TELECOMMUNICATIONS: TOWARDS A NATIONAL POLICY

By Brooke Jeffrey

In May 1979 the report of the Consultative Committee on the Implications of Telecommunications for Canadian sovereignty observed that the rich countries in the world today are those that exploited the industrial revolution in the 19th century; the rich countries of the future will be those that exploit the information revolution to their best advantage. In this article the author outlines the fundamental importance of Telecommunications for Canada's future economic and cultural viability.

Perhaps the most alarming thing about the recent report of the Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty is that virtually every development and problem described was identified or predicted in numerous other studies prepared for the federal government in the early 1970s. There has been no lack of input by government scientists and bureaucrats, academics and representatives of high technology private industries. Similar recommendations emerged from the various task forces and commissions of the past fifteen years. What has *not* emerged is a comprehensive and coherent national policy which would enable Canada to regain its position of prominence in the field of telecommunications research and development. This is not to say that the government has not been involved in policy at all, but rather that its policy initiatives have been disjointed, uncoordinated and inconsistent. If concerted action is not forthcoming, Canada will at the very least lose a great deal of control over its own destiny, and may well "fall calamitously behind as an industrial nation."

In order to understand the urgency and scope of this technological crisis the observer must be familiar with the subject matter. Lack of knowledge is one reason why most Canadians are unaware this crisis exists. This leads naturally to the question of what exactly are telecommunications and informatics. Using the technical definition in the most recent of a long series of proposed new Telecommunications Acts, "telecommunications means any transmission, emission or reception of signs, signals, writing, images, sounds or intelligence of any nature by wire, radio or other technical system." This means all communications satellites and earth receiving stations, television and radio broadcasting, telephone and telegraph systems. It also includes most of the innovations of the computer revolution, for the informatics explosion of the '60s and '70s has produced a marriage of the two formerly separate technologies. The advent of micro-computers, microprocessors, fibre optics, etc., has led to the possibility of pay-TV, direct-to-home broadcasts, videotex systems and telephone-linked computer data banks. In short, we are on the brink of a new era.

Most Canadians are also unaware of the major role Canada has played in this technological revolution. Because of natural geographic and demographic realities Canadian scientists quickly perceived the obvious benefits of space-aided communications. As a result Canada established the world's first domestic geosynchronous communications satellite system. Subsequent successes

