

Among such firms offering these services in the United States are CompuServe and Dow Jones News/Retrieval, which between them have more than 250,000 subscribers, and The Source, which has about 60,000.[143] The first teleshopping service, Compustar, which operates 24 hours a day and offers 30,000 different products, was launched in the United States in the early 1980s. In 1985, the Home Shopping Network, offering 5,000 different products and services, had 8 million subscribers, while the Usenet network linked together American and Canadian users.[144] The first experimental videotext system, Prestel, appeared in England in 1979.[145]

But without doubt the most popular service is Minitel in France, with more than 2.5 million subscribers. France accounted for an estimated 90 percent of all videotext terminals installed in Europe in 1985.[146] In addition, France initiated a videotext pilot (the Redoute) in the early 1980s, and the Caditel service (via Minitel) in 1985.[147] France should maintain its leading position in the world market for some time. "In France, the transaction side of videotext (teleshopping

and telebanking) is being developed through a smart card, a plastic card with an embedded microprocessor. The aim is to make smart-card readers available in public places and on the Minitel terminals."[148] Videotext as a public service is generally more advanced in Europe[149] than in Japan or the United States.[150]

> [Tr] "According to predictions, European sales should rise from $350 million in 1985 to $1.6 billion in 1990. French sales alone should quintuple and reach $1.25 billion in 1990, compared to $233 million in 1985. While U.S. videotext sales should reach $1.5 million by that date, so that commercial prospects for videotext in Europe and the United States in 1990 appear to be much the same, many significant differences are hidden behind the figures. In the United States, where the definition of videotext is very broad, growth is expected in automatic command recording systems, general-purpose information systems internal to firms and businesses, and domestic transaction-related services. There are at the moment no major national networks."[151]

Bell Canada began marketing its Alex system on a trial basis in Montreal in the fall of 1988. At any time of the day or night, subscribers can obtain a wide range of electronic services and information such as shopping, bank transactions, lists of restaurants and shows, financial services, and special news bulletins. The following systems were also scheduled to become operational during the same period: Minitel (CETI), which would give access to modified statistics from the firm Iceberg, LTA (Longpré, Thavard et associés); Vidéoway (Groupe Vidéotron); and Infodoc, which would transmit data in real time or off-line.[152] These systems have spread much less quickly than expected owing to financial difficulties and an inadequate analysis of needs.

One of the main differences between Vidéoway and Alex is that the former uses the coaxial cablecasting network while the latter uses the telephone network. As a mass broadcasting system, as opposed to a switched network, Vidéoway has advantages (it makes transmission of large quantities of information to many subscribers easier) and disadvantages (selective communication and exchanges between terminals are more difficult).[153] Vidéotron argues that its system is better suited to low-cost, mass-market service than is the telephone network. Using Vidéoway interactive television, now in operation, the sequence of events in a program, and even its content, become interactive.  The user can even choose among alternative camera angles.[154] In the fall of 1989, Vidéotron began replacing its Vidéoway receivers with digital terminals (TVN) capable of providing four services: cable television and decoding of pay TV, interactive television, videotext and video games.[155] Vidéotron is expected to try to penetrate markets in the northeastern United States, Britain and France.[156]

World sales of telematic devices amounted to $90 billion in 1980 and $200 billion in 1987 and should reach $300 to $400 billion in 1993, with 35 percent of these sales in the United States, 20 percent in the European Community and 11 percent in Japan.[157] A distinction has been drawn between two types of telematics: mass-market telematics, such as videotext (which depend on entertainment and consumption services) and groupware, intended to bring together professionals or amateurs interested in various subjects and to encourage active participation in content creation. Groupware is largely inspired by French services such as Thélem and the SIGs (special interest groups) of American services such as CompuServe.[158]

In addition, by integrating family television with the computer, multimedia applications should add a new dimension to microcomputing.[159] Many opportunities exist for multimedia in the family entertainment market, integrating the computer with functions such as stereophonic sound, videocassettes and compact discs. The "de-massification of the masses", postulated by Alvin Toffler and others, becomes a reality in this field, where personalized products make up an "interactive household".[160]

Daily life in the domestic sphere will undergo important changes when the new media are introduced. Among the new functions to be found in the interactive household of the future will be a number of services for leisure, telecommuting, teleservice (such as telebanking and teleshopping), security, and so on. [Tr] "Any discussion of the home of the future, or the electronic household, involves all its objects: 'white products' (such as the washing machine and refrigerator) and 'brown products' (audio-video, computers and the telephone) plus networks for connecting all of these."[161] Most western households are expected to have two or three display screens in the 1990s. Communications protocols for household networks, known as *Home Area Networks* or *Home Buses*, have been developed in the United States and Japan.[162]

The first *smart house* in North America was developed in 1987 as an energy distribution and communications network intended, in its first phase, for the new residential housing market. The smart house will give its occupants the means to install and use intelligent functions for meeting their needs. The smart house will be automatic in that it will use computer systems to send and receive messages from one place in the house to another, and thus operate by itself with a minimum of human intervention. Nine million of these houses are expected to exist in North America by 1997.[163] Discussion should focus, however, less on the technical aspects of the new media than on the new lifestyles and habits[164] they will introduce.

### 1.3   Multimedia conglomerates and global networks

The phenomenal growth in sales of computer and communications products and services has been accompanied by a clear trend, apparent for several years now, toward industry concentration.[165] On the international level:

[Tr] "The United States is unquestionably the world leader in the database industry. American publishers and distributors account for more than half of total on-line database and access services. According to a study by IDC/LINK, sales of information distributed electronically amounted to close to US \$1.6 billion in 1984. These sales are predicted to increase to close to \$3.6 billion in 1989; the resulting annual growth rate of 17.8 percent is far higher than that for printed materials in either Canada or the United States."[166]

The high-technology electronics and communications industry (telecommunications and satellite communications) is almost entirely under the control of three large banking groups: Morgan Guaranty Trust, Chase Manhattan Bank and First National City Bank. The professional services industry is also highly concentrated, with the eight largest firms (Reuters, Dun and Bradstreet, Quotron, TRW, Mead, Telerate, McGraw-Hill and Dow Jones) accounting for 70 percent of sales; the other 1,500 service suppliers divide up the rest.[167] This phenomenon points to a fast-growing industry, that of financial and stock market information services.

"As has been documented elsewhere, the international flow of communication is largely controlled by a small number of Western transnational industrial conglomerates. The majority of the world's communication equipment (satellites, radio and TV sets, telex, etc.), patents on communication technology, and communication projects (films, TV programmes, comics, etc.) originates in what can be called the information industrial complex. This complex steers the global flow of communication because of its access to finance, technology and marketing: the three pillars of power in the present world order."[168]

The majority of Canadian on-line database producers are public and parapublic agencies (such as Statistics Canada, the Canada Institute for Scientific and Technical Information, and Consumer and Corporate Affairs Canada) who supply scientific, technical, legislative, legal or statistical information. According to Evans Research Corporation of Toronto, the compound annual growth in the Canadian market for database management systems (DBMSs) should reach 18 percent between 1989 and 1994.[169] Although this market is dominated by American systems (such as DB2, Oracle, dBase and Progress) a number of Quebec DBMSs, such as SSM with SSM-Protocol,

Info Centre with SpeedWare, Mage with SiMage and InformII with Edibase have been developed.[170] In the area of specialized information sources, SPORT is a sports-related database produced by the Sports Research and Development Centre in Ottawa. SPORT is currently distributed by the following services: BRS and DIALOG internationally, DIMDI in Western Europe and CAN-OLE in Canada.[171] Researchers can use the Canadian direct interrogation service (CAN-OLE) to consult a wide range of scientific databases from Canada and other countries.

This same trend toward concentration is apparent in the United States, where several large publishing houses, such as McGraw-Hill and the New York Times, have entered the database market; the Globe and Mail, with Info/globe, and Southam News, with Infomart, have done the same in Canada. In addition, the major book and periodicals publishers now see electronic publishing as a market with strong growth potential and are attempting to establish their own distribution networks. For this reason, McGraw-Hill recently purchased Data Resources and Reader's Digest bought The Source not long ago. More recently, Reuters, the information giant, entered the area of electronic information search and transaction services by purchasing I. P. Sharp.[172] Several large companies whose activities are not directly related to the distribution and sale of information have also entered this area. For example, telephone companies may offer electronic directory services or (as in the case of the iNet 2000 system from Telecom Canada) act as access channels.

According to Danic Vice president of Northern Telecom Limited, a new social and economic order based on telecommunications (see Table 1) will appear in the 21st century. [Tr] "This networking of the economic world was initially developed by a number of multinational electronics and computing firms who, in doing so, separated production, distribution and management functions."[173] The Integrated Services Digital Network (ISDN) represents an important step toward the establishment of universal integrated networks.[174] [Tr] "One important function of telecommunication is to provide a substitute for transportation: instead of moving people to ideas, telecommunication moves ideas to people."[175] Similar telecommunication systems exist in Europe and in the United States. Japan is in third place worldwide, while other countries, particularly developing countries, lag far behind.[176] While the integration of computers into these networks has opened a new market for telematics services, the new broadband transmission technologies — fibre optics, satellites and microwaves — will be the basis for equally fundamental changes, ushering in a new audiovisual and videophonic era.[177]

France, for instance, has begun to implement the largest electronic mail system in the world, Minitelcom, on the same computers used by the French electronic telephone directory. [Tr] "When put into service in the fall of 1988, Minitelcom will be capable of serving several million subscribers annually,

making it the size of a national telephone network. (CompuServe, the largest American electronic mail system, has 'only' 380,000 mailboxes)."[178] Professional users are the market of choice for the new communication services because of the growing importance of information as a production resource.

> [Tr] "This new generation of infrastructures is only just beginning to appear. The first fibre-optic link between two large American cities (Washington and Boston) was put into service by AT&T in 1983; the French PTT inaugurated its first experimental urban fibre-optic wiring at Biarritz in 1984; and the first complete wiring of a city with fibre-optic cable will take place in Montpellier in 1989. The Japanese are currently developing a prototype of a 21st century 'wired city' in a suburb of Tokyo."[179]

Teleglobe Canada, France Télécom, OTC and the Société internationale de télécommunications aéronautiques (SITA) will jointly start up and operate a new service of mobile aeronautical telecommunications by satellite.[180] In addition, Telecom Canada has decided to combine its services into a single network, the Intelligent Network. This new network will offer four services: Envoy 100 (electronic mail), iNet 2000 (information management and access to databases), Exten (voice mail) and RouteCommerce (electronic data exchange).[181]

In Canadian telecommunications,[182] the Montreal Telegraph Company (1847) was the country's first large telegraph company. By 1930, Canada had two telegraph networks, operated by Canadian National and Canadian Pacific; CNCP introduced telex to North America in 1956. Alexander Graham Bell originated the idea of the telephone in 1874 and the first long distance call was made two years later. The Bell Telephone Company of Canada was founded in 1880. "In 1901, Marconi received the first transatlantic radio signal, which was transmitted from England and received at Signal Hill in St. John's, Newfoundland."[183]

In 1958, Teleglobe Canada (created in 1949 and known as the Canadian Overseas Telecommunications Corporation until 1975), inaugurated the most extensive microwave system in existence at that time. It has since become the backbone of the Telecom Canada system. Teleglobe, which provides transatlantic telecommunications services, was sold by the federal government to Memotec Data Inc. of Montreal in March, 1985 and placed under the regulatory authority of the CRTC. Telesat Canada was created in 1969 to integrate satellite technology into the Canadian telecommunications system. There are now two national telecommunications networks, Telecom Canada and CNCP Telecommunications. Telesat Canada provides a third network for certain services. In addition,

## TABLE 1
## TELECOMMUNICATIONS: OUTLOOK
## FOR THE YEAR 2000



Source: CATY, G.-F. and U. HERBERT, "Les télécommunications: Nouvelles frontières de l'Europe", in *Futuribles*, no. 83, December 1984, p. 30.

[Tr] "Both Telecom Canada and CNCP are converting existing analogue networks to digital ones and are increasing their use of inter-city fibre-optic systems. The member companies of Telecom Canada are building a 7,000-km fibre-optic network that will reach from Halifax to Vancouver. It will be fully operational by the end of this decade."[184]

CNCP with its Telex, and Telecom Canada with its TWX, operate two competing switched telewriter services. Each operates national switched data networks, as well; two of the largest of these are Infoswitch and Datapac. Telecom Canada also offers two other digital data networks: Dataroute (the world's first digital data network) and Datalink (designed for small– and medium-sized users). In addition, Telecom Canada has begun to offer the Megaplan series of services (Megaroute, Megaplan and Megastream) for integrated voice, data and picture transmission on a digital network, while CNCP offers the MACH III service, combining traditionally distinct voice, data and picture transmission services into a single telecommunications network. Telesat Canada offers the digital satellite transmission services Anikom 500 and Anikom 1000, while Teleglobe Canada offers Globesat, a new generation of private business services.

