The Electronic Connection

An Ess initial Key to Canadians' Survival

Bernard Ostry

What you earn depends on what you learn



The electronic connection

All the notions we thought solid, all the values of civilized life, all that made for stability in international relations, all that made for regularity in the economy...in a word, all that tended happily to limit the uncertainty of the morrow, all that gave nations and individuals some confidence in the morrow... all this seems badly compromised. I have consulted all the augurs I could find, of every species, and I have heard only vague words, contradictory prophecies, curiously feeble assurances. Never has humanity combined so much power with so much disorder, so much anxiety with so many playthings, so much knowledge with so much uncertainty.

Paul Valéry (1932)

Unpredictability in every field is the result of the conquest of the whole of the present world by scientific power. This invasion by active knowledge tends to transform man's environment and man himself -- to what extent, with what risks, what deviations from the basic conditions of existence and of the preservation of life we simply do not know. Life has become, in short, the object of an experiment of which we can say only one thing -- that it tends to estrange us more and more from what we were, or what we think we are, and that it is leading us...we do not know, and can by no means imagine, where.

Paul Valéry (1940)

I think there is a world market for about five computers.

Thomas J. Watson, chairman, IBM (1945)

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Shock is a common feeling these days among leaders of the world's five biggest industries: computing, communications, consumer electronics, entertainment and publishing. Under a common technological lash -- the increasing ability to cheaply convey huge chunks of video, sound, graphics and text in digital form -- they are transforming and converging, albeit at different speeds. The newsletter Digital Media recently compiled a list of just those alliances formed to foster interactive television; it went on for six pages of small print. On the surface, the pell-mell rush for allies looks like chaos but there is a clear pattern underneath it all. These companies, betting on the emergence of a vast digital industry, are jockeying for position in what they expect to be its three distinct segments:

- The *content* of digital transmission, such as databanks, consumer services, music, books and movies;
- The *delivery* of information over telephone lines, cable TV, satellites or other wireless networks;
- TV *controllers* and the like, to let consumers filter and customize the flood of data to fit their needs.

The right combinations of content, delivery and manipulation, company strategists believe, will create the hot products and services of the digital age.

The Wall Street Journal, July 14, 1993

INNOVATION. Always "dangerous".

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Dictionary of Accepted Ideas, Gustave Flaubert

The prospects for education in the age of technology are nearly boundless. Instead of relying on schools of education to produce inspired teachers (of which there are never enough), we can look to the new technology to provide superb educational programming to whomever wants to learn and to offer choices among competing programs in the same subject area. Instead of restricting the amounts that affluent districts may spend as a way of equalising resources, we can use the electronic medium to ensure that all children have access to the same educational opportunities at a reasonable cost.

Diane Ravitch, The Economist, September, 1993.

Pathfinder

I now mixed up some vermilion in melted grease, and inscribed, in large characters, on the South-East face of the rock on which we had slept last night, this brief memorial --'Alexander Mackenzie from Canada by land, the twenty-second of July, one thousand seven hundred and ninety-three.'

Alexander Mackenzie, Voyages

Two hundred years ago, Mackenzie celebrated the first crossing of the American continent north of Mexico by leaving his mark on a rock on the shore of Dean Channel, Bella Coola River. The vermilion and grease he used were trade goods. The great journey had been made in furtherance of the fur trade. This first crossing of what was to be Canada was achieved -- like so many successful advances in communication -- by intelligence and collaboration.

The Scotsman, tough and resourceful as he was, could not have travelled at all without the voyageurs, his French-Canadian canoemen. The canoes themselves were of native design and construction. The diet that enabled the travellers to move swiftly through the country was one that had been evolved by tribes far to the east. The guides who showed the way from point to point were of various nations along the route. And behind the whole venture was the capital and power of the British empire, the city of London and the manufacturers of the dark, satanic mills of the English midlands. A marvellous achievement and the first, long stride in the history of transcontinental communications.

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Purposes of work

The federal government proposes to accelerate the development of transcontinental communications for the 21st Century by ensuring an electronic highway system is established soon in Canada. As envisaged, the system would connect all communication networks, thereby giving Canadians maximum access to information services of all kinds. The goal is to provide an enabling policy to encourage private investment, speed the work and development of new services, and ensure that high-speed networks such as CANARIE, CA*net and others connect with other networks in Canada and the world. The government's policy concerns are to ensure that the education and learning needs of all Canadians are met, that knowledge and skills can be acquired in a flexible and cost-effective manner as learners access the vast array of services the EHS will make possible.

Terms of reference:

1. Submit a draft report setting out findings, analysis and recommendations to this end.

- 2. Advise the federal government on how best to work with provincial officials, international organizations and the private sector to achieve the above purposes.
- 3. Present and discuss recommendations with senior management.
- 4. Review comments and submit a final report.

Executive Summary

Early in 1993 the federal government announced its intention to create a national electronic information highway system. The government has never clearly defined what it means by such a highway. That is, Ministers, Departments, officials refer to the need to interconnect the high-bandwidth, all-digitized hardware everywhere on the one hand and, on the other, to foster the carriage by the new, speedy system of various types of software. Often, the software referred to is either within the public jurisdiction such as education, health and other government services or, as with training or general cultural programming, requires public sector financial support and policy encouragement. Clarification of the federal initiative and role is required: is the government doing one or does it recognize their fundamental interdependence and is thus pursuing both? There is a distinction. Federal statements suggest further that the wire/fibre will reach into every house, school, business etc. Political jurisdiction, constitutional niceties and the existing regulatory environment are not publicly confronted by Ottawa spokespersons with rare exception. In the circumstances, this Report assumes the federal government is pursuing an EHS which will be universally accessible and that both the hardware and software development will be assisted by Ottawa to the degree that the private sector cannot or will not underwrite it.

The federal governments' announcement was not entirely a new initiative; it was more like a new beginning for an old idea. In fact, something of the kind had been floated late in the 1960s and proposed officially in the early 1970s. Nothing came of the proposal then. In order to avoid having so excellent and necessary a proposal mired once more in indecision, we must look briefly at its history.

The story falls into three phases, each covering about a decade: 1965-75; 1976-85; and 1986 to the present.

In the first phase, the Science Council of Canada made the government aware of the

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convergence of digitized communications and computer technologies and how they could be used for accepted social purposes. These matters were referred to the Telecommission set up by the newly formed Department of Communications. But no one in the government was assigned to drive the initiative of an electronic network of networks forward. Other priorities prevailed, especially due to anxieties about US space development which led to the establishment of Telesat. Political difficulties (the government's near defeat in the 1972 election and the growing friction with the provinces, in particular Quebec, in the communications field) led to excessive caution and fear of ambitious projects. Energies were diverted to deal with popular fears of US domination of information and entertainment technologies and software. Not really to deal with them, but to appear to deal with the most visible irritants.

The second phase (1976-85) was one of apparent marriage of hardware and software concerns within the DOC. In reality anxieties about culture and national survival pushed aside interest in high technology, so that the promise of advanced telecommunications was ignored. Traditional obsessions with the CBC and broadcasting prevailed. Meanwhile, it is true, the modest federal investment in culture was paying off in the traditional media of print, film, theatre, dance, painting, where Canadian artists were holding their own with the world. The CRTC and cultural responsibilities within the Secretary of State were moved to DOC, reflecting the shift in interest and the optimistic hope that the earlier gap between carriage and content would be effectively bridged.

It was the provinces that saw the promise of telecommunications in the service of their constitutional responsibilities for education, training and health services. But it could be said that their involvement was less than whole-hearted. Training was found to be grossly inadequate to the needs of the global economy. Education was seen to be frighteningly ineffective, with alarming levels of illiteracy and innumeracy. The educational establishments protested that they had created the finest pedagogical systems in the world. For the future, though, they would have to aim at better results. And they began to do just that. One of the tools they sought to employ was telecommunications.

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The transition to an information society was bringing dismaying dislocations of the economy, with growing unemployment and deepening recession. Governments found themselves strapped for revenue in a time when social services were in heaviest demand. In more affluent times government had not hesitated to go into debt. Now the deficits were at depths that paralysed action. Federal attempts to correct some of the problems through new initiatives at DOC proved too little too late.

Gloom deepened in the third phase (1986-93) when it began to become apparent that Canada, from being a world leader and pace-setter in telecommunications had fallen behind its global competitors, and looked like it would fall farther behind unless something useful was done right away to improve performance. The US, Europe and Asia were moving swiftly to take the lead in this area. By now personal computers were widely used for many purposes, financial and retail services were computerized and many users were networking. The electronic highway system was not only an idea whose time had come, but also one that isolated Canadian actions began to try to build upon, assuming federal help. In Ottawa there were bureaucratic obstacles, yet the provinces and private sector were ready. Strong federal leadership would be needed to see the project through.

Specific recommendations to this end are put forward at the conclusion of the report along with strategies to ensure the partnerships essential to a successful outcome nationally and internationally. These include the need for a public statement of consequence from the P.M. of the day along the lines of those in the US to make clear the urgency and the recognition that all Canadians have a stake in the construction and nurturing of an EHS if they are to be participants and not victims of the information revolution; a five member cabinet committee reporting to the leader and colleagues; a Deputies committee serving Ministers; eight task forces external to but including representatives of the federal government to deal with the main problems. All this machinery to be serviced by the necessary secretariats and expertise. The timeframe suggested is five years for completion of the system.

However, there may be unconscious (and not so unconscious) obstacles in the path of those

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wishing to carry the proposal forward. If so, this would, of course, feed the general reluctance in Ottawa to entertain new initiatives in a penurious environment. Throughout my personal discussions with the federal bureaucracy on this and directly related issues well before and since this current contract, I have been left with the strong impression that hesitation or reluctance to act stems in part from a deep-seated suspicion or fear that powerful hostile constituencies outside of Ottawa - within the provincial governments, the educational establishments, the international agencies, Canadian regulators, the private and public corporate world of telecommunications et. al. -- stand ready to obstruct and/or embarrass a federal initiative to build an EHS rapidly. My experience denies this. Indeed, the reverse is true. Without exception, the likely players and potential partners, are profoundly disturbed and distressed by the lack of federal leadership, the loss of time and the declining reputation of Canada as a former leader in this field. Appended to this report is a list of persons consulted by me. They comprehend authorities in this subject from every region of Canada and from the United States, Mexico and Europe. Together they represent almost every aspect of this issue. Not one is a critic of the idea; each, in a position to do so, offered to co-operate with a federal initiative of the kind proposed.

With every new technology, especially one that promises to revolutionize some of the basic ways we conduct our lives in this world, the questions are do we need it? and what do we need it for? These questions were asked of space technology in the '70's but not of the technologies associated with a future EHS of which we knew more. But knowing what we know now, the questions have clear answers. Yes, we do need an EHS and what we need it for is to help solve some of our most severe educational problems, improve our competitive position in international trade by at least ensuring a highly skilled workforce, provide business and universities with improved channels of communication, promote self-reliance, strengthen our national identity, integrate government services so that they are more efficient and effective and help build "Team Canada." Throughout Canadian history, we have tended to react defensively to US development that seemed to pose a threat to our identity as a country. In the past few weeks the US Secretary of Commerce together with the Vice-President issued a lengthy paper with their announcement of details of the President's

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LEARNING & TRAINING ON THE ELECTRONIC HIGHWAY PROPOSED STRUCTURE



"National Information Infrastructure: Agenda for Action." This, of course, is just the most recent of a long series of statements by the leading members of the new administration from even before their election. But this is the superhighway plan of the White House. Apart from the various task forces and national advisory councils the President sets up because "the federal government has a key leadership role to play" in developing the highway is an "action" plan to "open up overseas markets". That's us. In the past Canadians, or at least their governments, have tended to be too slow and too cheap in the quality of their responses to similar threats from the Republic. And we have ended up the poorer and the weaker, comforting ourselves by whining. If we move now in the fields of education and training to start we might just protect our interest in time.