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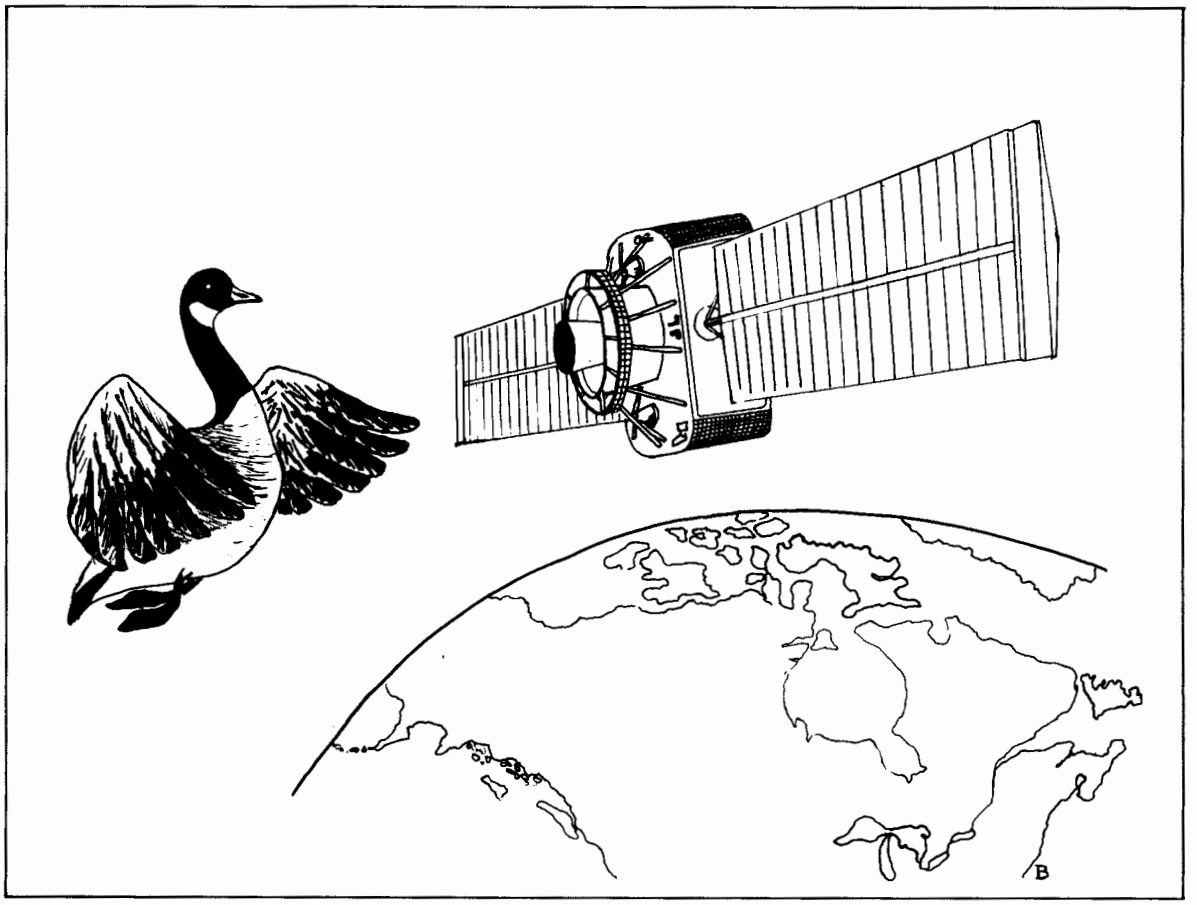
included the Canada/NASA program which developed *Hermes*, the world's most powerful communications satellite, and *Anikom*, a system of small portable earth terminals which were adopted and used by the United States, Brazil and several other nations. In addition there have been countless innovations on the part of the many private electronics firms which have developed to produce hardware for the space industry.

Partly as a spinoff from this early electronics involvement with telecommunications satellites Canada has also been a leader in certain areas of computer communications and electronics, now commonly referred to as informatics, both through the federal Department of Communications and private industry. The most recent and dramatic of Canadian innovations in this area is a videotex system, trade-named Telidon, produced by the Department of Communications. Videotex systems are a form of two-way TV technology which epitomize the marriage of computers and telecommunications. While most major industrial countries have been working to develop their own videotex system, the Canadian Telidon system is demonstrably superior and the most advanced on the market. It was recently chosen over a number of competing European systems for a major U.S. field trial sponsored by the Public Broadcasting System and the U.S. National Telecommunications and Information Administration, and may soon be selected as the international videotext standard by the Consultative Committee on International Telegraph and Telecommunications at their meeting in Geneva in November of this year.



Once again a number of private firms have developed to service this sector of the telecommunications industry. For example, two Canadian companies, Norpack Ltd. of Pakenham, Ontario and Electrohome Ltd. of Waterloo, will be supplying equipment to Washington for the Telidon field trials. In addition several firms have succeeded in this very competitive North American market by specializing in areas where they perceive gaps in the American high technology industry. Mitel Corp. of Ottawa scored a major victory over several U.S. firms to sell AT&T a micro-electronic switchboard system which its researchers had developed. The company will soon begin production of a microprocessor which it claims is five to ten times faster

and requires less power than other models. Similarly, Gandalf Data Communications Ltd. of Ottawa was the first to develop a limited-distance transmission device which links computer terminals to central computers via telephone lines. The company has also unveiled a new long-distance data transmission device, called a Super Modem, which has been termed one of the most significant developments of the past 15 years.