Among other recent innovative services are Service 900 (access to recorded messages and to surveys), LEXIBAR (an information service intended for managers), ANIKAST, and RadioNet 1. Several electronic mail services have also been set up over the last few years: Envoy 100 has been joined by EnvoyPost, Telepost, Globefax, IntelPost, Teletex and Globetex.

A recent report from the FAST group summarizes the ongoing technological changes as follows:

"New information and communication technologies have overcome time and distance. Masses of data flow across the borders in different signals — analogue or digital — and through different media — post, telex, telephone, data networks .... This development is the result of the combination of telecommunications and data processing and is clearly demonstrated by the advent of satellites of a composite type which will equally well transmit voice, messages, pictures and sounds and provide a powerful instrument of global communication."[185]

Writing about the pace of innovation in the new technologies, E. Rogers calls attention to the shrinking time span not only between each new invention, but also between an invention and its spread. In addition, he notes that a new technology may change what came before in various ways but does not replace

it. "So the history of communication is the theory of 'more'. Each new medium may change the function of previous media, but they do not disappear."[186]

According to A. E. Cackwell, an infrastructure of telecommunications-based information services is essential to an information society.[187] In this respect, because of the new economic role it is called upon to play, the telecommunications system is on the front lines of global technological competition and will be a major factor in the future of the world trade environment for services, now taking shape as part of the GATT (General Agreement on Tariffs and Trade) negotiations.[188]

Despite a number of difficulties, the RACE (Research in Advanced Communications in Europe) program is intended to develop a Europe-wide telecommunications network infrastructure for integrated, network-based communications services. Development of mobile communications services has also accelerated throughout Europe in the 1980s.

> [Tr] "These services have gone from low-capacity, operator-controlled networks to high-capacity cellular radiotelephone networks carrying a wide range of services. Thanks to progress in digital technologies and to work undertaken at the initiative of the Special Mobile Group of the Conference of European Postal and Telecommunications Administrations, a Europe-wide digital network will soon exist. Other mobile services (such as Telepoint) and intercity radio networks have been developed to cover a number of market niches and ease congestion problems. Consequently, personal communications networks could constitute the most serious threat to fixed communication networks."[189]

Three consortia plan to provide worldwide aeronautical communications by satellite, and both Inmarsat and the European Space Agency are developing mobile land-based services for data transmission and voice communications, which should be in operation in the early 1990s.

Competition is likely to be fierce among the international communications giants seeking to establish and control all-purpose "global networks". The magazine *Business Week* indicates that large international telecommunications firms such as AT&T, Kokusai Devshin Denwa (Japan) and British Telecommunications are in a race to upgrade their networks.[190] Existing telephone lines must be replaced by digital data lines with high information capacity. AT&T, British Telecom and France Télécom have just laid a transoceanic fibre-optic cable between Europe and North America, capable of simultaneously carrying 40,000 telephone conversations in voice, data or video form. This cable promises to be a key link in the world's intelligence network.[191]

While firms such as IBM, DEC and Unisys have already begun to use their own private electronic mail networks for most of their international communications, gradually abandoning conventional telephone lines,[192] cellular telephones are becoming more and more a part of the telephone system. In addition to voice communication, facsimile messages can be sent and received using the cellular network, and data links can be set up with a central computer, from any marine or land vehicle. This capability has given rise to the notion of the "mobile office" or "office of the future".

Developments in telematics and office automation, and the proliferation of specialized business networks and information services, stress the critical importance of telecommunications to information technologies and to the economies of industrialized countries. However, ever since the beginning of the 1970s, the industrialized nations' leadership in the world information marketplace has been challenged. According to Elmandjra,

> [Tr] "A combination of the quantitative increase in information, a qualitative growth in knowledge and astounding improvements in information processing capacity has encouraged a redistribution that has made the rich richer and the poor poorer in a much more insidious and complex way than the unequal distribution of capital."[193]

Anderla has shown that technical information has begun to grow faster than purely scientific information, owing to the appearance of new scientific disciplines and to the fragmentation of other disciplines into several specialties.[194] A number of activities — education, training, culture, mass communication and medicine — encourage information transfer. But the structure of technological exchange, which often occurs by means of the technical information accompanying the sale of industrial equipment, is not neutral. Through technology transfer,[195] developing countries acquire not only the technological processes (machines, operating procedures, know-how) but also the work organization and social relationships typical of capitalist industrialized nations.[196] In this way, developing nations end up adopting social relationships typical of the world economy in general. [Tr] "But this can hardly be avoided since, essentially, the newer and more dynamic industries sell products involving grey matter, depend on contributions from science and technology, and require highly trained scientific and technical personnel. Such industries lend themselves to control by developed countries."[197]

In summary, thousands of databases and computer files store, process and make available in real time a large amount of sensitive information. The most powerful nations are in a position to amass more information about the less powerful nations (for example, on natural resources, economic potential, or the financial, health, social or political situation) than the weaker nations have about

themselves.[198] The Canadian information industry must therefore face the challenge of international competition, particularly from international multimedia firms controlling a large portion of the global cultural and electronic mass media market. The problem of international freedom of information had already arisen at the UNESCO Conference at Nairobi in 1976, at which the nonaligned nations demanded a "re-stabilization" of information flow and pushed for a "new international information order".

The industrialized nations are thus engaged in a race to control the new information technologies. The electronics industry* is dominated by large firms from the most highly industrialized countries, armed with international development strategies. [Tr] "Sales of the 100 largest electronics firms account for three quarters of world production".[199] While there is a larger number of American firms, with overall revenues greater than those of Japanese or European firms, there are six Japanese, two American and two European firms among the world's ten largest firms.[200]** Very early, in France, the Nora-Minc report[201] expressed concern about the organization of a collective memory by American databases and proposed that information storage be considered an issue of national sovereignty.

> [Tr] "As an informational commodity essential to productive power, knowledge is and will be a major — and perhaps the most important — issue in the world competition for power. The United States, which fought first to control territory and then to control the use and exploitation of raw material and inexpensive labour, may conceivably fight anew to control information. This opens a new field for industrial, commercial, military and political strategies."[202]

In the age of the information society, domination is not only economic and political but also sociocultural — associated with the means for international distribution of knowledge and with the potential for access to science, technology, culture and information.

This brief overview illustrates the size and complexity of the information industry, and the way in which its development is linked to advances in new technology. The stakes are high for all nations involved but are difficult to control because the industry is highly concentrated. The information industry must deal not only with issues of economic and social development, but also with issues of political and cultural sovereignty — a fact that serves to complicate the analysis.

*See Appendix VII, Concentration in the Electronics Industry.

**See Appendix IX, The 100 Largest Electronics Firms Worldwide.

# 2
# SOCIAL ISSUES

*[Tr] "We still know little about information as a commercial commodity or consumer good, a constantly renewable social resource the value of which is created or established by means different from those for other goods and resources."[203]*

Information society, programmed society, media society, digital society, "telepower" — these concepts all describe the profound changes brought about by the progressive integration of computer and communications technologies. The growing presence of these technologies is evident from the explosion of information, through the new media, into all spheres of life — economic, social and cultural. "It is redefining global power relationships, changing national identity, speeding up the pace of our lives, and altering in basic ways how and where we live, work and play."[204]

## 2.1  Deregulation and the public interest

The explosion of electronic information services can be traced to a major development — deregulation[205] of the telecommunications industry — in Japan, Europe, the United States and Canada. Three characteristics common to the process of deregulation in the United States and Europe can be identified:

- the appearance of new operators in the field of broadcasting;
- a smaller role for government in system organization (for example, the reduction in regulatory powers of the FCC in the United States and the abandonment of the monopoly on programming, and in some cases on broadcasting, in Europe);
- the gradual replacement of a doctrine based on the public interest by a doctrine based on market forces.[206]

Deregulation, which began gradually in the United States during the 1970s and accelerated during the 1980s, led to the dismantling of AT&T and the emergence of competing service suppliers. "In the United States, however, service competition has been limited to new services. Multiple entities have been authorized to provide video services or INTELSAT Business Service to support digital communications requirements for businesses."[207]

According to Globerman, the American telecommunications industry is regulated by the FCC, the Public Utility Commissions (PUCs) of each state and the Federal Court in charge of implementing the Modified Final Judgment according to which AT&T and the Bell System Operating Companies (BOC) have been separated into distinct units. In general, intrastate communications services are not regulated by the FCC but by the PUCs.

"AT&T, the main international communications firm, is subject to regulatory control by the FCC and the PUCs while other service suppliers, in particular MCI, Sprint and AllNet, are not subject to control by the FCC but only to less strict regulation by the PUCs. The long distance communications sector is dominated by AT&T, which generates close to 75 percent of revenues."[208]

In the 1980s, Great Britain took the lead in the Western European deregulation movement, which was characterized by the development of new services and telecommunications systems as well as by a reduction in rates for international business communication.[209]

"This was implemented in two stages. Firstly the 1981 *Telecommunications Act* was passed and, in line with the Carter report on the Post Office, postal services were separated from telecommunications. The former remained as the Post Office and the latter became British Telecom (BT).

"The second stage was the 1984 *Telecommunications Act* which enabled the transfer of BT assets to the government as a prelude to privatization."[210]

On one fundamental point West Germany's telecommunications reform was closer to the French reform than to the British. [Tr] "Unlike England, there was to be no new independent regulatory body responsible for actually carrying out liberalization."[211] Instead, a compromise was reached to pursue two objectives — encourage competition and preserve the public infrastructure.

The European Economic Community (EEC) leads the movement toward the liberalization of telecommunications services in Europe. The EEC has established the RACE (Research in Advanced Communications in Europe) program to set up an integrated broadband communications (IBC) network and encourage communications integration. The EEC wishes to promote the competitive delivery of value-added services, as well as the establishment of a digital infrastructure for the simultaneous carriage of telecommunications and audiovisual services.

[Tr] "In the United Kingdom, the government has been a staunch supporter of competition since 1984; this has led to a duopoly for basic services as well as the authorization of several suppliers for mobile services and multipoint satellite services. Sweden, on the other hand, has never used a monopolistic framework for providing telecommunications services and, while not a member of the European Community, is in a good position to take advantage of opportunities offered by the single market. West Germany has

recently embarked on a liberalization program; in France, although reform is imminent and despite substantial political and financial control, consumers are satisfied with the quality and range of services of France Télécom. Other countries, such as Greece and Portugal, are still facing the problem of modernizing their networks, while Italy is still trying to rationalize its structure for offering complex services."[212]

In Europe, economic liberals and interventionists have disagreed over the place and role of the public sector in the economic organization of the telecommunications industry. This controversy has split the EEC[213] between member nations from the north (United Kingdom, West Germany, Denmark and the Netherlands) and the south (France, Italy, Spain, Portugal and Greece).

[Tr] "This dispute is surely based on ideological differences apparent, over the last ten years, in the contrast between the British decision to privatize British Telecom and to open their industries to foreign capital and the French preference for developing projects around governmental decisions and relying on a strong public presence."[214]

The OECD has noted the same liberal and interventionist orientations in the information sector.

[Tr] "Governments in Europe and Japan have implicitly or explicitly encouraged the establishment of intersectoral links among hardware, software and service suppliers. This study shows that, in some cases, videotext has developed in response to clearly defined public policy intended to stimulate demand. In other cases, governments have preferred to let market demand direct private sector initiatives."[215]

Regardless of approach, however, the telecommunications industry, now open to competition in a market economy, has come to form one of the principal economic pillars of industrialized societies. Although there is no consensus as to deregulation and equipment standards, the liberal approach, as adopted by the United States, has stimulated competition by encouraging the formation of a variety of open markets.[216]

[Tr] "There are many immediate consequences of deregulation: stiff competition in long distance communication (although AT&T still controls 95 percent of the market); short-term creation of a vibrant telematics market; confrontation between AT&T and IBM in each company's traditional market; opening of the American equipment market to AT&T's competitors; and the appearance of AT&T in a world market from which, until now, it has been excluded.