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What other government policy offers Canadian workers such potential; what policy offers such hope for our future?

Introduction

As technologies of communications converge and collide, there is no question but we are in white water. Carried forward with increasing speed we move through changing landscapes, a new heaven and a new earth every moment, rushing on in a confusion of tumbled waters, the distant tumult of unknown cataracts in our ears. In devising policy we cannot set goals and objectives as though we were in a settled landscape. As in the wartime song, "We don't know where we're going until we're there", what we need in these shifting perspectives is the skill of voyageurs to keep off the rocks and pace our onrushing journey, the calm of the bourgeois in observing the terrain and fixing positions by celestial navigation. Not forgetting that the river we follow is not the only one, and that other explorers are splashing their vermilion and grease on rocks in a myriad of other landscapes.

On February 23, 1993, the Honourable Perrin Beatty, Minister of Communications, spoke in Vancouver at the INTERCOMM '93 conference. Among other things, he said:

"This generation has the opportunity to reshape our nation for the future, to reassert our unity of purpose, and to expand the meaning and value of our citizenship... in the same way our forebears did by linking themselves together first with footpaths, horse trails and waterways, then with telegraph, rail and telephone lines, and now with roadways, optical fibre, cables and satellite beams.....I'm talking about an electronic highway system, as varied in its capacity and uses as is our national system of roads: a network for all of us to use in seeking vital information, government services, community participation, health care, police protection, education material, entertainment, even home shopping and banking services, allowing us to strengthen our common values and national identity."

The subject of the speech sounded new, exciting, promising, offering a bold, almost

visionary initiative in advanced technology. And there was no doubt that, taken together with similar announcements by other powerful ministers, what was promised was going to be delivered. In the same month, what's more, President Clinton was proposing the same kind of initiative for the US, including a plan to carry it out, while the US Congress were considering a proposal for a learning network dedicated to formal K-12 education and training from PBS.

On reflection, though, anyone who has lived through the vicissitudes of Canadian federal communications policy, is bound to observe that the idea behind the proposal is not new at all. So it is worth looking back to the birth of the idea of an electronic highway system and trying to understand why it is perceived as a novel proposal. To put it more bluntly, why have Canadians waited so long to realize an excellent idea? An outline of its history will help us to answer this question and to understand why the present time presents a matchless opportunity for action.

The history of Canadian telecommunications policy since 1968 has been one of clear foresight rendered futile by missed opportunity. The question arises: How should the federal government have organized itself and the country at large to implement and use the electronic highway system? If this sounds as much like a "why?" as a "how?" it is because there's an essential link between the two sorts of questions. One of the most significant lessons experience will teach us about new technology is that it does not get adopted just because it is there. There has to be a strongly-felt need for it in the national community. In other words, it has to be widely recognized and accepted as a means of achieving desirable economic and social objectives. It is critically important that the question of what action to take be decided now, without further delay, so that the newest technology may become available to serve our present and future social needs, along with the needs of business, scholarship and science. Both the former DOC

and the Department of Industry, Science and Technology led by their respective Ministers

and Deputies have expressed determination to have the system in operation by the year 2000.

There is another reason why completing this system is urgent. Much of the basic hardware exists in Canada, (if it's architectural design is not already in place), and the extra cost of linking it all together will be less daunting than that of starting from scratch. Meanwhile, we are told, foreign DBS technology threatens to displace what is already in existence. The projected Hughes Electronics satellite will beam programs direct to 18-inch dish antennae and decoders priced at US\$700 to the customers, who will also have to pay for the service generally as well as for individual programs. Technical quality, based on a digital system, will be high, with 150 channels of clear pictures and interference-free sound. Canadian newspapers and media routinely refer to the proposed DBS satellite as the Death Star. Why? Because it could kill off Canadian programming and cultural development -- and there we go again. It may be argued that the social needs for which the EHS is designed could be satisfied more economically by DBS. Not so -- the EHS should be tuned to our own social needs and sensibilities, while the DBS will carry only what its foreign owners find profitable. Further, the EHS will be able to carry hundreds of channels more than the DBS. And DBS from the US is only one such "foreign" threat. Canada's partners in DELTA and other projects in the European Community or the NAFTA are not marking time. Every day they strike ahead while we stand still increases our peoples vulnerability in the competitive world.

Large claims are plausibly made for the Electronic Highway System. In his speech announcing the project Mr. Beatty voiced what is almost certainly the expert consensus. In this view the EHS will advance the business and career dreams of citizens as they develop new goods and services in every sector of the economy. EHS will strengthen our prosperity and global competitiveness, revolutionize government decision-making by "empowering" citizens to influence policy, and give students better access to library and other learning services. And since (said Mr Beatty) "in our uniquely Canadian way, we strive to be a great people, EHS will empower and enable us in that noble pursuit." Right. The problem is that while Mr. Beatty made this statement just twenty-four hours after a similar one by President Clinton in Washington to build a US EHS, the White House has moved quickly to act. In

Ottawa, the federal government has done nothing.

Noble pursuits aside, in a time of massive unemployment and recession, Canadians have practical concerns.

An OECD document dated June 28, 1993, stresses the role of "comprehensive human resource development as an integral part of a policy package to boost employment performance." Education and training can make more workers employable. And the EHS is probably the most cost-effective way to meet their learning needs, and ensure that social policy and the labour market reinforce each other.

A study under way for the federal government claims that EHS will give industry and business the means to sharpen their competitive edge; will give Canadians at large improved access to more information; will deliver social services (in health-care, education and retraining) more cheaply; and will assure Canadian content in information-systems along with Canadian jobs in the new information services.

Other studies look to EHS to facilitate R&D in industry, and in the universities as well.

In education it is claimed that EHS will help solve the crisis in literacy and retraining. We may take judicial notice that the education crisis is a reality, and that it is a source of widely felt public anxiety. One of the features of a global economy, as the OECD suggests, is the need for continuing education and training, and for re-education and re-training throughout life. Many frustrated Canadians in these fields have calling for the same action well before the global economy entered Canadian consciousness. There were few listeners. In existing institutions, in universities and colleges and polytechnics, costs are rising while in some countries, including Canada, grants are falling with shrinking revenues. It is in these circumstances that we recognize a deepening crisis in education. There was never a moment at which it was more important than it is right now to act effectively and arrest forever the former trends to illiteracy and upgrade the knowledge and skills of workers and the

unemployed. It is clear that the most effective way to achieve this is through telecommunications. Private broadcasters backed by international capital have already entered the field albeit too often with inferior products.

In the US the Clinton administration has committed itself to creating an all-American EHS. In July/August 1993, Wired magazine, supporting the original decision, announced earlier that year, prescribes a "Jeffersonian ideal." It calls for: "A National Information Infrastructure that promotes grass-roots democracy, diversity of users and manufacturers, true communications among the people, and all the dazzling goodies of home shopping, movies on demand, teleconferencing, and cheap, instant databases -- it is composed of a high bandwidth, open architecture incorporating distributed, interactive switching." In the past few weeks, Clinton and Gore, following directly upon their campaign rhetoric on the subject as well as their formal announcement in February '93, have appointed the various senior officials "special assistant(s) for education and training to the President" who are responsible for carrying out the "President's and Vice-Presidents Technological Initiative." Included in the initiative is a \$5 billion worker retraining program. At the end of September the US Vice-President and the Secretary of Commerce published details of the steps to be taken to carry out the initiative at once.

Such are some of the claims made for an EHS in a time when optimism is otherwise rare. Yet, although seemingly marking time at the moment, Ottawa's preliminary reports suggest reasons to look forward to success. Canada is technically well equipped to deliver what is needed. We already possess one of the world's leading communications systems for the delivery of voice, data and broadcast information. As every Canadian knows, we have been good at communications because, as the world's second biggest country with a relatively small, scattered population, we had to be good at it in order to be a country at all. We were good at it even before we had a country.

We are served already by two of the most extensive, end-to-end digital telecommunications organizations in the world, Unitel and Stentor. And both wish to support a strong federal

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lead in spite of their criticism of aspects of the current regulatory environment. The two carriers already form an infrastructure which is 95 per cent digitized, as against 60 per cent for the US system. Canada is also one of the most wired industrial countries, with advanced cable and telephone services across the country. Again, we have been pioneers in the use of communications-satellites. Our communications industry in software and hardware is at the leading edge of the technologies and has a significant share of the world market in these products.

The federal government should take the lead, while assigning and recognizing important roles for its partners in an EHS project. For, as with Mackenzie's trail-blazing journey, the EHS is a venture in which many hands will be needed. Luckily there are scores of interested parties in the public and private sectors and the educational community, who are ready and willing.

Powerful ministers, as we have seen, have expressed determination to establish EHS. It is a superbly promising project, eminently practical and feasible, and a national bargain in which every participant wins. And it has the allure of something new. Or rather, it is not exactly new, and if the idea has not yet been acted on in more that 25 years, we need to know why - if we are to act effectively now.

According to an internal DOC strategic study, the main objective is to create a pan-Canadian information infrastructure, accessible to the public, adaptable to a variety of information services, present and future, affordable and effective and carrying Canadian content.

Defining the objective in the way just paraphrased is clear only to the point where content is introduced. We need to understand the past a little better in order to see why the question of content can muddy the waters. Important as it is, past anxieties on this score have tended to be counter-productive. Canadian ownership of communications companies did not guarantee Canadian content. Nor did regulation. To serve the country best, it may be more helpful to

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focus on the actual social needs of Canadians and Canadian communities -- in information of every kind, education, training and entertainment -- than to agonize over their fears. Instead of cursing the darkness, we need to light a few candles. But other elements of the objective as stated above do need to be stressed. The metaphor of the highway is suggestive.

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Highway: Public road, accessible to all, some licensed, some not. To regulate traffic there are arbitrary rules. In some countries traffic keeps to the right, in others, to the left. Which rule is adopted doesn't matter, so long as there is a single rule which is inflexible and binding on all users. Protocols and standards require enforcement.

Hence in the metaphor implied in "Electronic Highway System", the essential elements are "public", "accessible to all", "regulated."

The metaphor of the highway dominates contemporary thinking. But when the idea of a public information network was first broached, the image was that of a nervous system with the public link-up as backbone or spine. This may have been suggested by McLuhan's notion that media were extensions of the human nervous system. Or maybe it arose from the notion of the "body politic". At all events the image reappears in recent documents from IST. It may help us understand the present situation if we look back to the beginnings of official explorations of the subject.

In the mid-1960s the conquest of space, as an aspect of the Cold War and competition with the USSR, was a large and exciting topic. Canada was involved in NASA in various ways including weather rocket launchings at the range near Churchill, Manitoba. The rockets beamed back meteorological data in digital code.