These successes might lead the observer to conclude that the term "crisis" is inapplicable to the current situation in Canada. However, an examination of the minus side of the ledger will quickly dispel any such optimism. Despite outstanding Canadian achievements in satellite communications, fibre optics technology and computer communications, the electronics manufacturing industry is relatively weak and fragmented. Past achievements were accomplished in spite of the absence of any comprehensive government science policy and industrial strategy, but Canada already has lost its position as a leader and is actually in danger of falling behind.

The existence of many small electronics companies is tenuous since this industry suffers from the same difficulties of Canadian industry in general — lack of resources and capital. However, in the telecommunications field the lack of capital is far more serious as it is imperative that larger capital investments be made for research and development (R&D). Although some individual companies are doing well, Canada is losing ground on both domestic and foreign markets. The trade deficit in electronic goods is now around $2 billion a year, and it is widely agreed that only increased funding for private and government R&D will alleviate this problem. Conversely, it is generally agreed that a strong telecommunications industrial base is one of the most promising means of reversing Canada's balance of trade problems and assuring economic sovereignty.

A large part of Canada's economic problem is therefore related to the question of R&D in general and the current situation could only be termed depressing. Among the Organization for Economic Co-operation and Development countries Canada now ranks 14th, just ahead of Turkey and Greece, in percentage of GNP spent on R&D. A spate of task forces and *ad hoc* committees set up by the Science Council and the Ministry of State for Science and Technology (MOSST) have all pointed to the same dilemma — R&D in Canada is primarily funded by government. This is presumably because of another economic reality, the branch plant syndrome, since original research is done by the American-based parent company. In Canada, there is slightly more than one scientist and engineer in the business sector for every scientist and engineer engaged in R&D in government; this compares to an approximately five to one ratio in the U.S., Japan, Germany and Sweden.

It can also be argued that continued Canadian dependency is in fact the result of the low level of industrial R&D. According to Dr. Patrick McGeer, head of the British Columbia Ministry of Science, "The reason for the high degree of continued foreign control is the low level of R&D, not vice versa. We can't expect to have domestic control of our industry unless we have control of R&D." While he does not suggest the situation can be totally reversed, he and many others argue that the situation can be appreciably improved, to Canada's economic benefit, since high technology R&D industries create high levels of job demand and profit. This is particularly important at this time because of the critical problem of unemployment or underemployment facing graduate research scientists in Canada.

Worse still, while successive federal science ministers have expressed their commitment to increased government funding, this level has dropped since its peak in the late '60s, especially taking into account inflation. Despite a recent government commitment to raise overall R&D expenditure in Canada to 1.5% of GNP by 1983, Canada's current R&D level is 0.9%, down from a high of 1.28% in 1967, and well below the levels of funding in the U.S. (2.4%), West Germany (2.2%), Japan (2%) and France (1.9%).

Another negative aspect of Canada's "telecommunications ledger" is the problem of cultural sovereignty. This is a multi-faceted problem. First, as both the Consultative Committee and former Deputy Minister of Communications, Bernard Ostry, have pointed out, there is now a massive flow of Canadian information (credit, insurance, medical) across the border for storage in American data banks. While the economic implications of this are serious enough, the cultural implications are staggering. Some of these include reduced Canadian control of foreign companies in Canada, possible invasions of personal privacy of Canadian citizens, computer crime, dependence on foreign computer staffs, risk of publication of information which is confidential in Canada, an undermining of the Canadian telecommunications system, and the possibility of decisions affecting Canadians being subject to foreign laws.

Also, while there has always been concern over the American presence in Canadian broadcasting, the advent of cable, pay-TV, fibre optics and videotex systems present even greater threats to Canada's cultural survival. Cable has already increased Canadian access to

American programming. Although pay-TV has not yet been approved for Canada, the technology exists and federal officials are aware of numerous "illegal" earth receiving dishes in Canada which are picking up American satellite signals. In addition, despite Canada's prominence in the videotex field a lack of Canadian data banks means that the information available for use by these two-way systems may well be foreign.