"In Europe, new alliances have been struck: AT&T-Philips, AT&T-Olivetti, a new IBM strategy for the European market."[217]

However, policy governing the development and promotion of the telecommunications industry remains a concern. For example, the ten EEC countries intend to pursue a strategy of economic and social renewal through telecommunications investments. [Tr] "Implementation of European telecommunications policy is important for two reasons, both equally compelling: so that successful technological development in Europe can continue and, as a result, so that telecommunication becomes the catalyst or, if one prefers, the spearhead of the Community's industrial renewal."[218]

The governments of several countries have turned to a telecommunications monopoly in a more or less straightforward attempt to shore up their national electronics industries. [Tr] "This 'championing' of the national industry has guided policy in the principal European countries for a long time, although certain countries occasionally stray from it. Each country has tried to cultivate, in each of its major electronics industries, one company capable of becoming large enough to take on foreign competitors."[219] The policies of industry and government have encouraged growth not only in the three main fields (electronic components, computing equipment and telecommunications), but also in software and consumer electronics.

As part of its "Japan Inc." policy, Japan has undertaken a wide-ranging, $120-billion project, the Network Information System (N.I.S.), to establish a common framework for Japanese companies over the next 20 years. This innovative MITI (Ministry of International Trade and Industry) initiative coordinates industrial and export promotion policy, and facilitates industrial restructuring by encouraging firms within the same industry to form associations.[220] Japan has chosen a solution half way between the American approach based on competition and private initiative, and the European state intervention model. The main sources of innovation in the Japanese electronics industry have been NTT (Nippon Telephone and Telegraph or Nihon Denshin Denwa Kosha), operating domestically, and KDD (Kokusai Denshin Denwa), operating internationally.[221]

Canada has also taken a position between these two extremes, and the development of its telecommunications industry has followed a middle road between European-style public monopoly and American-style liberalism. "As telecommunications and broadcasting represent two of the politically sensitive sectors in national life, governments have generally structured these sectors as state enterprises, regulated monopolies or highly regulated industries to ensure that multiple political, social and economic objectives were attained."[222] In July 1987 the Minister of Communications announced a Canadian telecommunications policy built around three main objectives: universal access

to reasonably priced basic telephone service, an efficient telecommunications network infrastructure and the creation of a viable, competitive market for telecommunications services and equipment in all regions.[223] While the idea of public service has been central to telecommunications policy, and while activities in the industry have traditionally been regulated by the CRTC,[224] telecommunications have gradually been moving from public to private hands, owing to the stagnation of public networks and the growth of private networks.[225]

At the same time, a consensus has been building in favour of the free international circulation of information and data. As early as 1983, however, the Ministère des communications du Québec was stressing the importance of drawing a distinction between raw data and information. [Tr] "Conflicts between nations may arise when data are transferred through telecommunications, either by processing firms or (especially) by multinational companies, and subsequently returned in processed form as information."[226]

The rise of the information sector and of transborder data processing raises a number of economic, political, sociocultural and national sovereignty issues that are only beginning to be understood. For example, the appearance of database services charging a fee for information calls into question the traditional view of information transport and processing as a "public good", to be available almost free of charge. [Tr] "In this area as well, the production of homogeneous, widely circulated information tends to be replaced by customized information available as network services, and sold at prices that reflect user needs as well as the often considerable financial investment."[227]

Telecommunications deregulation has caused the notion of public interest[228] to be reviewed and redefined in favour of the liberal view[229] stressing the consumption of new telecommunications services and the reconsideration of the role of centralized public networks. "Telecommunications, unlike a lighthouse or a road, is not a public good in the classic sense: users can be excluded and charges can be assessed, breaching the major condition for a public good."[230]

To ensure that the new networks function properly, we are moving toward international regulation. Most countries, in fact, make a distinction between basic telecommunications services — subject to strict regulation — and value-added services that enjoy greater freedom.

"The Type 1 category includes the domestic telephone companies, Telesat Canada, CNCP Telecommunications and Teleglobe Canada. While new entrants into Type 1 will be limited for the time being, increased competition among these carriers will be encouraged. In July 1987, the Minister of Communications announced that Canada will, as a policy, insist upon at least 80 percent Canadian ownership

for Type 1 carriers, with the exception of those foreign-owned
companies already operating in Canada. This announcement
essentially formalizes the existing ownership pattern and is similar
to the ownership criteria in the U.S.

"Type 2 carriers will provide the public with enhanced services, such
as computer-based information retrieval and electronic mail. Type 2
carriers or providers will not be regulated, nor will they be subject to
any specific obligations or foreign ownership restrictions."[231]

These changes are the result of the rapid growth of the electronic
information services market and the broadened definition of such services to
mean all content carried by electronic channels, from simple telephone
conversations to dialogues between computers.

"The traditional public network operated with the obligation of
universal service, i.e., virtually any interested customer had to be
served, regardless of location. In the open network system, the
question is whether universal service obligations apply to all
participants. The answer is likely to be differentiated by service
provided. For some of the more specialized services, the general
obligation will not exist. But for 'basic' service, it will continue, and
the definition of 'basic' is likely to expand. The boundary line is likely
to be an ongoing issue of policy debate."[232]

The long-term consequences of this orientation may discredit the notion
of *public service* in favour of American-style commercial service. The availability
of more private financing through program sponsorship, through satellite
communications requiring massive private investment, and through
coproductions involving foreign or commercial partners has made the mass
media industry into an open marketplace.[233] Discussion of the importance and
role of public interest in the telecommunications industry must also cover issues
of monopoly (guarantees of equal and universal access to the
telecommunications system to protect the public interest) and competition
(technological innovation as a way of keeping up with the generalized trend
toward globalization).[234] [Tr] "A new field of study is opening up in which the
state is no longer responsible for regulating and controlling mass culture, even
though the rules of the game continue, at least formally, to respect the public
interest."[235]

In addition, since the new information services blur a number of traditional
distinctions, user access to the new media should be reexamined to define the
rights and obligations, of carriers, suppliers and producers. According to Rubin,

"Six broad categories of problems should be of particular concern to any manager concerned with planning for and using the new information technologies: (1) labour and employment issues; (2) trade and protectionism; (3) national security and scientific and technical information; (4) role of the federal government in the marketplace, as both producer and supplier; (5) role of the federal government as a regulator in the information marketplace; and (6) preservation of personal privacy."[236]

At issue is how to reconcile the rights and responsibilities of the public and the suppliers of information services, and in doing so to strike a balance between public interest and market requirements when it comes to access to electronic information services. "At the same time that governments liberalize, they must address other interrelated national issues, such as social equity, linguistic rights, regional development, national sovereignty, and national security, to name but a few Canadian concerns."[237]

## 2.2   International competition and national independence

By contributing to the disintegration of national boundaries, the communications industry plays a key role in the trend towards a world economy in which the free movement of goods and services around the world depends on the unimpeded movement of information and electronic transactions. [Tr] "A number of technological innovations have helped to globalize various individual and common communications systems, break down national boundaries, and bring forth a world sociocultural system."[238]

The new electronic information services can clearly help stimulate a nation's domestic trade. However, the trend towards a global market, combined with the Canada–U.S. Free Trade Agreement, may reinforce the competitiveness of foreign information products and services within Canada. For example, three regions (the United States, Japan and Europe) dominate world trade in electronic goods. [Tr] "Firms in these regions form part of the emerging world oligopoly in this industry: the 25 largest firms, all American, Japanese or European, control more than half of the world information systems market."[239] Despite worldwide deregulation, the number of firms in the telecommunications equipment industry should decrease substantially over the next ten years. As they did in the cultural industries, Canadian firms, clearly dominated by their American competitors, will have difficulty competing with foreign products in their own market.

> [Tr] "Because of the small size of the Canadian domestic market, our average production costs are much higher than those of our southern neighbours. Americans can turn a profit on audiovisual products much more easily, given their large and rich population, and can thus offer them internationally at very competitive prices."[240]

Since information services should, in theory, be accessible on networks worldwide, this raises questions about the potential for international growth of the Canadian information services industry. Development of specialized information services oriented specifically to a French-speaking clientele, for example, is hampered by the small size of the Quebec market. The need for firms operating internationally to turn a profit seems to conflict with the Canadian and Quebec governments' cultural objectives and their programs to encourage the use of French in business. A review of linguistic policy is called for, to draw a clear distinction between a firm's internal and external communications needs.

In addition to internationalizing competition, NITs seem to perpetuate dominance relationships. "The fundamental pattern seems clear. The benefits of deregulation and pro-competitive policies are greatest for those already at the top of the Telepower heap and those benefits diminish as one moves down the slope. Trickle-down benefits for developing countries at the bottom are difficult to identify and even harder to quantify."[241]

Transmission satellites and other NITs also tend to reduce the role of central governments. According to Ricardo Petrella, for example, in many countries it is the large international companies such as Olivetti, IBM, Alcatel, Mitsubishi, Nestlé and BASF that make the most important decisions about technological and economic resource allocation that affect several countries.

"International relations have changed rapidly in the last half of this century. Large multinational corporations now exist with annual earnings in excess of the gross national product of the world. Telepower technologies have made it more and more possible for multinational corporations to expand the range and scope of their operations. Communications allow the interconnection of home offices with branch offices for real-time operations around the world in a matter of seconds. ... With telepower, many multinational corporations have virtually become *electronic village enterprises.*"[242]

Mergers, acquisitions and industrial restructuring seem to have placed world development in the hands of large corporations. Governments will have greater difficulty in asserting their legitimacy in an era when [Tr] "...the themes of a reduced role for government and competing networks replace nationalization and extending the welfare state in current political rhetoric."[243] Because of this, a country's national objectives may conflict with international technologies and world markets and, therefore, with the interests of the large corporations. [Tr] "Globalization has been one cause for government and business to forge a new dynamic alliance."[244]

The welfare state, responsible for economic growth, social progress and cultural development, seems to have been called into question, as well. [Tr] "Their sovereignty and legitimacy under attack not only by developments in science and technology and growing world markets but also by the new social relationships and political arguments accompanying these changes, national governments are losing their substance."[245]

Canadian telecommunications policy does not hinder foreign-controlled companies from providing information services in Canada. For example, the free trade agreement between Canada and the United States has confirmed the existence of a North American information services market, and has opened the Canadian market even more to American cultural products.

"The emergence of the information economy as a dominant paradigm finds Canada unprepared to wage an economic battle for those commodities which are based on content. Even worse, while Canadians have, since Confederation, created a large number of national building projects such as the railroad, telephone system, cable system and satellites, the emphasis has been on hardware. It is these networks which carry the foreign content to Canadian markets. The lack of significant Canadian film, video, record, database or software industries means that imports of material will now, and in the future, continue to rise."[246]

While the Canadian database industry clearly lags behind that of the United States, Canadian communications policy has not come down clearly in favour of either permitting free circulation of information and information products from anywhere in the world, or encouraging a reasonable Canadian presence in areas directly affecting Canadian identity. The burning question now is whether the database industry should be supported in the same way as other cultural industries.

Unless it increases its presence in the information services market, Canada may suffer negative impacts on its trade balance in the service industries and thus become dependent on its trading partners. In addition, the small size of the Canadian market has impeded the development of a specialized Canadian database industry. At issue is whether market forces alone should influence the growth of information services, or whether the production of particular kinds of local information services should be stimulated.

[Tr] "Governments have a direct and immediate 'objective' interest in supporting 'national' firms. Since 'national' independence and economic welfare always depend more on the mastery of advanced basic technology (such as semiconductors, compound materials, robotics, highly sophisticated instruments, microcomputers,

supercomputers, cognitive science and biotechnology) as well as on their marketing, government is increasingly 'dependent' on technological innovation and the competence of private business in world markets. At stake is government's political and social legitimacy, hence its capacity to ensure ongoing national socioeconomic development. To intervene in support of its 'national' firms is therefore in a government's best interest."[247]

Canadian industry should attempt to reap some of the economic benefit from the growing world information services market. However, new opportunities from free trade will be available only to those Canadian suppliers of information products and services that can compete in domestic and international markets. Since electronic information services are often cultural (to inform, educate and entertain) and offer new possibilities for existing cultural products, a critical mass of Canadian information products must be developed, and better domestic and international marketing of these products encouraged.

[Tr] "In a sense, what is currently missing from this technical revolution is 'information'. The problem, which goes beyond the generally recognized technical lag between programs and equipment (between software and hardware), is social and cultural, as well. New, poorly defined needs, contents and uses will develop gradually, according to a particular mechanism very different from that governing technology supply."[248]

Finally, while Canadian cultural industries have received considerable development support from governmental programs intended to assist them in competing with foreign cultural products, similar government intervention in the information services industry could be perceived as hindering open competition in the marketplace.

The question of regional differences in the access to information facilities and services was discussed at the April, 1987 meeting of federal and provincial communications ministers in Edmonton. The series of common measures adopted by participants at that meeting will form the basis for telecommunications system regulation and a new national telecommunications policy for Canada. As a result, problems of local distribution and information management relevant to the new media should be at the core of much economic and political discussion in coming years.