In the US, Comsat, with its Early Bird satellite, was hailed as "the carriers' carrier." A

1965 article on Comsat by Tom Alexander in Fortune magazine concluded with a prophetic paragraph:

"Altogether, the satellite shatters the traditional segregation of kinds of messages and their links, and threatens to make obsolete the present organization of the communications industry. Nothing can stop this technical revolution, any more than the Mississippi River can be stopped. But the form the revolution will take, its organization, and the speed of its application are now being decided."

Even the reference to the Mississippi' seems clairvoyant, though the reason may have less to do with Fate than with incompetent engineers.

The Fortune article reflects the thinking of the 60s in its preoccupation with space and the satellite. A later article on Comsat in the same magazine (by Lawrence Lessing in 1967) was to attract interest within the Trudeau administration. Within the public service, it is true, experts were well aware of the possibilities. But their voices had not been heard. Again there were anxieties about US direct broadcast satellites and a concern for orderly, controlled development of communications technology in Canada by Canadians.

In early 1968 the Science Council of Canada set up a committee on scientific and technical information to recommend policy for coordinating scientific and technical information. The group submitted a study proposing a "knowledge network" whose function would be "to move the resource of knowledge wherever it is needed in Canada." The proposal was soon elaborated. The Science Council reported in 1971, calling for a "National Spine, or trunk computer communications network to link the sub-networks" with regulations to assure compatibility of systems. The National Spine should own and operate the system as a single network organization. In addition "digital transmission of data, including computer data, voice and television signals and facsimile, is technically feasible and economically attractive....The privacy and security of the data entrusted to the network system will be a major issue of concern." That was in 1971.

In 1968, after the euphoria of EXPO 67, the new prime minister, Pierre Trudeau, had wanted to be seen as creating new initiatives in government. In response to public concerns, several new departments were created, namely those of consumer and corporate affairs, of the environment and of communications.

The Department of Communications (DOC) was legally established early in 1969. Some months later, the first communications Minister, Eric Kierans, announced plans for a far-reaching study of Canada's \$5 billion -- and rapidly growing -- telecommunications industry.

Neither the Minister nor his able Deputy, Allan Gotlieb, had been familiar with the subjectmatter of their new responsibilities but they were eager to master it. The articles in Fortune magazine were predicting that direct broadcasting satellites would revolutionize telecommunications. It was clear that there was more to communications than McLuhanism. The main government interest had been in the initiatives of Bell Telephone, and in carriers regulated by the Department of Transport. There was a need for more emphasis on new telecommunications products, on content, on both software and hardware.

Gotlieb wanted the study to provide the new Department with a framework for policy and legislation. Intensive research was set in motion, at first within government departments. Briefs were also invited from the general public, especially consumers of telecommunications services.

The Telecommission, as it came to be called, would be run by a five-member directing committee. The five members named were: Allan Gotlieb, Deputy Minister of communications, chairman; Pierre Juneau, president CRTC; Gilles Bergeron, assistant deputy minister of communications; Paul Tellier, assistant secretary of the cabinet; de Montigny Marchand, research director; and H.O.R. Hindley as executive director, a widely

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experienced public servant with a passion for clear expression.

In addition to more than 40 special studies conducted in government departments, the Telecommission Report, Instant World, was published in 1971, a document of quite remarkable prescience. Chapter 15 on "The Marriage of Computers and Communications" begins by remarking that the conquest of space has overshadowed the digital computer applications that made it possible, and goes on to forecast that "the marriage of computers and communications systems, if it can be successfully consummated, may generate, within the next few decades, social changes more profound than those of the past 200 years." The report then reviews what is technically feasible at the time of writing. Human capability for logical thought has been "vastly accelerated and extended." Social and economic benefits are predicated on an assumption of virtually universal access. But the vision of universal access is not likely to be realized until the late 1980s, and then only if it is immediately accepted as a desirable objective. The Telecommission predicts, among other things, that "the spread of computer-assisted instruction in schools...could radically affect the whole process of education." The Baby-Boom generation was bursting the seams of the school systems of the provinces and a number of new universities and colleges had been founded in the 1960s. Several provinces, including Ontario and Quebec, established educational TV networks. The University of Toronto was hoping to use television extensively in its new Scarborough College, though this was not followed through. Instant World notes that remote access computers were already in experimental use in some school systems.

The Telecommission took note of predictions that a cashless society would soon arrive, but thought they were exaggerated. (Mcluhan was already describing money, with characteristic wit, as "the poor man's credit card.")

The Report warns that the future will be determined largely by decisions being taken "today" (i.e. in 1971): "As far as Canada is concerned, most of the action and planning for multi-service computer/communications systems has been going on in the United States." Noting a tendency for data-processing firms in the US to diversify into communications-functions, the

report predicts that telecommunications carriers in Canada might be exposed to competition of a kind difficult to regulate. Uh-huh.

There are hints of the recurrent Canadian anxiety about independence. Although Canada had an efficient east-west telecommunications system, US data banks could pull business southward. Canadian information already stored in US banks might well be used for the exclusive benefit of foreign commercial interests.

One of the most significant paragraphs in this strikingly able document begins as follows: "There appear to be some persuasive technical and short-term economic arguments in favour of promoting the development of a coast-to-coast network of dedicated digital transmission systems... to form what the Science Council of Canada has suggested should be called the Trans-Canada Computer Network." The idea had first been mooted publicly in 1968.

In other words, back in 1971, an interdepartmental committee in Ottawa -- prompted by the Science Council -- was already envisaging an Electronic Highway System. It would require a central body responsible for over-all planning, establishment of standards, research, and also subsidies, if such were necessary to ensure universal access.

One more sentence should be quoted: "Some cynics would suggest that all the fine-sounding social and personal benefits that are being predicted are no more than pie in the sky and, if developments are to be controlled only by market forces, they may well prove to be right."

This impious reference to market forces, the golden calf which was to be worshipped in the years to come, may have shocked some devout marketeers in political and business circles. But it should be said that at this stage there was no compelling bias in favour of government intervention.

Instant World forecasts nearly every technical innovation of the past 20 years. Free of jargon, the document is written in plain English and French. It was widely read and admired around the world, perhaps more abroad than within Canada.

Alerted by this document, the federal government appointed two task forces, one on computers and privacy, a subject already broached by the Swedes, the other the Canadian Computer-Communications Task Force, which reported its findings in 1972 in a two-volume study entitled Branching Out. The Task Force offered 39 recommendations and some suggestions. Action was taken in four cases, and begun in five others which were discontinued. Twenty-four recommendations appear to have been ignored, despite a green paper which followed about a year later commending the importance of the report.

Any sense of urgency aroused by Instant World soon faded. Lengthy discussions ensued with the provinces some of which, as noted earlier, had already set up educational TV channels of their own. By and large, they saw the usefulness of the new telecommunications but failed to commit the resources to it that could have made it effective. A federal program begun in 1971 on the use of technology in education lapsed in 1975 and the federal interdepartmental watch-dog committee on technology, set up in 1971, was scrapped in 1977.

The climate of national opinion, it seems, was not ready for a novel public venture in telecommunications. The need for it was not clear at the time to anyone but the farsighted scientists. The Cold War was still an obsession, and outer space claimed attention (as did UFO's, reflecting some popular anxiety). The DOC was busy with regulation of cable, national standards, convergence of technologies, security and privacy. Computer literacy was still relatively uncommon and regarded as an eccentric skill. Although computers were getting smaller and cheaper, the technology still seemed unfriendly to Canadian users.

It looks as if the reasons why nothing was done about the EHS were partly political. The education crisis had not surfaced. The nature of the information revolution was not yet widely understood. The need for competitiveness in world markets was not obvious to the business community, who had not yet learned to think globally. The provinces were leery of this new burst of activity in a field they were not certain was theirs. When, in 1972, the new government was almost defeated and communications minister Kierans resigned, anyone with an eye to the technological future began to look like a space cadet. The usefulness of

EHS for significant social purposes was not obvious. And it dawned on policy-makers that the mere existence of a technology did not mean that anyone would want to use it. (The conventional wisdom of 1967, as expressed in Fortune magazine, had been directly to the contrary: "Great new technologies move with an inner force. When an important development becomes feasible, it generally finds use." Not so long ago a sentimental movie about baseball, Field of Dreams, made ubiquitous the phrase: "If you build it, they will come.") After all, towards the end of the 17th century, Sir Christopher Wren, of the Hudson's Bay Company, had invented a machine that could knit stockings eight at a time, but no one saw the point of such a thing until years later, when Britain was ready for the spinning jenny. Wren went back to designing St. Paul's and other city churches. More to the point, perhaps, AT&T invented the cellular telephone in the 1940s, but thought it little more than a niche product!

In the increasingly bearish mood of the mid-1970s, Instant World began to seem irrelevant. Governments were running out of money. While they worried about sovereignty, culture, the boob-tube and US spillover, cable was delivering what is today feared from the so called Death Star, the uncontrollable DBS, -- American schlock.

Not until November 30, 1978, was the next federal landmark decision taken, when communications minister Jeanne Sauvé announced the appointment of the Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty. Rapid advances in technology had triggered familiar Canadian anxieties about national identity and independence.

Many politicians had drawn attention to the need to safeguard Canada's cultural sovereignty (the Consultative Committee were among the first to use this expression) as others had done, mutatis mutandis, before them -- Graham Spry, Allan Plaunt, Sir John Aird, Vincent Massey, Robert Fowler and Judy LaMarsh.

Members were the Hon. J.V. Clyne, CC as chairman (he had clung to his honorific after

stepping down from the BC supreme court to become a lumber magnate); Beland Honderich, publisher of the Toronto Star; Guy Fournier, a Quebec journalist and film writer and past president of the Writers and Artists Federation of Canada; Lloyd R. Shaw, a Halifax business leader and Canadian nationalist; Robert Fulford, editor of Saturday Night magazine; Alphonse Ouimet, CC, past president of the CBC; Dianne Narvik, a Calgarian businesswoman with interests in pipe-lines; and, once again as secretary, Henry Hindley, whose long experience in government and telecommunications proved invaluable; and Pierre Billon, a DOC official and an author in his own right, as associate secretary. If there was any noticeable bias in the Committee's composition, it was towards nationalism.

They were to be an "arms-length" committee, "wise and experienced Canadians" free of formal links with government, though also free to use its services. In order to hasten their findings, they were not going to take up time with public hearings. They were asked to make specific recommendations on a strategy to restructure the Canadian telecommunications system in a way that would safeguard national sovereignty. Terms of Reference were:

to make recommendations on the future of the Canadian telecommunications system in relation to new technologies and the need for Canadian hardware and software resources to meet foreign competition, with particular reference to the role of broadcasting in contributing to the preservation of the sovereignty of Canada, including:

(a) the use of communications satellites to the best advantage of Canada;

(b) the status of the cable companies in relation to broadcasting and to the common carriers in the provision of new services;

(c) the importation of foreign programming;

(d) the framework and timing for the introduction of pay-television nationally.

Expanded terms of reference were added when the government decided that the Canadian communications system was "in a profound crisis more severe than any...since the 1920s."

And now the committee was to bear in mind the current mixture of Canadian attitudes toward government intervention, regulation and public expenditure, and to leave constitutional matters to a first ministers conference.

In the event, the Clyne committee invited, and received representations from 22 delegations and 67 written briefs. It submitted its report in March 1979 under the title Telecommunications and Canada.

In retrospect, the report appears to have represented a transition from anxieties about hardware and technical systems to anxieties about software, culture and sovereignty. Just as the DOC had moved the focus of concern from the Department of Transport's subject matter of the machinery of telegraphy and telephones and regulation to informatics, electronics and privacy, the Clyne report returns to the traditional Canadian enterprise of safeguarding selfgovernment and cultural development. Broadcasting received a large share of attention.