This then is the context in which Canadian telecommunications policy must be examined. At present this policy could not be termed "national," since the field of Canadian telecommunications is rife with federal-provincial jurisdictional disputes, and since it lacks a goal directed and comprehensive overall administration. Various provinces have established or are attempting to establish their own research schemes. The federal government has reorganized its granting bodies but continues to provide support, both internally and in the private sector, on an apparently incrementalist and *ad hoc* basis. Its attempts to regulate have been controversial, and the areas in which it has not yet regulated are glaring by their omission.

CONTROL AND DEVELOPMENT POLICIES

To analyze the current telecommunications policy situation in more detail it is first necessary to break the concept down into two parts: *a policy of control*, which would include both jurisdictional issues and regulation, and a *policy of development*, which would include science policy administration, the funding of R&D, as well as industrial incentive legislation. The former policy is more closely tied to the issue of Canadian cultural sovereignty, while the latter has primary implications for Canada's economic well-being, although there is undoubtedly a secondary cultural impact. Given the constraints of this paper it is not possible to discuss both aspects of telecommunications policy in detail, and as a result the remainder of the article focuses primarily on the second aspect, development policy, after outlining very briefly the major issues and policy options of the control aspect.

In theory and in practice Canada has accepted the concepts of regulation and government intervention/ownership to a much greater degree than the United States, due in part to our small, scattered population and less capital for investment. Few would deny that Telesat Canada has been one beneficial result of this approach. On the other hand, both the CBC and the CRTC have been considered mixed blessings. The increasing interrelationship of telecommunications-informatics has produced numerous conflicts between government and private industries, and among the various industries, particularly the carriers. Questions have been raised as to the authority and/or advisability of a regulatory body such as the CRTC formulating policy, while in a number of new areas no policy has been formulated at all. Whether to permit pay-TV and how to regulate it, regulation of the various carrier mechanisms and the content of programming, and expanding regulatory legislation to include the results of informatics are only some of the problems. The report and recommendations of the Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty have been both roundly criticized and strongly advocated by various members of the industry as well as informed observers, and it would be pointless to attempt any analysis of them here. The report makes clear, however, that there is no comprehensive *national* telecommunications policy (with regard to control), that in some areas there is no policy at all and that it is imperative action be taken quickly to determine policies for these areas, whether the specific committee recommendations are adopted or other policy options are chosen. At the minimum, decisions must be forthcoming regarding: the regulation of cable companies as broadcast receivers and telecommunications carriers, resolution of the carrier conflict in general, a formula for the introduction of pay-TV, legislation controlling the trans-border data flow, creation of Canadian-based data banks, and maximization of the utilization of our communications satellites.

In addition, there must be a satisfactory resolution of the various jurisdictional conflicts, and a co-ordinated, co-operative approach by federal and provincial governments if Canadian cultural sovereignty is to be maintained. At present, the jurisdictional problems centre around cable, pay-TV and fibre optics. The British Columbia government has given tacit approval to pay-TV proponents by its support for the illegal receiving dishes prevalent in the interior (and one on the lawn of the Legislature). All provinces except B.C. opposed the CRTC-federal Cabinet decision to allow CNCP to interconnect with Bell; since then Saskatchewan has taken the lead in establishing pay-TV through its creation of Cablecom Corp., which avoids CRTC jurisdiction by being entirely owned by SaskTel, the provincial telephone/telecommunications company. SaskTel is also planning to develop the world's longest fibre optics system, again entirely within the province. A bill before the Saskatchewan Legislature would prohibit any equipment being attached to the SaskTel system without permission, and place a ban on advertising of such equipment. The federal Cabinet's ruling did not provide for *interprovincial* interconnection. Quebec

also has initiated a number of programs since the creation of its own cable corporation.