In our opinion, government's role in the development of the new information services should be well defined, as should conditions for access to these services and mechanisms to ensure, in accordance with national sovereignty and cultural identity objectives, that Canadian culture is reflected in them. For example, since a large proportion of products carried by the new

media will have cultural content, the government may choose to propose social and cultural objectives and principles similar to those found in the *Broadcasting Act* to regulate these services. "Moreover, the old issue of contents versus carrier will reappear in new forms and will require extensive national debate as fundamental decisions on major national investments come to the forefront."[249]

## 2.3  Accelerated exchanges and national identity

The cultural identity of a people is global, in the sense that all aspects of society (economic, political, social and cultural) are relevant to it. Culture and mass communication techniques (such as radio, television and the print media) guarantee the cohesiveness of the public realm. Because of their role in entertainment and relaxation, the mass media have become the main focal point, where public opinion[250] is created and displayed for private consumption. The spread of new information technologies and new services into the home accelerates the trend toward the domestic consumption of cultural products.

But deregulation and the spread of new media in the information age have profoundly affected cultural production. For example, new information technologies, by reducing design, reproduction and dissemination costs, substantially change conditions for both individual and collective cultural development.

> [Tr] "These new technologies provide a material foundation for cultural and intellectual works by supplying new vehicles for ideas, sounds and images. To the extent that they help intelligence and imagination, they constitute a revolution in culture. They also industrialize culture by increasing opportunities for widespread cultural development and consumption, as well as for access to both broad and specialized audiences."[251]

In addition to an explosion in the sale of goods and services, the development of the new media has accelerated the exchange of images and ideas, and increased intercultural contact. In qualitative terms, [Tr] "[...]this modern world of communication requires, above all, a pluralistic frame of mind that tolerates differing ideologies, value systems and beliefs."[252] For the European Community, the fundamental principles of free expression, pluralism of ideas and respect for national values form a widely accepted basis for specific, necessary community action in the cultural domain. The new international order has reached the age of cultural diversity, a new requirement for survival.[253]

These examples illustrate the scope of the challenge faced by society in the information age. The new media reinforce the current trend toward a greater demand for information, and raise several cultural issues as well.

Culture can be defined as a set of values, ideologies and practices that confirm a given society's view of itself. Cultural identity is an essential characteristic of the development of society. But there is more than one culture in modern society. [Tr] "Our culture is in fact made of several cultures (and this does not even include national culture, which deserves a study of its own): 'humanistic' culture, scientific culture which extends to techno-scientific culture, and mass culture."[254]

The technological revolution and the expanding knowledge and skills that accompany it, so critical to the information society, have had the effect of breaking down the traditional boundaries of culture. Science and culture have come to be key elements in the international order.[255]

[Tr] "Many factors — the increasingly important place now occupied by intellectual work in the structures of production and in the organization of society; the growing importance accorded to science, technology, information and communications systems, educational materials, and cultural and occupational retraining; increased demand and consumption, no longer just by small minorities but by large masses of people — have had a profound effect, even compared with a few years ago, on the way in which cultural development and dissemination policy is formulated."[256]

Since it forms part of the value system of the society it directly or indirectly supports or transforms, technology has come to be a major factor in cultural change.[257] The sociologist Edgar Morin compares culture to an information process in which the informational heritage is composed of knowledge, skills, rules and standards of society.[258] In the information society, culture is demonstrated through a complex communication system.

[Tr] "Simon Nora and Alain Minc, in claiming that memory is one of the foundations of the cultural model of society, have stressed that accessible, structured information sources are as critically important as the raw data themselves. The database now appears to be the most crucially significant cultural issue related to information in modern society."[259]

Knowledge, in becoming a means of production, changes the relationship between economic power and the power of government. [Tr] "For the commercialization of knowledge cannot leave unaltered the special privileges national governments have traditionally enjoyed in the production and dissemination of knowledge."[260] The key issue, how to use information, has fallen increasingly into the domains of experts of various kinds. However, as the concentration of activities in this area has demonstrated, the conditions necessary for cultural domination are all present here, as well.

Since the new media place different cultures in competition with one another, cultural autonomy is at risk.[261] But the market needs culture, and one of the best ways to promote a country's cultural autonomy is to encourage cultural development, hence the creation of original works. NITs can stimulate national cultures by facilitating the diffusion of a nation's cultural products.

Bernard Miège has written that the European film industries, other than in France, are anything but remarkable. In addition, control of the television market by public systems has discouraged the emergence of an industry capable of producing commercially viable programs and thus increased the danger, both cultural and economic, of invasion by American programs.[262] [Tr] "European culture is constantly being eaten away by American customs and lifestyles, and by a growing confusion between democracy and consumer society."[263] In fact, the emergence of the new media only confirms the well established trend toward cultural americanization, visible in a broader acceptance of the American notion that a person's identity is determined by patterns of consumption, as well as in the predominance of English as the universal language of communication.

The new information technologies and international cultural products therefore appear to be causing a crisis of culture, reflected in changes to national cultural identity, the emergence of a culture of technology and the appearance of new cultural practices. This interaction between technology, economy and culture requires government intervention in the public interest.

Two general viewpoints are common in discussions of the cultural impact of the new media. The first of these, an industrial (or pessimistic) critique, argues that the new media reflect the predominance of international cultural industries, a serious threat to national cultural identity. At issue is cultural identity, since more uniform products and services, as well as free movement of cultural goods, may homogenize cultural consumption practices. Local cultures are thereby diluted and replaced by an international culture dominated by a few large countries.[264] In this sense, technological progress is a potent force in integrating societies worldwide.

[Tr] "Above all, a trio of large economic blocs — North America, the European Community and Japan — are relentlessly taking over the world. Increasingly homogeneous science, production and management techniques, lifestyles, culture and consumption are causing an ideological, social and political consolidation subject to neither national will nor governmental authority. Beyond the apparent mess of competition and national rivalries, uniformity is on its way."[265]

According to this point of view, social and cultural practices are subject to the logic of technological development, and the economic criteria of rationality

and efficiency. The logic of commerce and consumption gradually penetrates into all areas of a culture, which is thereafter dominated by international cultural industries. Freely available cultural products and the new wired cities, supplied by the multinationals of the mass media, would further integrate societies.[266]

By placing cultures in competition, the new media pose a challenge to national cultural autonomy. The 21st century would be characterized by the growing presence of the United States in science and culture at the expense of Europe.[267] However, although the large nations of Europe feel threatened by American products, the problem is more serious for countries — such as Canada, Austria, Belgium and Switzerland — living in the shadow of larger countries and facing the danger of growing cultural dependence.[268]

In addition, while the cultural autonomy of Canada seems threatened,[269] that of Quebec would seem to be even more precarious[270] because of its unique linguistic situation. The case of Quebec has universal significance since it questions the place of national cultures in an age of transnational integration, and the influence of the new media on the cultural practices of individuals (that is, on language and culture).

The second point of view, that of the modernists (or optimists), sees the new media as a force for renewing culture, broadening cultural practices and increasing international cultural exchange. The new communications techniques naturally lead to [Tr] "...more freedom, more leisure, more culture, more communication and understanding among people."[271] In this view, Quebec's unique linguistic profile, which acts as a protective screen, is an advantage.

The interpenetration of cultures caused by NITs would stimulate the rise of a pluralistic society characterized by a variety of available information sources, by a multiplicity of carriers, and by a range of options and ideas carried by the media.[272] NITs could give rise to a world without boundaries and foster a planetary dimension to intelligence called a *noosphere* by Teilhard de Chardin, an *iconosphere* by F. Perroux, the *global village* by McLuhan and the *second cerebralization* by E. Morin. The interactive potential of the new media would presumably lead to a democratic, egalitarian and decentralized society.

> [Tr] "Techniques give way to other techniques in a line of cumulative progress. Television is progress over cinema in that it makes more democratic the consumption of images; cable and satellite are progress over traditional television in that they increase the number of available images; the video recorder is progress over the passive consumption of programs; and soon the videodisk and fibre optics, by enabling interactivity, will mark even more progress."[273]

Industrial and governmental promoters have taken up this argument, as have writers such as Toffler, McLuhan and Servan-Schreiber who claim that the

new technology should contribute to individual and collective well-being and provide a way of competing with international economic forces.

The new media and their accompanying cultural practices are expected to provide a larger quantity and diversity of products, not just mass broadcasts.[274] In turn, these new services would stimulate demand and interest new audiences.[275] Electronic mail, information banks and telecommunications would then bring about new cultural habits and practices, as well as new kinds of social relationships.

Because the information society involves a new way of thinking and acting, the individual and social assimilation of the new culture of technology becomes a major issue. Individual assimilation of the computer culture requires the ability to use knowledge about computers as well as about the machine itself for more than preestablished functions; social assimilation requires that individuals and groups have the power and the ability to define uses for the technology in their own cultural and social context.[276] This assimilation takes place at many levels: acquisition of technical skills, proficiency in use and access to content.

If culture and technology were previously distinct, the new era reconciles them by making technology an integral part of culture.[277] Progress is science become culture.[278] While a new culture of technology is inevitable, it is still too early to predict whether the new media will reinforce individual cultures, since cultural content in many countries is not sufficiently well developed.[279]

Until now, development policy governing computers and communications has tended to focus on the supply of computer hardware and information services. Future policy should emphasize demand for both use and content of the new media. For example, communications network policy could consider both its physical and nonphysical aspects and draw a distinction between the communications infrastructures themselves, the services operating on them and the people who use them.[280] In addition, the relative positions of Canadian and Quebec information services in these new markets raises an important issue with respect to the reinforcement of national identity and culture. Information policy, like broadcasting policy, could be structured to encourage the production of local services and facilitate access for all Canadians, and also determine the extent and proportion to which Canadian media should reflect Canadian and Quebec cultural identity.

Despite the free-market context in which the new media are being developed, most observers agree on the need for government action to neutralize possible negative impacts on economic, social and cultural development. Current circumstances would suggest that government intervention is needed in developing new information services and enacting measures to guarantee accessibility, protect confidential personal information

and safeguard culture, and consequently, in influencing content development. Besides economic and technological factors, policy should take into account social and cultural factors, as well. Coordinated telecommunications, broadcasting and cultural policy, adapted to the realities of the information age, should have a social and cultural basis as well as an economic and technological basis whenever national culture, hence national sovereignty, appears threatened by international cultural products.

> [Tr] "Governments face a double problem. If they refuse to go along with the network standardization that globalization implies, they risk being excluded from powerful communication systems. If, on the other hand, they accept the idea of communications without boundaries, the nations they govern become vulnerable to any sort of outside influence and they risk the cultural colonization of their territory."[281]

The explosion of information in the new media, use of the computer and the strategic importance of communications are thus profoundly changing the structure of industrial society. Although all agree, for the moment, that the new media bring technological and economic progress, little attention has been paid to their effect on personal, social and cultural advancement and on community and individual lifestyles. The relationship among technology, economy and culture needs to be treated as aspects of the same issue in order to achieve a global information-based framework.

On the eve of the "Europe 1992" proposal, the European "culture question" may offer some insight into how to deal with cultural issues. In light of this development, for example, it has been suggested that cultural policy should be developed at both the foreign and domestic levels.[282] Such an approach may be appropriate in the case of information policy for Canada and Quebec.

In addition, unhindered access to information services on global networks creates problems for Quebec's distinctiveness. For example, recent economic developments and the changes brought about by new information technologies have raised doubts about the future of the public use of the French language. The recognition of English as the universal language of communication, its rise as a technological *lingua franca* and its predominance in the information industry all contribute to the use of English for information products and services. It is not yet clear whether the new information services will encourage the creation of French-language products or will just be a method of disseminating foreign products; nor is it clear whether current changes will lead to a redefined French-speaking public forum. The development of domestic and foreign cultural policy for Quebec should also consider internal and external linguistic policy for organizations, in view of the apparent contradiction between

greater access to the international information market and the cultural objective of encouraging the use of French in business.

At a time when imported American products have an advantage, some basic information services could be seen as falling within the public interest. We must consider with care the appropriate balance between the public interest and the free market, whether French-speaking electronic information firms can stand up to international competition, whether implementation of information services can be made to respect the cultural distinctness of Canada and the linguistic distinctiveness of Quebec, and whether public interest information services should be distinguished from private services.

Government policies and programs exist to help cultural industries compete with foreign cultural products, and a similar approach could be put into place to help certain information services. Since NITs are increasingly interrelated, it may be appropriate to coordinate policy in several areas, such as telecommunications, broadcasting and culture. Since information services carry cultural content, cultural policy could be made to apply to them. Finally, the new information services industry could be supported in the same way as other cultural industries.

# SUMMARY

The first two chapters sketched the general trends apparent in the emerging information society, the first chapter describing the information environment in which society is evolving and the second discussing related social issues.