Within the DOC at this time it had been noted that a group of experts had invented a new system of interactive television, then called Telidon, also known as Videotex and based upon the North American Presentation Level Protocol-NAPLPS-international standard that Canada was instrumental in developing. Efforts were made to make commercial use of it, but industry was not interested in products that could take years to yield profits, and it was used experimentally in Ontario as a medium for dispensing information to tourists. Bell Canada and Northern Telecom tinkered with it in various applications in the Prairies as well as urban centres. It became the forerunner of the Globe & Mail's information retrieval system. But like the recommendations of the Clyne committee, Telidon languished for lack of real

political or commercial impetus. The public mind (and bureaucratic interest) was elsewhere. Its technology was pirated in Scandinavia. And meanwhile, silently, computer technology was racing ahead. Costs fell dramatically while miniaturization advanced. Electronic products multiplied. Fathers found themselves obsolete when the children could program devices that were opaque to their elders. Word processing was revolutionizing offices while factories and workshops made increasing use of cybernetics. The word "informatics" came into common use.

In the fourteen years since then the onrushing spate of new technologies has overtaken the more technical parts of the document. The use of faxes and computerized banking, the trend from main-frame to personal computer-networks, and then to powerful laptop computers, the use of portable telephones, the computerization of library catalogues and museum inventories, the development of networks, large and small, modems and bulletin boards, the use of satellites -- all this has been offset by concentration of wealth and power in the hands of a few, very large, international communications corporations beyond reach of most law or regulation, by increasingly high levels of unemployment and the growth of functional illiteracy especially in math, science and technology.

Above all, the momentous fact of digitization has changed the world. It is in truth an advance in human communication as significant as the invention of alphabets -- which the ancient world believed to be of divine origin.

The alphabet provides a code by which all the words of a language can be expressed by the use of roughly a score of abstract symbols, meaningless in themselves. Digitization reduces words, images, sounds and numbers to abstract binary signals, based on the digits 1 and 0, the on/off positions of electric switches or (in fibre optics) of light and occlusion. Digital technology effectively dissolves the distinctions between delivery-systems. Cable, telephone, glass fibres, Herzian waves, all can carry the signals; magnetic tape, video-tape, CDs, floppy disks and hard disks can record, code and index them. And more recently it has become

evident that electronic data can be compressed, saving time and hence costs in long-distance transmission.

Among findings that proved prophetic, the Clyne report also warns, "much has already been said about the social impact of computer-communications..., but we believe few people understand how devastating that impact might be on jobs for Canadians."

In the Scots version of the story of Dives finding himself broiling on the hob of hell, the sinner wails, "Laird, Laird, ah didnae ken it wad be like this!" "And the Laird in his infinite guidness and maircy replied, 'Weel, mon, ye ken the noo!'" Like Dives, we know now, when it's almost too late.

Noting Canadian leadership in some technical developments, the report gravely remarks: "this is an industrial sector that can create jobs and be competitive on an international scale. The timing is important. It may not be possible to do tomorrow what we fail to do today." The sad fact is that, such were the political and bureaucratic exigencies, we did fail to do it yesterday. <u>Today may be our last chance</u>.

The Clyne report stresses distinctions between carriage and content, insisting that the message is distinct from the medium. McLuhan's famous aphorism ("The medium is the message") had been taken literally in some circles, and sometimes is still so taken, though in essence the Guru probably meant no more than that media exerted powerful effects of their own, independently of their content. It was an idea derived from Innis, who may have got it from W.E.H. Lecky, an Irish historian and MP of the late 19th century. Carriage media need regulation, rules of the road, as it were; regulation of content has proved impossible and, were it possible, would be almost certainly undesirable.

The report also contains chapters on cable, broadcasting, programming and pay-television, all

reflecting the perennial worries about foreign domination that would have been uppermost in the minds of the committee members in journalism and broadcasting, Fulford, Honderich, Ouimet, Fournier, and of the strongly nationalist Shaw. Whether they were computer-literate is not on record.

A chapter on informatics quotes the Science Council of Canada and the earlier Instant World for technical aspects. And just as the origins of the DOC seem to have been influenced by an article in a business magazine, government actions in Britain on telecommunications are shown to have resulted from a BBC program on the microcircuit silicone chip. The extent to which informatics reduced employment was foreshadowed in this program, as were some of the technical marvels of informatics such as a computer reading aloud to a blind man and a quadriplegic controlling his wheelchair by word of mouth.

Change and innovation, praised in a tireless chorus of technical literature, have become the environment of our time, the possible is presumed to have occurred already, so that we begin to suffer an effect not unlike that induced by certain narcotics, where everything seems to be happening too slowly. There was an anecdote in the 1950s about a "hipster" (pre"hippy") knocked down by a speeding car; the hipster dusts himself off and drawls, "Man, I thought he'd never leave!"

Despite the plummeting cost of electronics it must be admitted that many of these marvels do not yet seem to be in daily use. It may be noted, though, that existing computers are routinely wired for sound, against the day when even the cheapest will be controllable by voice.

In the same chapter is found the bleak statement, "Canada, which had a head-start on other countries in the early 1970s, has now fallen behind, not very far but far enough to require

urgent attention." Since the urgent attention was not forthcoming in the 1980s, one may judge the degree to which Canada has lagged behind by the 1990s.

The Clyne report ushered in a time of renewed pre-occupation with Canada's capacity to retain it's integrity as an independent country and thus, with broadcasting and what Europeans have come to call "Canadianization" -- the swamping of our broadcasting system by dumped US production. The report followed its recommendations with a heartfelt "exhortation", in effect a strong warning of the danger to national sovereignty resulting from the provision of superb facilities for foreign penetration of the Canadian communications-system. With the fall of the government in 1979, the Report fared almost as well as Instant World had earlier.

Broadcasting -- obsessions of late afternoon

By the 1980s the high noon of broadcasting had passed. No longer were vast, captive audiences glued to their sets for the benefit of a few network advertisers. Private broadcasters complained about "fragmentation" of audiences; in other words, there was more choice for viewers. But Canadian fears about being swamped by American production, American commercial values and American manipulation were not allayed.

In May, 1985, Flora MacDonald, Minister of Communications (repeating a decision of one of her predecessors, David MacDonald) established a task force to recommend a cultural and industrial strategy to guide Canadian broadcasting for the remainder of this century. Co-chairmen were Florian Sauvageau and Gerald Lewis Caplan, with five other members experienced in broadcasting. Five of the seven were bilingual and the report, presented in September 1986, speaks feelingly of inadequate translation from English to French.

The task force received 253 briefs, heard 276 submissions, and met privately with 170 persons. The report draws attention to the paucity of materials bearing on its subject, stating that the Canadian broadcasting system is "substantially more complex than most Canadians

realize," and is "one of the great achievements of our nation." Looking back, the task force sees "a decade of studies".

It has to be said that reading these studies, so much alike despite their differences, reminds us of a remark McLuhan made about city planning, to the effect that all the planners could do was study the scene -- by the time they were ready to report, the scene had changed. Not that this reduced the value of their efforts; studying the scene was essential. Which in turn reminds us of Mackenzie and his canoemen; keeping off the rocks and avoiding being swamped were vital to survival.

Only a few years earlier, composer Lou Applebaum and author Jacques Hébert had chaired the Federal Cultural Policy Review Committee set up by Hon. David MacDonald in an effort to bring order to a chaotic area in which the federal government had been mired for years. Decisions on cultural matters were routinely deferred until the day when a federal policy would be declared. In 1982 Applebaum-Hébert concluded that the CBC was essential to Canadian culture, and that private broadcasters should be required to make a larger contribution to new Canadian programming on English-language television. The 1985 task force concurred, adding, "there has hardly been an inquiry that has not agreed on the overriding dilemma of the Canadian broadcasting system," which called for serious Canadian programming in a system dominated by US programming, which in turn was marketdominated.

But Applebaum-Hébert (in the view of their successors) had proposed a measure which would have aggravated the problems, namely, to restrict CBC to airing programs produced outside the corporation.

Sauvageau-Caplan took note of attempts by the DOC to gain control over the CRTC, after it had been set up in the late 60's as an "arms-length" authority regulating radio and television. (The theme of interdepartmental rivalry and in-fighting recurs. Such conflicts, though wasteful, are endemic to large bureaucracies and especially to those in democratic governments.) The report criticized DOC's "miscalculation" of the degree to which direct broadcast satellites would be adopted. And "in institutionalizing the status of cable, the Department's strategy was legitimizing cable's overriding function of bringing more American programs to more Canadians." Perhaps despairingly, the 1985 committee added that "whatever kind of Buck Rogers future" was in store for us, the Canadian tradition demanded that we continue to "entrench the Canadian presence in our broadcasting system." The word "entrench" doubtless reflects what Northrop Frye called our garrison mentality, our sense of being under siege. Finally, "more than ever, broadcasting must be seen as a fundamental part of cultural policy. It must be program-driven, not hardware-driven as in its first decades." Shades of Clyne!

In 1988 this report appeared to bear fruit. That year produced a new broadcasting act based on the recommendations of Sauvageau-Caplan, as well as a publication designed to sell the new broadcasting policy, Canadian Voices Canadian Choices. The new statute echoed many clauses and phrases of previous enactments, especially those concerned with culture and identity. It also deliberately followed "the basic structure of its predecessor, the 1968 Broadcasting Act." Canadian Voices announced priorities:

Programming. The policy called for more Canadian drama and variety in primetime English-language television.

Fairness and Access. This had to do with la difference between Frenchness and Englishness in Canadian culture and expression.

Technology. Of which a good deal more would be written and said.

The central importance of the CBC to the continuance and development of Canadian culture was reiterated and stressed. The doctrine had become one of the accepted pieties of public discussion but, like the money issued in Samuel Butler's musical banks, it was not honoured in the market place. Crippling budget cuts were continued.

To go back a year, now that DOC had captured official cultural authority, the Department did make efforts to increase public awareness of what was happening in the country and the world as a result of the new technologies. Communications for the Twenty-first Century, issued in 1987, surveys some of the developments. It concludes that the new information technology is "transformative" and will radically change the way we work and live.

This has come about as promised. In the grip of social fevers brought on by such changes, we have to reproach ourselves with having done nothing despite clear warning. The bleak facts are that changing communications have gone far beyond threats to sovereignty or to Canadian arts and sciences to throw increasing numbers of men and women out of work, to exacerbate functional illiteracy and ignorance, and to contribute to the provocation of whole populations to increasing frenzies of tribal anxiety and anger. The irony is that the same powerful technologies could reverse these conditions, given the political will to use them for that purpose. It may have been inherent in the nature of commercial television broadcasting to reduce its appeal to that of the lowest common denominator -- we can still see the tendency in CNN, which shows ever more viewers ever less about the world -- but the same cannot be said of narrowcasting and individualized services such as are now coming into use.