Finally, it is apparent that consensus must be reached and decisions taken quickly before American influence is irreversible. Moreover, while there is clearly a need for a new Telecommunications Act, and a policy of regulation in some areas to preserve cultural sovereignty, the degree of regulation must be judicious to prevent suffocation of Canadian industry or swamping by American competition. The U.S., unhindered by the problems of an endangered cultural identity, a massive public broadcasting system and sparse population markets has in fact been in a deregulatory trend for over two years. Canadian control policy must therefore strike a balance between the two regulatory extremes, and must above all be co-ordinated.

While the federal government has been aware of most of the issues involved in telecommunications control policy for some time the lack of general agreement as to the appropriate course of action and policy options, within the industry and among the provincial governments, has caused a delay in responding to these aspects of the technological revolution.

Quite the opposite is true in the case of telecommunications development policy. Here there has been a singularly united front of government research scientists and bureaucrats, university professors, representatives of the Canadian telecommunications-informatics industry, Canadian nationalists and the press, all calling for increased R&D funding on the part of government and industry, and for a comprehensive science development policy for Canada. The fact that these have not come to pass is not due to lack of consensus but rather to a combination of other factors, some unique to the Canadian situation.

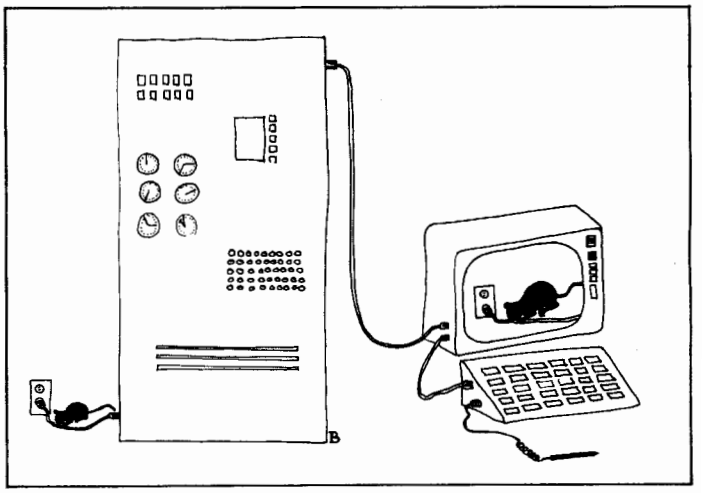
It is difficult to overstate the importance of this issue for the future of Canada as a western developed nation. A recent study of science policies in industrial nations delineated three categories of science policy:

> A strategy of development across as wide a spectrum as possible; only the U.S. and the Soviet Union have been able to adopt this approach, although Great Britain and France attempted it until the 1960s. A strategy of specialization in a limited range of areas where chances of success and commercial benefit are greatest; Sweden, Switzerland, the Netherlands and West Germany are classic success stories in this approach. A strategy of importation or imitation; Japan and Canada are classified here.[1]

Obviously, size and resources are a major factor in the type of strategy chosen. However, the study and others like it would lead most observers to conclude that Canada certainly possesses the necessary resources to adopt the second strategy if Sweden and the Netherlands are capable of doing so. Moreover, the study takes care to point out striking differences in the approaches of Canada and Japan, a country whose size, paucity of resources and post-war restrictions did not permit any alternative to the third strategy, but which nevertheless has been far more successful than Canada.

The reader cannot fail to recognize that all of these other countries have had very specific science policies for decades, or that these policies have included a commitment to R&D funding, and a broad industrial strategy with clear objectives. While these have not always been wholly successful, as in the case of France, they have nevertheless resulted in far more progress than has been accomplished by the absence of a similar strategy in Canada. In the cases of France, West Germany and Japan, such conscious planning has in fact rebuilt countries devastated by two global conflicts. Needless to say the more centralized governmental systems of most of these countries, their indigenous industries (Phillips, Volvo, etc.) and their distance from the U.S. have all assisted them in their development of industrial strategies, and conversely Canada has been handicapped by the opposite set of realities.