## 1.    New media — new culture

While mass culture had its start toward the end of the 19th century, it was in the middle of the 20th century, when the message became available to everyone through the print media and later radio, that a sizeable information and entertainment industry came into being. This traditional information industry encompassed mainly publishing, music, film and television.

But the emergence of a mass media industry has caused the concepts of culture and economy to become increasingly interrelated; culture seen as a consumer product subject to the rules of the free market has given rise to the concept of cultural industries. The increasingly concentrated production and distribution of cultural products by American multinational companies has led to the appearance of multimedia firms active simultaneously in publishing, radio, film, television and the plastic arts. By breaking down territorial limits on broadcasting, direct television by satellite will reinforce this tendency by encouraging the development of transnational television.

The last quarter of the 20th century is the age of *customized* products from the new information industries, as developments in telecommunications and the new information services encourage audience targeting. Universal information is replaced by more specialized and fragmented information, accompanied by greater audience segmentation. The video recorder, by creating a new kind of television viewer able to choose among a wide variety of available products, is the key element in the audiovisual system of the future, which will also include the videodisk player, cable or fibre-optic networks, access to databases and household microcomputers. Satellite, fibre-optic and microchip technology are at the heart of these developments.

The more traditional static media such as newspapers, books and photographs, and the dynamic media like radio, film, discs and television, have been joined by dynamic interactive media. These new media have simultaneously extended the cultural industries into the area of communications and brought new technology into culture. The trend toward global cultural industries has been reinforced by successive waves of international acquisitions and mergers. At the same time, substantial growth in the international culture market has been reinforced by movement toward a global economy.

This new multimedia environment, since it is characterized by access to a variety of services and *multiproduct* marketing strategies, casts a different light on the concept of the cultural product. The variety of vehicles and contents does not, however, signal the demise of the mass market era but the rise of a two-tiered market consisting of an international mass market, structured as an oligopoly, and targeted national or local markets.

These developments increase the range of products and services available in daily life such as cable television, videocassettes. This diversification calls for new, high-quality television content and, consequently, enhancement and stimulation of the creative process.

Ever more widely available information products and services have been accompanied by a new, growing industry for producing information, considered now as a consumer product. Text, numeric data, sound and images can now be recorded, saved and exchanged electronically and have become products in their own right, leading to the appearance of new information industries. For example, a wide range of innovations for specialized professional or business purposes such as EDI, computer software, facsimile, portable microcomputers and cellular telephones have experienced significant and rapid growth in recent years.

Significant growth in information products and services has been accompanied, however, by a clear trend toward the concentration of production and distribution activities in the hands of American firms. In the professional services industry, for example, the eight largest firms account for about 70 percent of sales. The trend toward concentration is also apparent in acquisitions and mergers between firms operating in related areas (such as publishing, newspapers and telephone).

Changes affecting the workplace have been accompanied by more minor changes in information services such as electronic publishing, public databases, games and cultural information intended for the general public. Multimedia products integrating the computer with household television, sound system, video cassettes and compact discs should, however, become increasingly common in the home entertainment market.

A new generation of infrastructures tending toward an *intelligent global network* is also emerging. Since information has become a powerful factor in production, industrialized nations compete fiercely in the marathon to control communication systems and other new information technologies.

In the age of the information society, domination is not just economic and political but social and cultural as well, associated with the means of distributing knowledge, information and culture internationally. As a result, the Canadian

information industry is faced with the challenge of international competition, particularly from international multimedia conglomerates controlling a large share of the global cultural media and the mass electronic information markets.

## 2. Economic and cultural issues

Deregulation in the telecommunications industry has been an important step in the rapid development of electronic information services. Even if policy approaches (liberal and interventionist) differ, the result has been to open the telecommunications industry to competition. Despite political rhetoric in favour of a free market, many governments have used existing telecommunications monopolies to support national electronic industries more or less openly. Developing and promoting the telecommunications sector and establishing links among hardware, software and service suppliers have been key elements of public policy.

In general, a shift to international regulation has created a distinction between basic services, subject to strict regulation, and value-added services, which enjoy greater freedom. Over the long term, this orientation seems to have devalued the *public service* concept in favour of a liberal vision based on an American-style consumption of the new information services. In this context, we believe that the ways users gain access to the new media should be examined closely and the rights and obligations of carriers, suppliers and producers better defined. The issue consists in reconciling the rights and responsibilities of the public and information service suppliers, thereby striking a new balance between the public interest and the marketplace with respect to electronic information services.

By helping break down international boundaries, the communications industry plays a significant part in the trend toward global markets. It has been argued, however, that as is the case with cultural industries, Canadian information service firms, clearly dominated by their American competitors, will have difficulty competing with foreign products in their own country. The international growth potential of the Canadian information services industry should be closely examined, as should possible expansion of French-language information services.

International competition seems to perpetuate dominance relationships between nations. Because knowledge is emerging as a tool of production, the relationship between economic and governmental power must be reexamined; the key issues now are access to information, and control over its production and distribution. As a result of mergers, acquisitions and industrial restructuring, large corporations seem to be directing world development while governments have greater difficulty asserting their legitimacy. A country's national objectives

could conflict with multinational technologies and the world marketplace, and thus with the interests of the large corporations.

Canadian telecommunications policy does not hinder the supply of information services by foreign-controlled companies; the Canada-U.S. Free Trade Agreement has confirmed the existence of a North American information services market. But unlike Europe, Canada has note structured industrial development policy to encourage Canadian firms to benefit from world markets. Canada does not yet seem ready to enter into the economic battle for control of new content-based markets; therefore, imports in this sector will likely increase, confirming the tendency of the Canadian database industry to lag behind its American counterpart.

Because of the small size of the Canadian market, and the economic and cultural stakes associated with the information industry, it may be in the government's interest to reduce dependence on world markets by supporting Canadian firms. The following issues arise: (1) whether market forces alone should determine growth in information services or whether production of local information services for specific markets should be stimulated; (2) whether the presence of a reasonable number of Canadian products should be encouraged in industries directly affecting Canadian identity; and (3) whether the database industry should be supported in the same way as other cultural industries. It is time to go beyond a strict supply and demand framework and encourage economic development based on national, social and cultural objectives. A major issue relates to the identification of new needs, contents and uses, and how they relate to the nation's cultural capital.

There should be general discussion of the role of government in the development of new information services, access to the new information services, and ways in which Canadian media can be induced to reflect Canadian culture, in accordance with cultural sovereignty and national identity objectives. For example, since in many cases electronic information services are cultural in nature (being intended to inform, educate and entertain) and offer new opportunities for displaying existing cultural products, a critical mass of Canadian information products, and better domestic and international marketing of these products, should be encouraged. Economic and political discussion in coming years should focus on problems of local distribution and information management related to the new media.

The 21st century will see an increase in cultural contact among nations. Exploding trade in information goods and services, reflected in accelerated exchanges of images and ideas, freedom of expression, diversity of ideas, and the respect of national values should form the basis of a new cultural order. One of the challenges of the information age in coming years will be to reconcile the developing information marketplace with cultural imperatives.

In the information society, culture manifests itself through a complex system of communication. Databases will play a critical role in increasing communication and expanding knowledge in modern society. Technology will be an important force in cultural evolution by helping to reinforce or transform society's values and customs.

A number of authors claim that the new media could confirm the well established trend toward the predominance of American consumer values, hence toward cultural americanization. Because NITs stand to encourage an invasion of American products, national cultural autonomy may be threatened. Wired cities and the free movement of cultural products may lead to greater integration of societies by transnational mass media. The new media, with the predominating international cultural industries they reflect, constitute a serious threat to national cultural identities. Important issues here are the role of national culture in an era when societies are being integrated into transnational cultures, and the influence of the new media on the cultural practices of individuals (their language and culture).

On the other hand, NITs may serve the development of national cultures by facilitating the dissemination of domestic cultural products. The new media may thus lead to cultural renewal, a wider range of cultural practices and more international cultural exchanges. Interpenetration by NITs could lead to a pluralistic society characterized by the variety of available information sources and carriers, and by the range of ideas carried by the media. A new world without national borders will give a planetary aspect to information. The interactive potential of the new media could lead to new habits, cultural practices and social relationships in a democratic, egalitarian and decentralized society. The relative positions of Canadian and Quebec information services in the new information marketplace will then be fundamentally important to the affirmation of national and cultural identity.

Industrial society is being profoundly restructured by the information explosion available in the new media, by the use of computers and by the strategic importance of communication. Technology and culture are melding. Since a technological culture now seems inevitable, telecommunications, broadcasting and cultural policy should be coordinated and adapted to the needs of the information age. While computer-oriented development policy has focussed primarily on the supply of equipment and information services, future emphasis should be placed on demand for both the new media and the content they carry. The relationship between technology, economy and culture calls for an overall attempt, based on information, to evaluate the extent to which Canadian and Quebec cultural identities should be reflected in Canadian media.

Because of the importance of social issues in the emerging information society,[283] government should take action in the following areas: developing new

public information services, defining the rights and obligations of carriers, suppliers, producers and consumers; setting up measures to ensure accessibility, protect confidential personal information and safeguard culture; and regulating the development of content in the new services. In addition to economic and technical factors, social and cultural factors should also be considered in information sector policy formulation. It may also be appropriate to develop separate policies covering domestic and international information.

Finally, the free movement of information services on networks worldwide threatens the future of the public use of the French language, since information products and services exist primarily in English. The new information services may encourage creation and production in French or they may be only a means for disseminating foreign products. Similarly, the ongoing changes may help to redefine the French-speaking public forum.