Federal bureaucratic difficulties in the late 1980s proved distracting to the government. In 1987 an Assistant Deputy Minister in the DOC had found that the obsession with software and nationalist concerns had seriously weakened the Department on the technical and hardware side. Research and development was all but absent and no policy existed to guide the government in telecommunications, even though the federal government was in the midst of negotiating with the provinces on such issues. But, when DOC moved to strengthen or rebuild those sections that dealt with such matters, they found themselves in direct competition with counterparts in Industry, Science and Technology. Prodigious efforts were made to recover lost ground: the regionalization of the joint industry/government initiative to foster developmental alliances expressed through Vision 2000, the stimulation of R and D within government and industry, the attempt to draft new telecommunications policy and legislation to strengthen the infrastructure, the establishment of new standards as well as the

attempt to streamline and re-order the existing ones, the drafting of new spectrum policies, the planning and establishment of a new telematics and new media branch, the promotion of greater use of referral databases etc., etc. Unfortunately much energy and time was wasted in fighting over turf. The highway was not part of the turf so that, by 1992, when DOC published New Media...New Choices, an outline of how it would refocus it's activities to establish an integrated approach to develop policy and new directions in information technology, it was too late. Their power base had been stolen from under them. It had moved to IST.

The Information Society

One economic trend of the '80's in North America was to offshore manufacturing, keeping such functions as research, design and marketing nearer home. A Montreal entrepreneur, for example, set up as a clothing manufacturer, with the design function in New York, an entire village in India doing the work by hand or with simple machinery, while the marketing was done from Montreal. Materials and labour cost little; the value added was from mental functions in North America, which came to be known as "information."

At the 1992 Couchiching Conference, Georgina Wyman gave a vivid illustration of the information component in manufactured goods. A former Deputy Minister of Supply and Services who had become a Bata shoe executive, she showed two almost identical shoes, a Reebok Pump and a Bata Power Shoe. Both were assembled in Korea or China, probably by the same company, with agents of both Reebok and Bata in the same building. Both cost between US\$15 and US\$20 to make, but one shoe sold for \$150 and the other for \$70. The brain or value-added component was supplied in North America, including the design and marketing functions. Different prices reflected different levels of demand linked with marketing strategies, the more expensive shoe having become a modish item with teenagers thanks to effective promotion and advertising.

The trend, in which the "clever" work of business was done in the developed world and the drudgery in emerging economies, made increasing use of new information technology and soon there was general talk of the Information Society, the Information Revolution and so on.

Global competition between nations intensified. It was very important to be a clever nation rather than one of the drudges. Being a clever nation meant commitment to change, and that involved, in addition to embracing the new, the shedding of old products, old habits and increasing numbers of workers, old and young.

Knowledge, it was said, was the key to employment and wealth. So it was all the more dismaying when, say, researchers with PhDs in microbiology found themselves out on the street. Middling nations like Canada could not afford this kind of wastage.

The 1987 DOC study, Communication for the Twenty-First Century, referred to earlier, described some of the technology and outlined the concept of the Information Society. "And it must be borne in mind," the study remarks, "that much of this technology is little more than five years old." An exposition of the importance of data bases and of software follows, noting that software might be the single most important commodity in ensuring future national economic success. "Canada cannot afford not to have a lively and vigorous software industry. Like the database industry it will be central to our social, economic and cultural life." Seven years have passed: and the "vigorous software industry" is where? It is here, but tiny and weak, operating in a less than welcoming environment.

We were to "address our weaknesses" -- i.e. not necessarily to correct or overcome them, but to look at them sternly, maybe wringing our hands a little. The increasing use of that word "address" reflects a sense of impotence that seems to have afflicted whole nations paralyzed by ever-accelerating change. Action is seldom resorted to, while studies multiply. One is reminded of the actions of a fighting bull when the matador has played him to a standstill with a brilliant sequence of passes. The bull watches every movement of the muleta as in a trance. While the matador finds his moment of truth as he drives home the Toledo steel, the bull is addressing the issue.

It is helpful to recall once more the lesson that merely knowing how to do something does not mean there will be any demand for it. As the present moment, Japanese buyers are reported as massively indifferent to the latest state-of-the-art offering from SONY, a MiniDisk recorder/player, "the biggest step yet in personal and musical entertainment for people who never stop moving." Sooner or later, it seems, they do stop moving. With a new technology, the questions are, do we need it? and what do we need it for? These questions were not asked in the 1970s, and so nothing was done about EHS. But knowing what we know now, the questions have clear answers.

It seems that in the 1970s Canada was preoccupied with building superb telecommunications as a kind of defence, much as the canals, the railroads and the TransCanada Highway had been built -- to assure the movement of our own information within our own territory.

The 1980s saw a frantic obsession with the amazing fact that the existence of our own highways merely facilitated the movement of foreign traffic.

Yes, we do need an EHS, and what we need it for is to meet our educational needs, improve our competitive position in international trade, and provide business and the universities with improved channels of communication.

It is in education that the need is most obvious, since every family is painfully aware of deficiencies in opportunities for learning, training and retraining. If our children are not learning in the school system as at present organized, technology offers promising alternatives, such as the Alberta Premier's vision of nationally wired schools and the various recent proposals for Canadian cable in the classrooms. There have, of course, been numerous analyses of the data expressing our educational problems. In 1992, the National Advisory Board on Science and Technology counted the number of expert studies over a tenyear period: 40 reports and 600 recommendations. Not one led to action. We know what to do. We have the advanced telecommunications to deliver life-long learning and training. We invest more in education than any other country except Japan, pay teachers more than the US, conduct elaborate studies in all provinces.

Educational authorities claim we have a wonderful system. But the results are horrible: a high-school dropout rate (often challenged!) of about 30 per cent with a small percentage returning after a few years; 28 per cent of young people born here functionally illiterate, and 40 per cent innumerate. Some graduates need retraining to do their jobs, some to succeed at university. Most recently, a widely reported survey of more than 26,000 Americans gives a far more alarming picture. Nearly half the adult population of the US suffer from impaired literacy, unable to write a letter in English about a billing error, or to calculate the length of a bus trip from a schedule. There is no reason to believe that Canadians would make a better showing.

In Canada, under-exploiting public institutions in the hope that private agencies would take their place has proved a costly illusion. Some 75 per cent of employers surveyed by Statistics Canada in 1987 provided no formal training at all for employees. Studies showed a gaping discrepancy between industry's heavy investment in technology, equipment and machinery and their failure to make the essential human investment in education, training and skills. Those few Canadian public and private corporations that do make the investment refuse, unlike their European counterparts, to share the training programs with anyone outside their industry.

Statistics Canada predicted that from 1987 to the year 2000, 64 per cent of new jobs would require 13-plus years of education. Yet almost two-thirds of Ontario youth entered the labour market without any post-secondary education at all - one third had not completed high school. The trend is likely to continue. A recent survey by Price Waterhouse, quoted in BusinessWeek, cites 75 per cent of 316 "top New York executives" to the effect that most new entry-level jobs will require specialized training beyond high school or a college degree in the next four years. An expert opines that new technology creates jobs, but at higher skill levels "which hits kids the most."

There's some promise in the fact that educators now claim they are going to focus on results.

But the best guess is that the only way to do something fast and effective about illiteracy, innumeracy and ignorance is to give all learners access to the highly efficient, accessible and cost-effective technology of telecommunications. In 1991 the Carnegie Foundation for the Advancement of Teaching called for, amongst other proposals to improve education and training in the US, the expanded use of telecommunications, especially TV and video. In December, 1993, PBS will launch a new service by satellite (paid for by the US congress) to do just that.

The provinces

Despite federal fears that jurisdictional jealousies could raise their ugly heads, the provinces fully endorse the federal initiative towards a National Electronic Highway. Advised by their own educational and telecommunications commissions, they have been calling for speedier action from Ottawa. Ontario, British Columbia and, above all, New Brunswick are openly committed to supporting it, and all the provinces together have discussed the broader use of telecommunications in education and training at more than one premiers' meeting during the past five years, most recently at Baddeck.

A recent Commission on Excellence in Education in New Brunswick observes, "While education is and should remain within the constitutional jurisdiction of the provinces, there is a compelling need for a national strategy in education and training that includes the federal government, especially at the post-secondary level."

The same Commission recommends, "that the New Brunswick government explore with the federal government and New Brunswick's learning technologies and telecommunications industries the development of a learning technologies industry for domestic and export purposes." It calls for a "central role for the central government" in Canadian education, noting that "the uncoordinated efforts of provincial governments were not sufficient to meet national needs." Moves toward a telecommunications network should be explored through the existing NB*net for research.

With the provinces and territories as with the federal government necessity has been the mother of invention. Vast distances and limited resources have impelled a search for the most cost-effective ways of carrying out the most expensive provincial responsibilities, health care and education. Telecommunications are being exploited for distance learning and telemedicine. From faxing to teleconferencing and other techniques, the provincial authorities have used whatever means come to hand in the effort to extend their services as far as they can go. What has already been achieved is in itself remarkable; a succinct overview of provincial activities in telecommunications by the DOC fills two thick binders of close print. What is possible in the near future is even more remarkable.

An example from medical technology: it is well known that highly skilled surgeons are extremely costly, because of rare talent and years of training. But thanks to computer and communications technology, an exciting possibility exists that the techniques of what is called laparoscopic surgery can be practised over distances. A specialist in, say, St. Johns, Nfld, using this technique, will be able to remove a gallbladder from a patient in Labrador without leaving his home base. The equipment will not be expensive. But finding a way of using it could make more and better use of a scarce resource.

More generally, telemedicine is out of the experimental stage, offering library and radiology references to permit accurate long distance diagnosis and treatment. (The forerunner was the GP's phone visit, "Take two aspirins and call me in the morning." Space medicine taught the faculty to monitor vital signs in outer space.)

In Ontario the Ministry of Culture and Communications issued a report in August 1992, prepared by the province's Advisory Committee on a Telecommunications Strategy and titled Telecommunications Enabling Ontario's Future. The committee was large, including representatives from government, business, unions, the educational and library communities, first nations and at least one author. An even larger economic infrastructure sub-committee includes many other active interests in telecommunications. And with yet another populous sub-committee on Strategic Application by Government it can almost be said that everyone who is anyone in the province's telecommunications is involved. The main committee was chaired by Don Tapscott, then vice-president, technology, DMR Group Inc. In all, more that 100 leaders in their fields contributed their work as volunteers.

As in Mackenzie's heroic journey from Canada by land to the Pacific shore, intelligence, collaboration and partnership were of the essence.

The report offers a vision: "Enabled by telecommunications, Ontario, and in turn Canada, will be the best place in the world to live, work, learn, and do business." Goals are proposed: "A telecommunications structure which enables growth; a dynamic, growing telecommunications sector; enhanced quality of life through telecommunications; strategic application of telecommunications by the Ontario Government." The committee proposes "a network of networks," which on a national scale means EHS. There is no hint of jealousy about bureaucratic turf. Every line, every paragraph breathes eagerness to see the job done.

In May 1993, the province's Ministry of Economic Development and Trade announced the first meeting of the Council for an Ontario Information Infrastructure, chaired by Jim Coombs, past president and CEO of Sasktel and consultant with Deloitte & Touche, who said, "Our mandate is to lead the campaign for an Ontario information infrastructure."

The foremost interests of the province, as of others, are in the uses of an EHS for distance learning and for health care. In British Columbia the Technology Alliance, following my discussions with their leader, in a bulletin dated July 1993, hailed the federal initiative on "a learning culture", stressing that education should focus on results, and that learning opportunities should be extended throughout life using information technology.