In addition to domestic and foreign cultural policy, it may be appropriate to develop external and internal linguistic policy for organizations operating in Quebec, because the public use of French is threatened by the apparent conflict between access to the international information marketplace and the cultural objectives of encouraging the use of French in business. In a marketplace dominated by imported American products, it could be appropriate to determine the extent to which information services respect the cultural uniqueness of Canada and the linguistic uniqueness of Quebec, and thus whether information services should receive support in the same way as other cultural industries.
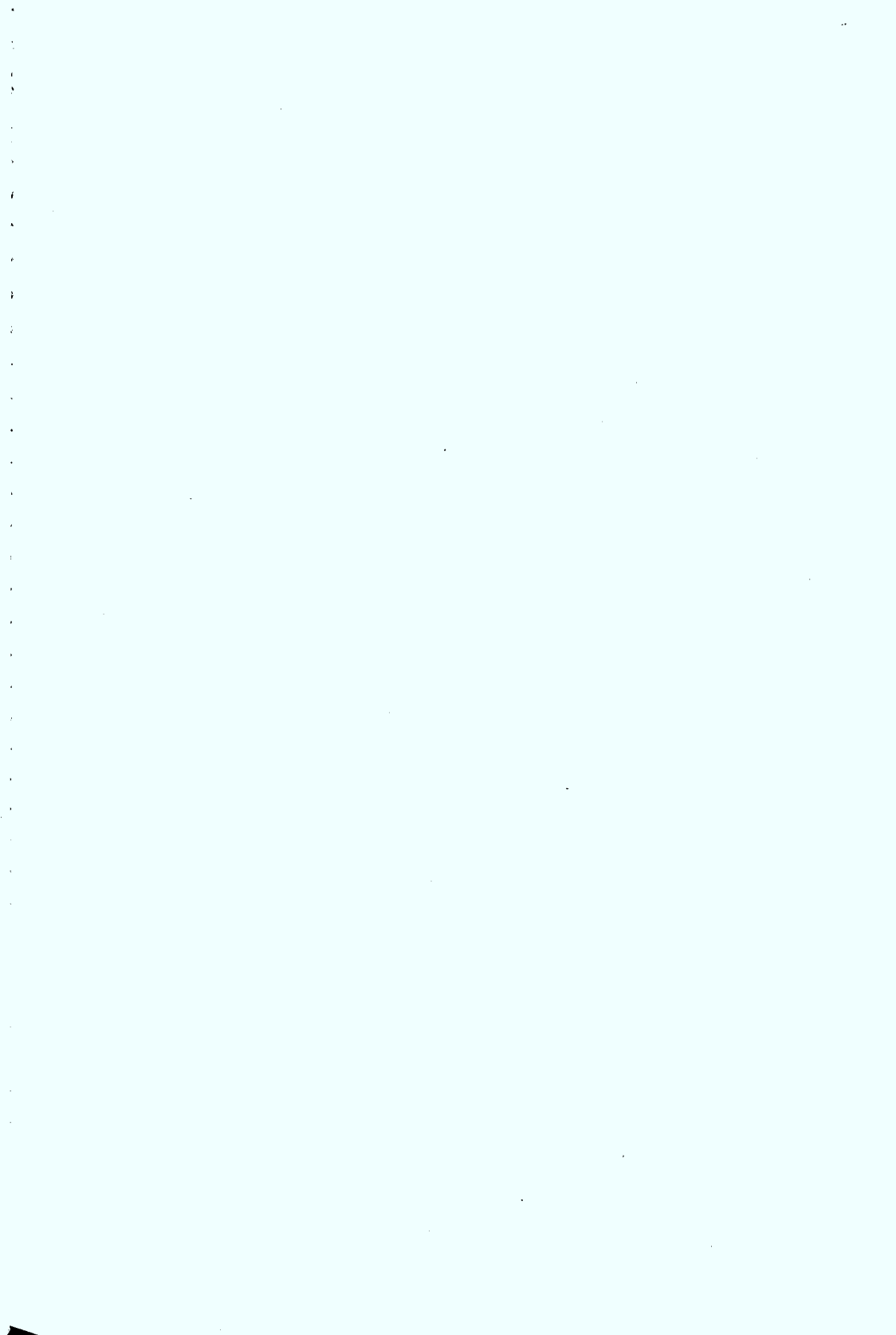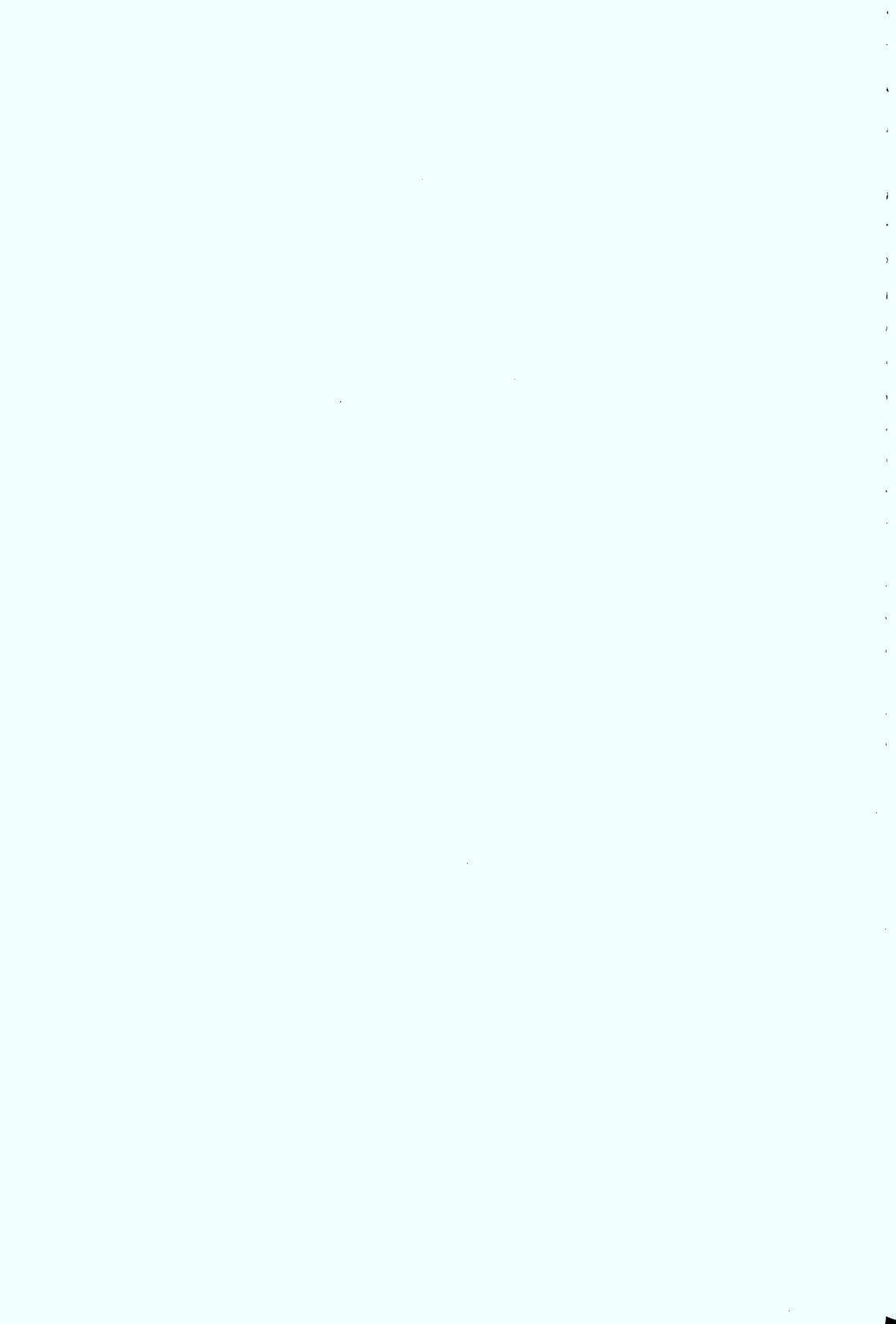
# APPENDIX I

**World Production of Colour Televisions in 1987:6**
**Major Producers**

| Rank | Origin | Firm | No. Colour Televisions (in millions of units) | % World Market |
|------|--------|------|-----------------------------------------------|----------------|
| 1 | EUROPE | PHILIPS | 8.2 | 14.3 |
| 2 | EUROPE | THOMSON | 7.3 | 12.7 |
| 3 | JAPAN | MATSUSHITA | 6.0 | 10.5 |
| 4 | JAPAN | SONY | 3.8 | 6.6 |
| 5 | U.S. | ZENITH | 3.4 | 5.9 |
| 6 | JAPAN | TOSHIBA | 3.2 | 5.6 |
| 7 | JAPAN | HITACHI | 3.1 | 5.4 |
| 8 | EUROPE | NOKIA | 2.5 | 4.4 |
| 9 | KOREA | SAMSUNG | 2.5 | 4.4 |
| 10 | JAPAN | SANYO | 1.8 | 3.1 |
| 11 | JAPAN | SHARP | 1.7 | 3.0 |
| | | Subtotal | 43.5 | 75.9 |
| | | All Others | 10.8 | |
| | | Total | 54.3 | 100.0 |
| Breakdown of subtotal | | | 43.5 | 75.9 |
| EUROPE | | | 18.0 | 31.4 |
| JAPAN | | | 19.6 | 34.2 |
| U.S. | | | 3.4 | 5.9 |
| KOREA | | | 2.5 | 4.4 |

Source:     HUMBERT, Marc and Jean-Louis PERREAULT. *La globalisation de l'industrie électronique*. EEC, 1992, p. 45.

# APPENDIX II

## Cross-ownership Among the 50 Largest Audiovisual Firms

| | % owned by | | % owned by |
|---|---|---|---|
| **RTL Plus** | | **Première** | |
| CLT | 46.1 | Bertelsmann | |
| Bertelsmann | 38.9 | Canal Plus | |
| WAZ | 10.0 | Kirch | |
| Maxwell | 2.0 | | |
| FAZ | 1.0 | | |
| **Radio Hamburg** | | **Antenne Bayern** | |
| Springer | 35.0 | Bertelsmann | 16.0 |
| Bertelsmann | 25.0 | Springer | 16.0 |
| Bauer | 25.0 | Burda | 16.0 |
| | | Sebaldus | 5.0 |
| **Nouvel économiste** | | **Le Point** | |
| Havas | 45.0 | | 20.0 |
| Hachette | 24.5 | Ringler | 10.0 |
| Filipacchi | 24.5 | Éditions mondiales | |
| **Elle** | | **M6** | |
| Hachette with RTS | | CLT | 25.0 |
| in Italy | | Amaury | 1.0 |
| Bonnier in Sweden | | | |
| Burda in Germany | | | |
| **HFP** | | **EBC** | |
| Hachette | 50.0 | Thames | 15.0 |
| Filipacch | 50.0 | CLT | 6.5 |
| **La Cinq** | | **Sat 1** | |
| Fininvest | 25.0 | Springer | 27.0 |
| Hachette | 25.0 | Holtzbrinck | 12.0 |
| | | Kirch | |

# APPENDIX II
**(continued)**
**Cross-ownership Among the 50 Largest Audiovisual Firms**

| | % owned by | | % owned by |
|---|---|---|---|
| **Auto Bild Partnerships** Springer with United Newspapers in the U.K. Mondadori in Italy Éditions mondiales in France | | **Radio Gong** Sebaldus Holtzbrinck | 29.0 10.0 |
| **Neptune Yachting** Hachette Hersan | 50.0 50.0 | **Lifestyle Channel** Maxwell TVS Maxwell TVS | 15.5 2.7 |
| **Univision** Zela News International TF1 | 73.0 15.0 12.0 | **Vital** Hachette Rusconi | 50.0 50.0 |
| **TF1** Maxwell Fininvest Éditions mondiales | 12.0 3.9 2.0 | **Amaury** Hachette | 32.6 |
| **RCS** Hachette | 10.0 | | |

Source: RENAUD, Jean-Luc. (1992) " Convergence entre les technologies de communication : le cas de l'Europe de l'Ouest", *Étude de cas de l'Amérique du Nord et de l'Europe de l'Ouest*, Paris, Éd. ECD, p. 110.

# APPENDIX III

## Television Channels Initially Planned for Satellite Distribution
## (January 1990)

| Satellite TV Channel (startup year) | Hours per day | Language | Source of Financing | Owners | | Number of households served | Satellite | Type of Programming |
|---|---|---|---|---|---|---|---|---|
| BBC TV Europe (1987) | 17 | English | User fees Cable fees | BBC | | 400,000 | Intelsat | Entertainment |
| Canal Info (1987) | 18 | French | Advertising | Caisse des dépôts, AFP Générale de communication Lyonnaise Communications GMF Newspaper holdings | 20% 12% 12% 12% 44% | 100,000 | Telecom-1C | News |
| Canal J (1987 | 10 | French | Advertising, subscription | Caisse des dépôts Abonnement Hachette Lyonnaise des eaux Générale des eaux | 40% 34% 16% 10% | 200,000 | Telecom-1C | Children's programming |
| Canal Enfants (starting 2nd quarter of 1990) | 14 | French | Subscription | Antenne 2 Bayard Press Canal Plus Compagnie européenne de publication Caisse des dépôts Générale des eaux Lyonnaise des eaux Société générale Banexi | 20% 10% 10% 20% 20% 5% 5% 5% 5% | 500,000 (planned during the first year in operation) | TDF-1 | Children's programming |
| Canal international | | Spanish | | TVE | - | | | |
| Children's Channel (1984) | 12 | English, Dutch subtitles | Advertising, subscription | Central TV Thames TV DC Thomson British Telecom | 25% 25% 25% 25% | 1,500,000 | Intelsat VA F11 Astra 1A | Children's programming |
| CNN (1985) | 24 | English | User fees from hotels and cable networks | Turner Broadcasting System (USA) | | 2,500,000 | Intelsat VA F11 | News |
| Discovery Channel (1989) | 6 | English | Advertising | United Artists International | | 600,000 | Intelsat VA F11 | Documentaries |
| 3 SAT (1984) | 10 | German | Public subsidy | ZDF, SRG, ORF | | 7,300,000 | Eutelsat 1 F5 Eutelsat 1 F4 DFS Kopernikus TV-Sat 2 | Entertainment |
| Eins Plus (1986) | 4 | German | User fees | ARD | | 6,800,000 | DFS Kopernikus TV-Sat 2 | Entertainment |
| Euromusique (1990) | 4 | French | Advertising | Générale des eaux Caisse des dépôts NRJ, RMC, CBS, Polygram | | 200,000 | TDF | Music |

# APPENDIX III
## (continued)
## Television Channels Initially Planned for Satellite Distribution
## (January 1990)

| Satellite TV Channel (startup year) | Hours per day | Language | Source of Financing | Owners | | Number of households served | Satellite | Type of Programming |
|---|---|---|---|---|---|---|---|---|
| European Business Channel (1989) | 4 | English German | Advertising | AWF<br>Blackbox<br>Jean Frey<br>CLT<br>Telekurs<br>Thames TV | 62.5%<br>15.0%<br>10.0%<br>6.5%<br>4.5%<br>1.0% | 24,000,000 (spread over: Sky One, Sky News, RTL Plus, Sat-1, Teleclub, Super Channel) | Astra 1A<br>DFS<br>Kopernikus | News |
| Eurosport (1989) | 19 | English | Advertising | Sky Television (News International 89%) + 14 members of the EBU | | 600,000 | Astra 1A | Sports |
| Film Net (1985) | 24 | Dutch Subtitles in Scandinavian languages | Subscription | Esselte | 99% | 380,000 | Astra 1A | Films |
| Galavision (1988) | 24 | Spanish | Advertising | Univisa Inc. | | 2,350,000 | Eutelsat 1F4 | Entertainment |
| Galaxy (1990) | 18 | English | Advertising | BSB (Bond Corp)<br>Granada Group<br>Pearson<br>Chargeurs<br>Reed International<br>Next<br>London Merchant Securities<br>Anglia TV<br>Invest International<br>Trinity International | 36.6%<br>15.1%<br>14.1%<br>12.1%<br>10.1%<br>4.4%<br><br>2.9%<br>2.6%<br>1.4%<br>0.7% | 900,000 (forecast end of first year in operation) | BSB 1 | Entertainment |
| Japanese Satellite Television (1990) | 2 | Japanese | Advertising, major sponsors | Marubeni<br>Mitsukoshi<br>OCS<br>Fuji TV, NTV, TBS,<br>TV Tokyo, NHK | 40%<br>30%<br>15%<br><br>15% | 200,000 (estimated number of Japanese living in Europe) | Astra 1A | News |
| Kindernet (1988) | 3 | Dutch, Subtitles in Scandinavian languages & English | Advertising soon, subscriptions | WH Smith<br>Telecable Benelux<br>Fuki 8 | 30%<br>40%<br>30% | 1,100,000 | Intelsat VA F11 | Children's programming |
| La Sept (1989) | 12 | French | Public lubsidy | R3<br>French government<br>INA<br>Radio France | 45%<br>25%<br>15%<br>15% | 130,000 | TDF 1 | Culture |
| Lifestyle (1985) | 8 | English | Advertising, subscription | WH Smith<br>DC Thomson<br>TV South<br>Yorkshire TV | 74%<br>15%<br>5%<br>6% | 2,000,000 | Astra 1A | Women's programming |

# APPENDIX III
## (continued)
## Television Channels Initially Planned for Satellite Distribution
## (January 1990)

| Satellite TV Channel (startup year) | Hours per day | Language | Source of Financing | Owners | | Number of households served | Satellite | Type of Programming |
|---|---|---|---|---|---|---|---|---|
| The Movie Channel (1990) | 18 | English | Subscription (50% of broadcast time) | BSB | | 500,000 (estimate after one year) | BSB 1 | Films |
| MTV Europe (1987) | 24 | English | Advertising | Maxwell<br>Viacom | 50%<br>50% | 11,200,000 | Astra 1A | Music |
| Nordic Channel (1989) | 5 | Swedish | Advertising | MODO Group | | 400,000 | Eutelsat 1F1 | |
| Now (1990) | 9 | English | Advertising | BSB | | 900,000 (estimate after one year) | BSB 1 | Entertainment |
| One World Channel (1989) | 1.5 | English | Major sponsorship | Development Aid for People to People (DAPP) | | 1,500,000 | Eutelsat 1F4 | Religion |
| The Power Station (1990) | 18 | English | Advertising | BSB | | 900,000 (estimate after one year) | BSB 1 | Music |
| Première (beginning spring, 1991) | 2 | German | Subscription | Ufa (Bertelsmann 75%<br>Canal Plus 25%)<br>Canal Plus<br>Kirch Group | <br>50%<br>50%<br>25% | Goal of 200,000 after first year of operation | TDF 1 | Films |
| Pro 7 (1989) | 16 | German | Advertising | G. Ackemann<br>T. Kirch | 51%<br>49% | 6,400,000 | Astra 1A<br>DFS Kopernikus | Entertainment |
| RTL Plus (1984) | 24 | German | Advertising | CLT (64.1%)<br>Ufa (Bertelsmann 100%)<br>WAZ<br>Burda GmbH<br>Deutsche Bank<br>FAZ | <br><br>38.9%<br>10.0%<br>2.0%<br>2.0%<br>1.0% | 13,100,000 | Astra 1A<br>DFS Kopernikus<br>TV Sat 2 | Entertainment |
| RTL Véronique (1989) | 20 | Dutch | Advertising, subscription | CLT<br>Elseviers<br>VNU<br>Philips, Crédit Lyonnais | 51%<br>19%<br>19%<br>11% | 3,300,000 | Astra 1A | Entertainment |
| SAT-1 (1985) | 18 | German | Advertising | PKS (Kirch 51%)<br>Axel Springer<br>APF<br>AV Euromedia<br>Neue Meridien TV<br>Ravensburger Film<br>Joint Holding | 40%<br>15%<br>15%<br>15%<br>1%<br>1%<br>13% | 12,600,000 | Astra 1A<br>Eutelsat 1F4<br>DFS Kopernikus<br>TV-Sat 2 | Entertainment |

# APPENDIX III
## (continued)
## Television Channels Initially Planned for Satellite Distribution
## (January 1990)

| Satellite TV Channel (startup year) | Hours per day | Language | Source of Financing | Owners | | Number of households served | Satellite | Type of Programming |
|---|---|---|---|---|---|---|---|---|
| Swedish Business Channel (1989) | 30 mins. | Swedish | Advertising | SASP<br>Dagen Industry | 50%<br>50% | 2,300,000 | Astra 1A | News |
| Screensport (1984) | 18 | English | Advertising | WH Smith<br>ESPN | 75.5%<br>24.5% | 5,800,000 | Astra 1A | Sports |
| SF Succé (1989) | 6 | Swedish | Subscription | Warner Bros.<br>Svensk Filmindustri:<br>Tichning Marieberg | 33%<br><br>67% | 50,000 | Intelsat V A F11 | Films |
| Sky Movies (1989) | 16 | English | Subscription | Sky Television (News International 89%) | | 350,000 | Astra 1A | News |
| Sky News (1989) | 24 | English | Advertising | Sky Television (News International 89%) | | 1,000,000 | Astra 1A | Entertainment |
| Sky One (1989) | 20 | English | Advertising | Sky Television (News International 89%) | | 1,100,000 | Astra 1A | Entertainment |
| Sport Kanal (1988) | 18 | German | Advertising | WH Smith<br>MHJ<br>TeleUno<br>Générale des eaux | 49%<br>25%<br>18%<br>8% | 5,800,000 | Astra 1A | Sports |
| Sport 2-3 (to begin second quarter 1990) | 24 | French | Subscription | Chargeurs SA<br>Antenne 22/FR3<br>Compagnie financière<br>Éditions de Rothschild<br>Entreprise et partenaire<br>Crédit national | 37.8%<br>33.4%<br><br>13.1%<br>11.1%<br>4.6% | 1,100,000 | TDF 1 | Sports |
| SportNet (1990) | 15 | Dutch | Advertising | WH Smith<br>ESPN | 75.5%<br>24.5% | 1,000,000 | Astra 1A | Sports |
| The Sports Channel (1990) | 18 | English | Advertising | BSB | | 900,000 (estimate after the first year) | BSB 1 | Sports |
| Super Channel (1987) | 24 | English | Advertising | Beta Television<br>Virgin | 55%<br>45% | 20,000,000 | Eutelsat 1F4 | Entertainment |
| Tele 5 (1984) | 24 | German | Advertising | Fininvest<br>Tele München<br>W. Fischer | 45%<br>45%<br>10% | 10,500,000 | DFS Kopernikus | Entertainment |
| Teleclub (to be integrated into Première at the end of 1990) | 15 | German | Subscription | Kirch Group | 100% | 110,000 | Eutelsat 1F4 Astra 1A | Films |
| TV1000 (1989) | 12 | Swedish | Subscription | Scansat (Kinnevik 100%) | | 70,000 | Astra 1A | Films |
| TV3 (1988) | 8 | Swedish, English subtitles | Advertising | Scansat (Kinnevik 100%) | | 2,300,000 | Astra 1A | Entertainment |

## APPENDIX III
### (continued)
### Television Channels Initially Planned for Satellite Distribution
### (January 1990)

| Satellite TV Channel (startup year) | Hours per day | Language | Source of Financing | Owners | | Number of households served | Satellite | Type of Programming |
|---|---|---|---|---|---|---|---|---|
| TV4 (to begin September 1990) | 4 | Swedish | Advertising | Investor, Providentia<br>SPP<br>LRF Group<br>Natur & Kultur | 33%<br>35%<br>25%<br>17% | 2,000,000 (educated estimate) | Intelsat V-F2 (Astra ou Tele-X) | Entertainment |
| TV5 (1984) | 8 | French | Public subsidy | Herbert Kloiber<br>CCT<br>Fininvest | 45%<br>24%<br>21% | 5,000,000 | Eutelsat 1F4 | Entertainment |
| TV Sport (1988) | 18 | French | Advertising, user fees for cable | WH Smith<br>Générale des eaux<br>Labazzari<br>Caisse des dépôts | 39%<br>39%<br>12%<br>10% | 160,000 | Intelsat VA F11 | Sports |
| WorldNet (1985) | 3 | English | Public subsidy | United States Government | | 6,200,000 | Eutelsat 1F4 Eutelsat 1F5 | News |

Source: RENAUD, J.-L. *Op. cit.*, p. 94-100.

# APPENDIX IV

## Cable Television in Western Europe

**AUSTRIA**

Number of cable distributors: 226          Number of households with cable: 500,000

| Main franchises | *Firm* | *Region* | *Number of households with cable* |
|---|---|---|---|
| | Telekabel | Vienna | 195,000 |
| | WELS | Linz | 38,000 |
| | Liwest | Linz | 31,000 |
| | SAFE | Salzburg | 11,000 |

**BELGIUM**

Number of cable distributors: 43          Number of households with cable: 3,200,000

| Main franchises | *Firm* | *Regio* | *Number of households with cable* |
|---|---|---|---|
| | Gaselwest | Kortrijk | 234,000 |
| | Brutele | Brussels | 232,000 |
| | ALE-Teledis | Liège | 217,000 |
| | Teveoost | Gand | 206,000 |
| | Radio Public | Brussels | 199,000 |
| | Integan | Antwerp | 168,000 |
| | Coditel | Brabant | 167,000 |

**DENMARK**

Number of cable distributors: 562          Number of households with cable: 800,000

| Main franchises | *Firm* | *Region* | *Number of households with cable* |
|---|---|---|---|
| | KTAS | Copenhagen | 210,000 |
| | Jutlen | Viby | 150,000 |
| | Scansatel | Fakse | 52,000 |
| | Stofa | Aarhus | 40,000 |
| | Stemens | Jutland | 39,000 |
| | Funen | Odense | 30,000 |

# APPENDIX IV
## (continued)
## Cable Television in Western Europe

**FINLAND**

Number of cable distributors: 75          Number of households with cable: 550,000

| Main franchises | Firm | Region | Number of households with cable |
|---|---|---|---|
| | Helsinki TV | Helsinki | 145,000 |
| | Tamperen Tieto | Tampere | 36,000 |
| | Oulun Puhelin | Oulu | 34,000 |
| | Turun Kaapeli. | Turku | 30,000 |
| | Waasa Telefon | Waasa | 26,000 |
| | PTL | Rovaniemi. | 16,000 |

**FRANCE**

Number of cable distributors: 79          Number of households with cable: 250,000

| Main franchises | Firm | Region | Number of households with cable |
|---|---|---|---|
| | Lyonnaise des | Paris | 23,000 |
| | eaux | Suresnes | 22,000 |
| | Île de France | Lyon | 15,000 |
| | Lyon Téléservice | St-André | 12,000 |
| | Câble St-André | | |

**GERMANY**

Number of cable distributors: n.a.          Number of households with cable: 6,100,000

| Main franchises | Firm | Region | Number of households with cable |
|---|---|---|---|
| | PKB | Berlin | 468,000 |
| | DBP | Düsseldorf | 216,000 |
| | DBP | Frankfurt | 203,000 |
| | DBP | Hamburg | 184,000 |
| | DBP | Cologne | 122,000 |
| | MPK | Munich | 96,000 |
| | DBP | Nuremburg | 89,000 |

# APPENDIX IV
## (continued)
## Cable Television in Western Europe

**IRELAND**

Number of cable distributors: 40          Number of households with cable: 360,000

| Main franchises | *Firm* | *Region* | *Number of households with cable* |
|---|---|---|---|
| | Cablelink | Dublin | 230,000 |
| | Cork Comm. | Cork | 30,000 |
| | Westward Cables | Limerick | 11,000 |
| | Cablelink | Waterford | 10,000 |

**IRELANDS**

Number of cable distributors: 182          Number of households with cable: 4,200,000

| Main franchises | *Firm* | *Region* | *Number of households with cable* |
|---|---|---|---|
| | Kabel Televisie | Amsterdam | 345,000 |
| | GEB | Rotterdam | 229,000 |
| | Casema | The Hague | 205,000 |
| | Casema | Utrecht | 98,000 |
| | GEB | Groningen | 75,000 |
| | KTE | Eindhoven | 72,000 |
| | CAI | Haarlem | 62,000 |