Education and health are subjects reserved to the provinces by the constitution but no

province has shown the slightest objection to working with the federal or other governments to achieve its goals with reduced costs and enhanced efficiency. Having managed to work together with all the interested parties within its own borders, the province is not likely to baulk at working with others beyond them. The metaphor of the highway implies this. There were difficulties, to be sure, in patching together the Trans-Canada Highway, which is only some 30 years old. But that was a matter of who should pay the shot and who should get the credit, a straightforward fight between bureaucrats at various levels. This time around, no one is looking for all the credit -- if only because the private sector and the provinces have been quicker to act than the federal government. Everyone will concede that Ottawa was the first to know what to do, even if it turns out to be the last to take action.

And the provinces are not likely to be impressed by a federal hesitation waltz. They are ready to dance. The best way to work toward the EHS with the provinces is for the federal government to become a dancing partner and provide some of the music and some of the musicians.

EHS at DOC and IST

Throughout the two decades following its establishment, DOC's interest in the EHS gradually lost momentum. Key officials were transferred elsewhere or left for the private sector and, generally speaking, did not see technology as a priority. By the early 1990s, in spite of last ditch efforts at DOC to revive its telecommunications interests, the initiative had shifted to scientists in the Department of Industry, Science and Technology. Dr. Digby Williams, director of the Microelectronics Technology Office, with senior advisors Joseph Padden and Rafiq Khan, commissioned a study from HICKLING and Comgate Engineering Associates Ltd., in association with the Alberta Research Council, the CGI Group, and Lang Mitchener Lawrence and Shaw. Once more, partnership was of the essence.

This was to be a feasibility study of a national high speed communications network for research, development and education. The network would have greater capacity and functionality than existing networks for R & D and education and could also serve as a model in demonstrating new equipment and services in information technology. More than 400 persons contributed to the resulting report, which was delivered to the Department in March 1990. Its objectives were to enhance collaborative research and to make the information-technologies sector more competitive internationally. Among other things the study proposed a "national backbone connecting regional and international networks at an initial capacity of 1.5 Mbs." Existing networks, of which there were a growing number, including the relatively slow CA*net "backbone" for electronic mail, did not fulfil all the needs seen by the report. The high-speed EHS would need government sponsorship because of the inability of the first firms to recover costs of market-making, educating consumers and developing technology. The strong interest of all governments in public education was an even greater reason for them to get into the act.

HICKLING found the EHS feasible and in demand by industry, government and the academic community. It recommended swift implementation to take advantage of a unique opportunity. That was nearly four years ago.

Another initiative came from the private sector with the Canadian Network for the Advancement of Research, Industry and Education or CANARIE. Nineteen bodies in the private sector were founding members of Canarie Associates, including the University of British Columbia and the Canadian Institute for Advanced Research. A business plan was issued in December 1992. A much larger body of participants contributed to the result.

The steering committee called for action to "link Canada by building a high-speed, broadband electronic 'information highway' led by the public sector and funded jointly with the private sector." Participating individuals, firms and institutions form a roll of virtually all interested parties across the country. There was no longer any excuse for inaction.

Noting the massive investments of other countries in exploiting the synergies between computers and telecommunications, CANARIE reported that Canada's carriers already had the basic infrastructure to provide high speed networking to R&D and educational users. The plan for implementation called for upgrading and operating the national R&D and educational network in 1993-1994. An experimental high-speed test network was to start operating in 1995. Detailed schedules followed.

CANARIE represents a successful partnership facilitated by governments between business and educational communities across Canada. It is a far-sighted and practical plan, if only, currently, as a funding operation.

In February, as noted above, Mr Beatty, then Minister of Communications, made his speech announcing the government's intention to go ahead and create the EHS. It was urgent that this commitment not be forgotten in the excitement of an election year and it has not been.

Last year the federal government launched its Prosperity Initiative giving as reasons: Our exports are losing market share. New technologies are not being applied as well as by competitors. Innovative products backed by R&D are not being created. Too few Canadian companies offer training for workers. Lack of skills and too much chronic unemployment is the rule.

And the social implications?

In July, 1993, David Suzuki observed in his column in the Toronto Star, "There ought to be some serious questions about the enormous social consequences of the information highway.... The electronic highway must not be allowed to enter our homes without a massive public examination. We can't afford to accept that all new technology is inevitable or a sign of progress." To which the answer could be that at least 20 years of public examination have been given to this concern. Suzuki himself, moreover, refrains from contributing, except to offer the notorious fact that the results of any new technology can seldom be foreseen. His is the classic small - c conservative position of radicals -- to avoid action because change is not always for the best as they see "the best".

This is a complex issue not given to black and white solutions as contemporary Luddites like Suzuki would prefer. Few effects of technology for non-violent purposes are evil. The highway image is again suggestive. When superhighways replaced the lesser roads that took heavy traffic right through the centre of small towns and hamlets, Main Street, Canada, became once more a quiet thoroughfare, friendly to users. And the big roads drew the Canadian communities, scattered over vast distances, closer together.

Also, in July, 1993, the Telematics and New Media Branch of Industry and Science Canada announced its plan, albeit internally, for the EHS. It will:

Consult with industry to develop an implementation plan to interconnect networks and offer services on an interoperable open basis.

Consult with provincial governments to define and coordinate policies, programs and implementation strategies.

Develop a procurement plan for government services on the highway.

Develop an Electronic Highway System R&D plan for government laboratories in partnership with Canadian industry.

Encourage private sector applications (coordinated with CANARIE Inc.)

There is no mention of education. The same document offers "some expectations", though not necessarily relevant to social needs. At least one prediction has a futurist sound: "A change in the way we read -- using computers and CD-ROMs -- will lead to changes in what we read. Once authors write with this new medium, new narratives will emerge in the same way as novels were spawned by cheap printing." The author,

Dr. William Arms, speaks warmly of the "demystification of print." Oddly enough

Dr. Arms is a librarian, or perhaps not so oddly, since libraries have been commendably quick to use computers for cataloguing, and it is possible for a librarian to be more comfortable with catalogues than with books.

Reorganizing its administrative arrangements in 1993 the government dissolved DOC, dividing responsibilities for culture and technology. Culture went to the Secretary of State's "Canadian Heritage" shop, technology to IST. In effect this returns to the old separation of hardware from software and could pose serious problems in the future for coherent, effective action.

The DOC/IST competition respecting the EHS may have been put to rest. But where is the EHS?

International perspectives

Throughout 1993 there has been a spate of articles in the English language press on the subject of an electronic highway. Media in the great Republic are forever discussing and promoting the subject, while Canadian counterparts are consistently silent or muttering, usually like Suzuki, in a negative or sceptical tone. The April 12 issue of Time (following the March cover story of the National Journal and of a PBS feature) ran a cover story on "the Electronic Superhighway." The article charts some of the elements: TV networks and productions; movie collections; interactive games; record companies; broadcast stations; long-distance phone service; interactive shopping; TV archives; libraries and data banks; news and information; financial services; classified ads, and video catalogues. The degree to which the US government will take part is not clear. And the article does not discuss the possible uses for social purposes such as education, training and health care. Emphasis is on the private money to be made.

There is, however, an American project already under way to create a Community Learning and Information Network -- CLIN, an acronym that was not invented to flatter a new president. It is a national plan for local learning and delivery systems, in effect an interstate electronic highway of information networks. (It looks remarkably like an initiative that was recommended persistently in Canada by the present consultant; rejected here but taken up with alacrity by the US.) The neighbourhood school will be the hub for community training and continuing education at all levels. Operations will be funded through "shared usage" by government and business. CLIN is immensely important to us in Canada, not only because of its innovative example (particularly in funding), but because its product will overflow here. And also because it will be able to carry our own product beyond our borders.

The media, though, have focussed on the frills. The New York Times Magazine supplement on May 16, 1993, ran a piece headed, "The telephone transformed -- into almost everything." Largely a gee-whizz piece, it elaborates the idea of global villages. Again there is no notion that an EHS could be useful or serve other purposes than marketing or entertainment (maybe because they believed so much has already occurred in education through the use of television, video and cable).

Nor was there much understanding of the need for a public component, essential in education. In Canada, under-exploiting public institutions in the hope that private agencies would take their place had proved an illusion. As stated earlier, some 75 per cent of employers surveyed by Statistics Canada in 1987 provided no formal training at all for employees. Studies showed a gaping discrepancy between industry's heavy investment in technology, equipment and machinery and their failure to make the essential human investment in education, training and skills.

An exception is the aviation industry, where informatics technology is intensely used in training pilots. Canada exports highly sophisticated flight-simulation equipment to other countries. And in South-East Asia cabin crews are being already trained for their jobs with the help of Canadian interactive teaching terminals where students can make and correct their mistakes in private -- hence without loss of face.

Statistics Canada, as indicated earlier, predicted that from then (1987) to the year 2000, 64 per cent of new jobs would require 13-plus years of education. Yet almost two-thirds of

Ontario youth entered the labour market without any post-secondary education at all - one third had not completed high school.

The grading of schooling, it's true, is open to redefinition. Grades may have been invented for the convenience of text-book publishers at an early stage of mass education. They do not necessarily correspond to levels of knowledge. Students will be able to learn at their own pace with learning-on-demand under new technology. In Europe, the DELTA project (telematic systems for flexible and distance learning) envisages universal access to "a flexible learning environment which will allow the learner to manager his/her own training."

Diane Ravitch, a historian of education, writing in September, 1993, in The Economist, predicts that teaching institutions will be redefined in fundamental ways: "who is educated, how they are educated, where they are educated -- all are due for upheaval." And she quotes Horace Mann, an American educator, who said in 1846, "Intelligence is a primary ingredient in the wealth of nations."

The National Journal (still in the US) of March 3,1993, ran an interview with vice-president Al Gore, who said, among other things, "I'd like to see a schoolchild in my hometown of Carthage, Tenn., be able to go home and plug into the Library of Congress. That is a realistic goal." Indeed it is. It may already be a daily occurrence. (For some time this kind of service has been available to Canadian centres.) The rest of the interview and article is concerned with business. The business of America... The collision of cable with telephone is the main concern. Again, an article in Fortune (April 19, 1993) declares, "Technology isn't the issue. What do consumers want to buy? What do they want to pay, and when?" No inkling that the technology could help solve the social problems that beset the US.

May 31, 1993, Newsweek considers "teaching minds to fly with discs and mice." "Shelves of studies testify to the advantages of learning via interactive software" says the text, describing what the technology is doing for disabled persons. In June, BusinessWeek reports "America online is hooked up for growth." And July 22, dawn breaks in The New York Times with "Plugging computers into education," reviewing a book by Seymour Papert on rethinking school in the age of the computer.

John Sculley, past chairman and CEO of Apple Computers, warns that technology alone, without systematic innovation, will not solve the problems: "It is important to realize that technology -- particularly in the context of education -- is no 'silver bullet'. It can help in engaging a student's interest in a subject, but it must be placed in a complete system that combines well-prepared teachers with integrated social services." Sculley's remarks occur in his Foreword to Bernard Woods' able monograph, "Communication, technology and the development of people," in which the author argues: "Computers will become a truly useful part of our society only when they are linked by an infrastructure like a highway system or an electric power grid. A National Information Infrastructure would be a common resource like telephones are today."