**NORWAY**

Number of cable distributors: 120          Number of households with cable: 450,000

| Main franchises | *Firm* | *Region* | *Number of household with cable* |
|---|---|---|---|
| | Janco Kabel | Oslo | 105,000 |
| | Norkabel | Oslo | 72,000 |
| | TBK | Oslo | 56,000 |
| | Oslo Kablnett | Oslo | 51,000 |
| | Finvik | Oslo | 28,000 |
| | Baerum TV | Oslo | 24,000 |

# APPENDIX IV
## (continued)
## Cable Television in Western Europe

**SWEDEN**

Number of cable distributors: 243          Number of households with cable: 800,000

| Main franchises | Firm | Region | Number of households with cable |
|---|---|---|---|
| | Televerket | All | 646,000 |
| | Finvik | Stockholm | 72,000 |
| | Kabelvision | Askim | 64,000 |
| | Malmö Kabel | Malmö | 45,000 |
| | Starkabel | Stockholm | 27,000 |

**SWITZERLAND**

Number of cable distributors: 560          Number of households with cable: 1,600,000

| Main franchises | Firm | Region | Number of households with cable |
|---|---|---|---|
| | Rediffusion | Zurich | 281,000 |
| | Rediffusion | Berne | 88,000 |
| | Telekabel | Lucerne | 44,000 |
| | Wiedmann | Lucerne | 39,000 |
| | Coelco | Locarno | 27,000 |
| | RGA | Thun | 26,000 |
| | Video 2000 | Neuchâtel | 25,000 |
| | Rediffusion | Biel | 23,000 |

**UNITED KINGDOM**

Number of broadband cable distributors: 13          Number of households with broadband cable: 72,000

| Main franchises | Firm | Region | Number of households with cable |
|---|---|---|---|
| | United Cable | Croydon | 20,000 |
| | Coventry Cable | Coventry | 13,000 |
| | Windsor TV | Windsor | 11,000 |
| | Aberdeen Cable | Aberdeen | 10,000 |
| | Swindon Cable | Swindon | 9,000 |
| | ELT | Tower Hamlets | 6,000 |

Source: RENAUD, J.-L. *Op. cit.*, p. 121-124.

# APPENDIX V

## Major Discoveries in Computing

| | |
|---|---|
| 1642 | Blaise Pascal invents the first mechanical calculating machine (using gears). |
| 1822 | Charles Babbage develops his "analytical engine" capable of calculating logarithms. |
| 1834 | Babbage's machine becomes programmable. |
| 1847 | George Boole publishes his *Mathematical Analysis of Logic*. |
| 1886 | Burroughs' electromechanical adding machine. |
| 1890 | Hollerith punched card machine. |
| 1906 | First grid triodes. |
| 1928 | Principle of the magnetic drum. |
| 1932 | Couffignal's binary numbering. |
| 1937 | Aiken's theory of electromechanical computers. |
| 1938 | In Germany, Prof. Zuse develops the Z1, an addressable-memory machine capable of performing 100,000 binary operations per second. |
| 1941 | IBM develops the Mark I, an electromechanical computer. |
| 1943 | Zuse constructs a programmable machine with 64 kilobytes of main |
| 1944 | memory. |
| | Principles of the modern computer set out by the Hungarian mathematician |
| 1946 | Von Neumann. |
| | J. W. Mauchly and J. P. Eckert construct Eniac, first electronic computer, at |
| 1949 | the University of Pennsylvania. |
| 1950 | The Edvac, first computer to use Von Neumann's architecture. |
| 1951 | First use of magnetic tape for mass storage. |
| 1953 | Magnetic core memory in ferrite. |
| 1956 | First commercial computer (Univac). |
| 1958 | Invention of the FORTRAN programming language. |
| 1959 | Univac (Sperry Rand) "Solid State I", first transistorized computer. |
| 1960 | Invention of COBOL and Algol programming languages. |
| 1962 | Invention of real-time processing (Sperry) and time sharing (Honeywell). |
| 1965 | First minicomputer, Digital Equipment's PDP I . |
| 1971 | IBM Series 360, first computers to use integrated circuits. |
| 1973 | Invention of the microprocessor (Intel). First microcomputer. |

Source: MIZRAHI, Jean. *L'échiquier de l'électronique*. Paris: Hachette (1986), pp. 327-328.

# APPENDIX VI

## Important Dates in Telecommunications

| | |
|------|----------------------------------------------------------------------|
| 1833 | First telegraph link (Gauss and Weber). |
| 1838 | Morse telegraph. |
| 1844 | Washington-Baltimore telegraph line. |
| 1858 | First transatlantic telegraph link. |
| 1860 | First sound transmission using electric current (Reis). |
| 1864 | Maxwell's electromagnetic theory. |
| 1876 | Alexander Graham Bell patents the telephone. |
| 1877 | Invention of the microphone (Hughes). |
| 1880 | First telephone line, from Boston to Providence. |
| 1887 | Hertz discovers radio waves. |
| 1892 | The American, Strowger, develops the first automatic telephone exchange (electromechanical technology). |
| 1896 | Marconi invents the first "wireless telegraph" (radio) system. |
| 1901 | Transatlantic link using radio waves. |
| 1920 | First "broadcasts". |
| 1921 | Invention of multiplexing. |
| 1922 | First electromechanical television system (Zworykin). |
| 1929 | Electron-sweep television. |
| 1934 | First radar system in Great Britain. |
| 1945 | "Crossbar" communication station. |

Source: MIZRAHI, Jean. *L'échiquier de l'électronique*. Paris: Hachette (1986), p. 329.

# APPENDIX VII

## Concentration in the Electronics Industry

|  | Cumulative sales (billion $) | Percentage of world total | Cumulative percentage of 100 largest | Percentage of smallest |
|---|---|---|---|---|
| 5 largest | 153 | 18.6% | 24.9% | 24.9% |
| 10 largest | 238 | 29.0% | 38.8% | 13.9% |
| 20 largest | 353 | 42.9% | 57.5% | 18.7% |
| 30 largest | 423 | 51.5% | 68.9% | 11.4% |
| 50 largest | 507 | 61.7% | 82.6% | 13.7% |
| 100 largest | 614 | 74.7% | 100.0% | 17.4% |

The 30 largest firms account for 50% of the world total.

The 16 largest firms account for more than 50% of sales of the 100 largest firms.

Source: HUMBERT, M. and J.-L. PERREAULT. *Op. cit.*, p 17.

# APPENDIX VIII

## The 100 Largest Electronics Firms Worldwide (1989)

| Country | Rank | Firm | Electronics sales (billion $) | Country | Rank | Firm | Electronics sales (billion $) |
|---|---|---|---|---|---|---|---|
| U.S. | 1 | IBM | 62,710 | U.S. | 51 | Ford Motor | 3,017 |
| Japan | 2 | Matsushita | 27,313 | U.S. | 52 | Control Data | 2,935 |
| Japan | 3 | NEC | 21,799 | U.S. | 53 | Allied Signa | 12,900 |
| Nether. | 4 | Philips NV | 21,078 | U.S. | 54 | ITT | 2,888 |
| Germany | 5 | Siemens | 20,290 | U.S. | 55 | Compaq Computer | 2,876 |
| Japan | 6 | Toshiba | 19,107 | U.S. | 56 | TRW | 2,870 |
| Japan | 7 | Hitachi | 17,900 | U.S. | 57 | Wang Laboratories | 2,869 |
| U.S. | 8 | AT&T | 16,586 | Korea | 58 | Goldstar | 2,863 |
| Japan | 9 | Fujitsu | 16,138 | U.S. | 59 | Westinghouse Electric | 2,783 |
| Japan | 10 | Sony | 14,760 | G.B. | 60 | British Telecom | 2,775 |
| Japan | 11 | NTT | 13,800 | Germany | 61 | AEG | 2,767 |
| France | 12 | CGE | 13,247 | Switz. | 62 | Asea Brown Boveri | 2,680 |
| U.S. | 13 | Digital Equipment | 12,742 | Japan | 63 | Omron | 2,634 |
| U.S. | 14 | Xerox | 12,431 | Japan | 64 | Alps | 2,549 |
| U.S. | 15 | Hewlett-Packard | 11,899 | U.S. | 65 | Boeing-Packard | 2,420 |
| U.S. | 16 | GM Hughes Electronics | 11,359 | U.S. | 66 | AMP | 2,377 |
| France | 17 | Thomson | 11,184 | Japan | 67 | Kyocera | 2,321 |
| U.S. | 18 | Unisys | 10,097 | U.S. | 68 | DuPont | 2,300 |
| U.S. | 19 | Motorola | 9,620 | U.S. | 69 | Harris | 2,214 |
| Japan | 20 | Mitsubishi Electrics | 9,400 | U.S. | 70 | Emerson Electric | 2,213 |
| U.S. | 21 | General Electric Co. | 8,920 | Japan | 71 | Nippondenso | 2,203 |
| Japan | 22 | Canon | 8,400 | Japan | 72 | Seiko | 2,200 |
| G.B. | 23 | General Electric Co. ple | 7,370 | U.S. | 73 | GTE | 2,140 |
| Japan | 24 | Sharp | 7,100 | U.S. | 74 | Pitney Bowes | 2,120 |
| Germany | 25 | Robert Bosch | 6,615 | U.S. | 75 | Amdah | 12,101 |
| Italy | 26 | Olivetti | 6,586 | Italy | 76 | Fiat | 2,075 |
| U.S. | 27 | Texas Instruments | 6,522 | Germany | 77 | Grundig | 2,062 |
| Canada | 28 | BCE | 6,095 | Japan | 78 | Nintendo | 2,022 |
| U.S. | 29 | Honeywell Bull | 16,059 | Nether. | 79 | Memorex Telex | 1,983 |
| U.S. | 30 | NCR | 5,956 | Japan | 80 | Casio | 1,929 |
| Korea | 31 | Samsung | 5,954 | Germany | 81 | Bayer | 1,913 |
| Sweden | 32 | Ericsson | 5,534 | G.B. | 82 | Racal Electronics | 1,861 |
| U.S. | 33 | Raytheon | 5,333 | Japan | 83 | Citizen | 1,800 |
| U.S. | 34 | Apple Computer | 5,284 | Korea | 84 | Daewoo | 1,779 |
| France | 35 | Groupe Bull | 5,133 | U.S. | 85 | Sun Microsystems | 1,765 |
| U.S. | 36 | Rockwell International | 5,029 | Japan | 86 | Minolta | 1,759 |
| Japan | 37 | Sanyo | 4,428 | U.S. | 87 | Avnet | 1,709 |
| Japan | 38 | Ricoh | 4,400 | U.S. | 88 | McDonnell Douglas | 1,650 |
| G.B. | 39 | STC | 4,269 | U.S. | 89 | National Semi Conductor | 1,648 |
| U.S. | 40 | Eastman Kodak | 4,200 | G.B. | 90 | Ferranti International | 1,642 |
| U.S. | 41 | Tandy | 4,181 | U.S. | 91 | Tandem Computers | 1,633 |
| Japan | 42 | Oki | 3,987 | France | 92 | Matra | 1,584 |
| U.S. | 43 | Lockheed | 3,830 | Japan | 93 | Murata | 1,568 |
| Finland | 44 | Nokia | 3,589 | Italy | 94 | Italtel | 1,568 |
| U.S. | 45 | 3M | 3,297 | U.S. | 95 | Zenith Electronics | 1,549 |
| U.S. | 46 | Litton Industries | 3,265 | Japan | 96 | Matsushita Electric | 1,500 |
| Japan | 47 | Pioneer | 3,239 | Japan | 97 | Yokogawa | 1,500 |
| U.S. | 48 | Martin Marietta | 3,188 | Nether. | 98 | Schlumberger | 1,500 |
| U.S. | 49 | Intel | 3,127 | U.S. | 99 | E-Systems | 1,463 |
| Japan | 50 | TDK | 3,024 | .S. | 100 | Tektronix | 1,433 |

Source: HUMBERT, M. and J.-L. PERREAULT. *Op. cit.*, p. 19.

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## TOWARDS AN INFORMATION SOCIETY
*By Lucie Deschênes*

The emergence of the information society has been the subject of a variety of publications worldwide, but few studies have attempted to describe it or to assess the relevance for Canada of the relationships linking technology, culture and the economy that such a society implies.

This overview first describes the information environment, tracing the evolution of modern methods for transmitting information and the new information services, and then discusses the emergence of multimedia conglomerates and global networks.

Then, the paper goes on to discuss several social issues, such as the relationships between regulation and the public interest, international competition and national independence, and accelerated information exchanges and national identity.

We hope this publication will be useful to people involved in the information sector at a time when their decisions must be made in an increasingly complex environment.

Canada