Europe has set up a body called Epos International. This non-profit centre is an initiative of state telecommunications ministries working together. It aims to increase the use of telecommunications for education with technology ranging from E-mail to satellite links. Epos is designing a public service for subscribers, as well as commercial software packages. It plans an open European distance-learning service. The activity is quite separate from the new interest of UNESCO in education and training for the 21st century (spearheaded by the EC's Jacques Delors) or ENCORE or the EC's commitment to DELTA's various projects (some with Canadian partners). But in a less-noticed explosion, public and private corporations are taking advantage of the obvious cash-savings opportunities. Recent examples of successful training, distance-education, open learning and other education schemes proliferate to the point that successful European software producers are now exporting 'packages' to the US market on request.

It ought to count for something in our cash-strapped epoch that projects like CLIN and Epos will save tax-dollars, essentially a re-channelling for better use of existing facilities. In Canada, even more than in Europe and the US, the technological infrastructure and much of the software are already in place.

The OECD, not noted for its hype, has contributed a number of relevant studies. A recent report on the New Technologies in the 1990s offers 'a socio-economic strategy.' Neither the technical nor the economic potential of major new technologies, they suggest, can be fully realized without anticipatory social and institutional changes at all levels of society. In the workplace this would mean a shift from the Taylorist production line to multi-skilling and devolution of responsibility. Retraining will be needed for bosses and workers. In effect, this retraining will have to reflect a change from "one-shot" schooling to a lifetime of learning.

All this is in line with Peter Drucker's repeated stress on organization around knowledge rather than around tasks.

If anyone in Ottawa does not believe Canadians, in large numbers, understand the relationship of education, training and jobs to sovereignty, competitiveness and reducing deficits, they should be watching our general election more closely. They should be reading the joint declaration of the Council of Ministers of Education and their references to their respective Premiers' decisions at Baddeck, concerning education and telecommunications. They should note the National Network for Learning announced in North York by Frank McKenna and Veronica Lacey during the election campaign. And they should bear in mind the twenty-five years that have elapsed since the Science Council and the Telecommission pronounced on the subject if they wish to believe that Prosperity 2000 or a Beatty/Charest speech will create a highway. Only Ontario now needs another Royal Commission on learning!

And, in the past six weeks, more advances have been made in the US and Europe (and Singapore!) toward establishing their highways than occurred in the previous six years.

Summary

During the last quarter of 1992 and the first quarter of 1993 a flurry of activity within the federal bureaucracy -- that is, within the departments of communications and industry, science and technology -- led to public statements, by ministers and others in the public and private sectors, that the government of Canada had decided to establish a national electronic highway system, a network of networks, to provide the necessary ground for a prosperous information-based economy. The decision was overdue.

In April, 1993, I was informed that the government wanted to accelerate this project, and was asked to report on how best to carry it forward. The problem was, and still is, that there never has been any such Canadian "project", and that it was ever thus in Ottawa. A distinction has to be drawn between conversation or discussions of a policy, establishment and destruction of temporary departmental task forces, the drafting and redrafting of EHS cabinet memoranda, plain political pretence and action. If an electronic highway system for Canada is to be developed swiftly, then the story of why the federal government's doing it and where we are in the process is important to recall and understand.

The idea of a digitized electronic highway system for Canada had been proposed by Canadian scientists and public servants twenty-five years ago. Nothing came of this proposal. Scientists and public servants have now been joined by politicians and business people in proposing just such a system. We still don't have it.

Why not?

The story of this complex federal policy issue divides itself neatly into three phases, each covering about a decade: 1965-75; 1976-85; and 1986 to the present. The initial intellectual discovery that newly developed digitized technologies were converging, and how they could be employed for significant and accepted social purposes, was described in considerable detail between 1968 and 1972 by the Science Council of Canada. The Council's suggestion was also referred to by the Telecommission which had been established by the new Department of Communications, itself carved out of the Department of Transport. But there was no one within the new government -- much less outside it -- willing and able to drive the proposal forward. The priorities of the government lay elsewhere, based, in this field, on fears of the United States in space development. This fear actually had led to the establishment of the DOC, and to ensuring that its priorities would be related to space and satellites. Inevitably this prompted the setting up of Telesat, with new regulations -- beyond those which Transport had been imposing on related industries -- and resulted in the eventual removal of the CRTC from Secretary of State to DOC so that regulation of both hardware and software could be centralized under one authority.

All this activity and research centering on satellites and space, -- together with the creation of new institutions, DOC, Telesat, and CRTC, and new regulations to safeguard privacy etc.-- sapped the energies of those most interested in the field. The new information technologies, by themselves, proved too feeble an engine to propel the subject into the political marketplace, even to serve sound social ends. The result of the 1972 election, in which the government nearly lost its majority, frightened the leaders of the Liberal party, and deterred them from embarking further on policies and programs that seemed over-ambitious -- centralizing, risky, expensive, or merely exciting because they were new. Interest in the messages and in the work of high-tech experts on DOC's staff waned, and with it, interest in the design and development of dedicated software, essential to the hardware's success in the market. Instead, energies turned to a different, fashionable, software concern, popular with a narrow nationalist constituency--broadcasting and its needs. This shift, in so far as it focussed attention away from convergence and digitization and weakened support for an EHS was to prove a mistake.

Federally created, centrally controlled technology, in the absence of a market or acceptable social purpose, couldn't work. But the government still did not recognize this. They were quite comfortable with the creation -- as noted earlier -- of DOC, the Telecommission, Telesat, the CRTC, privacy rules and other types of regulations. They failed to recognize that technology tied to regulation alone could not drive itself to the ends it was meant to

serve. By 1975, the idea of a national spine and the inspired engineers who imagined its future value, were not only on a back burner but out of sight and mind.

The next decade, 1976-85, abounds with advisory mini-telecommissions, and is witness to the apparent marriage of hardware and software within the DOC. But in respect of federal policy and accountability the reality is rather different. Throughout the period, R&D and high tech interests continued their decline within DOC, except for the blip of Telidon. But Telidon proved an example of the rule rather than the exception, in that it was dragged out of the Communications Research Centre rather than promoted to a receptive government. It was imposed for experimental purposes on an uninterested, even an unwilling, private sector. And as soon as possible, government and industry deserted the most advanced, promising technology of its kind in the world. Thus Canada handed over its global advantage in videotext to France, Britain and Japan.

Into this federal vacuum of attention and resources came concerns with the CBC and broadcasting. But broadcasting was an old technology producing software, much of which was clearly made better, or more popular, elsewhere. In spite of valiant efforts to breathe new life into the old machine, the public sector here too continued its decline, as did official interest in the proliferating new technologies which were falling in cost. Haunted by fears of being totally swamped by US entertainment products, politicians harped incessantly on the need to assert our sovereignty through Canadian products on the CBC and elsewhere in the country. It was just about as genuine, generous and successful an activity as the public servants' theoretical interest in the national spine twenty-five years earlier.

Such evidence as emerged of Canadian culture was kept off the free-trade negotiating table, but the engine that had driven the hardware and software concerns at DOC for two decades was failing. Not that the earlier investment in culture was not paying off. It was, handsomely, in the traditional media of print, documentaries, film, theatre, dance and painting, where Canadians were beginning to be recognized internationally as among the best in the world. But the original mistake of deserting the proposals of the Science Council and Telecommission had been compounded. Fear of the United States had driven the Canadian government into space and into cultural industries, but not yet into the electronic highway, even though the economics of the new media had made this a vital future need. And fear, alone, of what the United States was doing was not strong enough to move Canadian policies and programs to successful results that would counter the US cultural weight.

The provinces, frustrated, had taken up some aspects of the new technology and begun to apply them in their own jurisdictions in education and training. But high tech industry was still not seen by Ottawa as a potential partner in spite of political rhetoric to the contrary, still less the provinces who were waiting, except for Quebec, for a federal lead. Those partnerships were to come.

By 1986 the world environment affecting these fields, that is, education and training (and their centrality to economic competitiveness) had entirely changed, and so had the Canada in which the proposed highway and its services had initially foundered. Trade and finance had been globalized, largely as a result of the revolution in information technology. The world entered the never-never land of transition to information - and knowledge-based international economies. In the free industrialized countries the dislocation of restructuring brought frighteningly high levels of unemployment, a growing part of it resulting from lack of marketable skills in the workforce.

Training became the key concern, a priority for government and industry. It was discovered that the educational infrastructure itself had become grossly inadequate for the new needs. High levels of illiteracy, innumeracy and dropouts exacerbated the training problem. How could countries create learning cultures for an era in which a worker might have six different jobs over a lifetime of employment?

Canadians also came to see that their high national debt made matters worse, because it affected investment. Doom threatened any major trading nation with a declining reputation for investment-prospects. No rich country was more vulnerable than Canada to such a decline.

At first these crises hardly touched the policy-makers at DOC, who were deeply engaged in the issues of cultural development, broadcasting legislation, copyright, declining subsidies for cultural industries, payments to authors, etc. And when they awakened to their loss of leadership in the technology side of their responsibility, they discovered that just around the corner their neighbour department, whose terms of reference included industrial growth and competitiveness, was into the informatics game -- their game. Now there was a new fear goading them, not only of the outside world that was passing them by and threatening their future, but the fear that their colleagues in Industry, Science and Technology were moving onto their turf. Meanwhile they had cultivated few partners within the government, or even outside it in the provinces or industry. They had a problem. And this time, unlike fifteen years earlier, they lacked the intellectual and financial resources to confront the problem effectively. Scientists, engineers and researchers of the quality that had led the Science Council and had been employed within the DOC in the early 1970s were gone. And Canadian industry had not filled the void created by their absence.

Between 1988 and 1993, DOC and IS&T, sometimes competing, and occasionally cooperating with one another and with the NRC, began a brainstorm of activity trying desperately to make up for the lost years.

The National Research Council kept on trying to keep CA*net in place across Canada to serve scientists and researchers, while IS&T was trying to absorb or replace the same system, first by its own interest in informatics and then by using Prosperity 2000, and the idea of CANARIE, to build regional networks which would ultimately combine -- at least that was the idea in some IS&T minds.

Meanwhile DOC was trying to return to its roots in technological research by a new focus on future technology, by pulling together industry and the few scientists left to establish Vision 2000 as a focus for future activities in the new media.

All this federal activity should have been relatively easy. The former Prime Minister had

expressed his personal interest in the national advisory board he had himself set up for science and technology. The influential minister Wilson had been one of the few cabinet members to show awareness of the need to move ahead in telecommunications. But it was not easy. Bureaucratic consultations, preoccupations with turf and the special interests of different clientele of Departments dragged the process on if not down.

In the meantime, perhaps because of Ottawa's slow pace, the provinces decided to push ahead in telecommunications. In Europe too, there was increased interest and a quickening pace which, in certain areas, combined with the Canadian interest to create DELTA and joint conferences of various kinds in the late 1980s. All these different clusters of activity, all the interactions that took place, slowly began to build a kind of national and international consensus and a common view as to where one had to go to cope with the difficulties confronting all countries in the industrialized and democratic world. IS&T found its focus through Prosperity 2000, a national consultative program that recommended a range of new pieces of infrastructure meant to deal with the problems of competitiveness. It was to be done by greater cooperation with the private sector in building skills and training opportunities and future jobs. CANARIE was an integral part of that, even though it affected small numbers. DOC, through its process of Vision 2000 and watching what was going on at IS&T, focused on the electronic highway, and by 1992 both federal departments had found a place to move toward in the pursuit of the policies which the government they served had enunciated. By the end of 1992, DOC's Cabinet document proposing an EHS was ready to go forward. But, in Inventing our Future, the IS&T Prosperity Steering Group publicly announced their EHS initiative(Actions 12 and 37) with dates(!) for regional test networks to be in place. By early '93 everyone was promoting the EHS idea.

Thus by the time of Mr. Beatty's February 1993 speech, the anxieties right across the country about the crisis in education, about the lack of skills, about the need for training, about fears at the pace at which the US was moving to correct similar problems, all these were taking significant effect in Canada. Developments in Europe were also having an effect in that the connections that had been developed between federal government agencies and the European community were showing how far behind our competitors we had fallen. (The

Europeans assured us we were ahead!) The lesson was clear that new partnerships were needed to hasten further development in education, training, and information-based learning. All that, of course, depended on building elements of an information-based economy with which to bargain and build partnerships.

In a sense, Canada was back to 1968 with the fears of US high-tech directions, but this time united by deeply felt economic and social ills within the country and a desire generally to move ahead. The question had become not what to do, but how to do it and how fast to do it.

How would federal policy deal with this need to move the country forward and create a learning culture, so that a highly skilled workforce led by globally minded entrepreneurs could compete in this knowledge-based economy? Enter Messrs. Beatty, Wilson and Valcourt (joined in the dying weeks of the general election by the Hon. Jean Charest).

The reason for detailing the history to this point is to disclose not just the normal motive forces of federal policy-making in telecommunications, so often daunted by fears of failure to cope with the need to survive, but also to understand that within the federal government past weakness and failure due to wasteful political tensions and confusion has got to give way to narrowly focussed goals strengthened through jurisdictional partnerships and public/private sector cooperation. And so the strategy proposed here depends primarily on the federal government's getting its nerve up to act quickly, coherently, cooperatively and simply to serve a leader's vision.

Recommendations

When we built the Trans-Canada Highway over thirty years ago, we had a car culture, lots of cars, a love of cars. We had travellers, tourists, truckers, bus-drivers. We had the infrastructure for maintenance, policing, servicing accidents. There were few unknowns,

because the US had already developed its inter-state highway system. But Canadians today are not in a comparable position with respect to the electronic highway. They are in a vast Unknown which has to be faced, but they do have many advantages and they have to proceed with the project or else be left behind. Because of the lengthy and rather tortuous history of an EHS within the Canadian federal government and because of the need to involve and work closely with provinces grown sceptical of the genuineness of the federal interest, and with international organizations and a private sector used to federal indifference, the process_ is critical. So is the timing and projected sense of urgency. Thus, the recommendations that follow, carefully build into the process the participation and partnerships (at every possible level) essential to a successful outcome and consistent with current and future federal interests.

If one wants a Canadian highway, it can only happen now if it is seen to serve the profound needs of a public dependent on access to a revitalized education, training culture for its survival. It will only be pieced together intelligently by a private sector familiar with melding public and commercial interests. It will only grow if the public access is universal to quality products of value in the information marketplace - which is as international as national today. So that no proposal can hope to work that fails to bring the leading players in all these sectors together in a productive working relationship. It is neither simple nor easy. On the contrary, it is both complex and difficult. But it can be done. And it should start to function simultaneously top-down and bottom up.

The leadership has got to come from the Prime Minister. There has to be a clear vision and a commitment to lead. Such leadership is essential to seeing the EHS through, if there is to be a centralized national system based on many genuine partnerships. But the "vision thing" is not enough.

There has to be a far-sighted commitment to a new learning culture inspiring an informationbased economic system to produce a highly skilled contemporary workforce that will ensure our economic survival and growth. The leadership to drive the process has to be both inside and outside of government. The Prime Minister would have to make an announcement of concern and response, with a clear commitment that she/he will not let the project go until it is done. Without genuine Prime Ministerial leadership, support and continuous interest, the current proposals will prove as unsuccessful as all predecessors dating back 25 years regardless of the quality of intellect and imagination brought to bear. (And the "P.R." associated with the announcement must be crafted to attract maximum public attention so that the media, too, will be monitoring progress).

Responding to the Prime Minister's vision and purpose, a cabinet committee is needed of at least five senior ministers who know that their leader expects them to report progress and to deliver the goods in an agreed time frame: five years. Theirs does not have to be an onerous task. They would have to sit only some three or four times a year to ensure that they are monitoring and reporting results of consequence to the PM. While these might be five Privy Councillors one, the chair, would have to be more equal than the others and drive the pace forward. They would be served by their Deputies, who in turn would be served by a secretariat of officials from IS&T, possibly with others from cooperating Departments as required. The participating Ministries should include, besides IS&T, Human Resources, Canadian Heritage, Defence and External Affairs. The reasoning behind including the first three mentioned is obvious. Defence is essential because they have more daily, practical experience in the application of

tele-communications, training and education than any other federal department. They own schools and universities and are equipped with a surfeit of high-tech. They must deal continuously with illiterates and apply discipline. External has to be there because of its interest in the NAFTA with its educational tripartite commission, and because of the IDRC's WETV (world education television) proposal in addition to the need for international partnerships down the line with the UN, World Bank etc. World services, moreover, will be an important spinoff economically and strategically of the national structures and will be of considerable interest and value to the third and developing worlds and UN agencies acting on their behalf.

Serious consideration should be given to inviting a Premiers' representative as well as a provincial Deputy of their choice to each of the two senior federal committees referred to

above.

That is the extent of the federal administrative side because, in view of the history related above, the engineers, scientists, potential industrial participants are outside of Ottawa and more familiar with the complexities of the entire enterprise than is the federal government.

What is needed outside of Ottawa, are eight, operational, outcome-oriented, task forces: one led by industry eg. STENTOR and UNITEL to deal with the new architecture and technological requirements of a national highway; one in which the CRTC, consumers and industry lawyers would lead on standards and protocols and regulations; another led by CADE, CMEC, CCA and affiliates, unions and others on educational and training needs, as distinct from yet another which would be concerned with the designs of new software in education and training led by private sector specialists like the Godfreys, Ferns and Lantos; one on how best to deliver the wide range of existing software, to be found in industrial, military and financial institutions, such as Ontario Hydro, Bell Canada and particularly from federal programs in languages, management, environment, health and the rest. As well, there has to be a task force on the international side, working with both the White House staff and NAFTA, in addition to the not-for profit CLIN-type groups, World ORT, and with Europe via DELTA, DANTE, RARE etc., and also with the Commonwealth (COL) and Asia. An exploratory task force is needed to discover whether the system should be community-based while at the same time it serves individuals. And there has to be a task force on how to use the system in a thrifty way, through well-organized services, economy in personnel and procurement, and ultimately in reduced costs in delivering many federal and provincial services. IST officials would sit on all task forces. Provincial private sector leaders or Deputies should chair two, central Canadian industry leaders, two, and representatives of special interest groups, two of the eight groups. That leaves two for federal appointees. The eight task forces would have to have brought forward their draft recommendations within eighteen months so that a consentual report could go forward from the Chairs through the Deputies and Ministers to be in the PMO in under twenty-four months. This would leave three years for pilots, testing and implementation.

The work of all task forces has to be coordinated and led by one suitably experienced person with the obvious credentials who can see clearly that we are a lot farther behind than any interested party in public or private employ is willing to admit. (He/she would be advised by a committee made up of the eight chairs. That should comprise the working advisory committee. It should have no competitors if it is to reach consensus.) This model is not all that different in principle, I believe, from the one used successfully to develop CANARIE. It can work, and would require minimal dollars which could be shared amongst jurisdictions and private industry. It provides for the essential political and bureaucratic leadership and the necessary intellectual, technical and entrepreneurial leadership in both hardware and software issues. With a trusted, aggressive facilitator the time frame can be advanced. It assumes partnership is possible and will work.

To recapitulate briefly, the new government in the mid-1980s was sensitive to the dangers of high debt, low productivity and poor scientific and technical education, and minimal training within industry. It restructured certain departments and facilitated the development of CA*net and CANARIE, Prosperity 2000, Vision 2000 etc. Fresh awareness of the world trade environment came through regional trade agreements, through cooperation with DELTA, etc. Indeed, by November 1992 the DOC was actually ready with a cabinet memorandum to move forward with the electronic highway system as I mentioned earlier. That it never went forward, one suspects, was because of procedures followed at IS&T.

(That kind of turf war is costly and wasteful and will have to stop if this project is to succeed. By creating tensions between senior public servants and their Ministers, it weakens the possibility of achieving goals that all claim to support, it creates resentful losers and aids competing Ministers who seek support for other worthy projects, and it feeds the private sector and the general public with a poor image of government, an image has already indicated as being unacceptable. In all, it serves no one well, including the public service and it's political masters and it hampers progress in a highly competitive, indeed threatening environment.)

The provinces moved into a perceived vacuum, created a number of investigations,

recommendations, minimal infrastructure, less funding and not much else. CANARIE, in fact, is very little more today than a funding operation and one that might not prove more effective than what the Ontario government has established for related purposes. These activities do not move us very far towards an electronic highway system to deliver the educational and training facilities and programs that we need. But the process proposed above, with its built in partnerships, with narrowly focussed task forces, time-frames and an identifiable door through which recommendations pass for decisions, with a hierarchy of national representatives capable of making, taking and applying consensual decisions and a Prime Minster already publicly committed to results - all of this can make it happen.

After all, if the provinces cooperate as they say they wish to, like the other participating representatives of all the concerned sectors (private, regulatory, educational, designengineering, software, training -, video/film producers, international et. al.), all will have, by their action, indicated their commitment to a positive outcome within a practical timeframe and within a cost-sharing arrangement that debt and recession permits. If the task forces' representatives conduct their operations as genuine representatives of their respective constituencies these broad groups will be informed to the degree where they will be not only supporters of outcomes but also indirect contributors to the quality of the range of proposals. If the task forces are successful in their early diligent efforts this will lead to a variety of pilots, prototypes of hardware and software, monitored experiments with applications, new alliances etc. that will make their final recommendations the most advanced in the world and restore Canada's leadership in the whole field of telecommunications and social/cultural policy. Within 18 months of the Prime Minister's announcement of intent, results from the task forces should make possible comprehensive plans for implementation with each sector knowing and committed to its role and contribution to the whole including the fair distribution of any modest costs. These latter will largely be borne by the private sector - as with CANARIE - but some, initially and especially in particular fields of software design and production must be carried by the public sector though not necessarily with new dollars. Without the information from the task forces set up and then disbanded by the late DOC, it is difficult to be more precise.

In sum, it cannot be over-emphasized that public anxiety about education, about the pace of progress with their highway in the US government and marketplace and growing frustration with -- even hostility to -- governmental authority, because so little has been accomplished in confronting illiteracy and innumeracy, can become the motive force for the solution, which is to exploit the new, cost-effective media for education and training. The sense of hopelessness which results from witnessing hundreds of millions of dollars frittered away fruitlessly on the current methods of training and retraining, the haunting fear caused by unacceptable levels of unemployment, all this misery and malaise can be turned around. Such emotions need offer no barriers to action. Obstacles assumed by federal authorities are imaginary. Not only is there no sign of bureaucratic obstruction in the literature generated by the provincial, commercial and educational bodies, but in all the interviews and consultations carried out for this report, not one person tried to make difficulties.

The educational/training motive is the single most promising opportunity, perhaps the only opportunity, for winning public support in the drive to build the electronic highway system. The growing threat from the US, to our integrity as a country in this area fundamental to our survival should be an added impetus.

What we earn depends on what we learn. What we earn pays for our children's future. If, for any reason, we can't earn, they don't have one.

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