Nevertheless Canadian policymakers appear to have only recently grasped the vital importance of a planned science and research policy and one cannot help but assume that, despite the given handicaps, Canadian technology would have been much further advanced had there been such a conscious policy effort since World War II.



1. *T. Long* ed *Science Policies of Industrial Nations*, New York, Praeger, 1975. p.

Instead of such a policy the historical Canadian reality has been a combination of laissez-faire with regard to industry and incremental, inconsistent government support with regard to public and university research. While the American example has at times been almost as disjointed, the study mentioned above quite rightly points out that their enormous resources permit the Americans this luxury, while Canada's position does not.

Canadians can learn much from specific policies of other countries as well. The most recent successes of the Japanese in high technology industry, for example, can be attributed to their concentration in a few selected fields — that is, a deliberate move towards the second strategy. Similarly, a description of the failure of the French across-the-board strategy also contains much that is relevant to the Canadian situation. A fundamental threat to the French strategy of scientific and technological independence lay in the scarcity of the resources necessary to progress across too broad a front of research and development. Resources were virtually wasted in duplication of American or other foreign efforts rather than concentration on potentially important new scientific and technical fields. Programs operated on an extremely narrow margin, one too narrow to withstand serious financial or technical setbacks. As a result, therefore, of the inflationary spiral set off by workers' wage demands in 1968 and of the government's subsequent stabilization program, many of these projects and programs were abandoned completely or severely set back. The retrenchment that took place affected the overall level of support for science and technology, as well as the fate of important programs.

Canadian government funding began increasing in the late 1950s, peaking in 1967-68 and dropping off since then. As in the French case, general austerity measures were one major reason for this decrease. However, Canada also faced unique political problems with regard to regional interests and heightened provincial government aggressiveness.

Furthermore, as science policy is only one of a number of areas which a government must consider when making priority determinations, it is one which requires a large degree of political will since long-term benefits will not immediately be obvious, particularly to those who support other policy initiatives. In the case of Canada the exercise of political will on the part of the government for the past decade was concentrated to a large extent on the problems of Quebec, federal-provincial relations, bilingualism and constitutional reform.

In spite of this one could argue that a modest but coherent science policy could have been developed. Instead, while industry was making a futile attempt to duplicate American technology in most areas, the areas of concentration which emerged in government-funded research were more the result of personal interest on the part of research scientists than any overall strategy, and were not even consistently supported. Large amounts of money were sometimes allocated for research in areas which had suddenly become topical, even if no reasonable proposals or appropriate specialists were available. (Although this has become less common, examples can still be found, a recent one being sizable grants to several government research bodies for solar energy studies). Sudden influxes of money alone can not produce results and frequently have encouraged departments to submit proposals without due consideration.

Despite this uneven general record there have been successes, certain areas of telecommunications policy being the most conspicuous. Since the early '60s the federal government appears to have developed a conscious policy of mixed development, transferring a good deal of space technology from government laboratories to private industry, thereby creating an indigenous Canadian space manufacturing industry as well. The establishment of Telesat and the Interdepartmental Committee on Space were further positive steps in this overall strategy of co-operation between the public and private sectors. The Anik series and Hermes projects were the fruits of this co-ordinated approach, and provided positive reinforcement. By 1974 the government had a formal Space Program which stressed both the economic and cultural importance of telecommunications research for Canada.

However, the concrete application of this policy proved more difficult, particularly within government itself. By 1979 it was necessary, for example, to have a written policy statement reaffirm the 1974 policy of supporting the development of Canadian prime contractors. A study entitled *A Review of the Effectiveness of the Present Approach to Implementing Canada's Space Program* has been made available to Ministers in recent months, and calls into question the effectiveness of the Interdepartmental Committee. Problems have arisen due to the fragmentation of research among a large number of departments, and due to the competing demands of the various departments for slices of an ever-decreasing financial pie. Lack of overall government co-ordination in the past few years has actually resulted in Ministers promising increased funding for programs only weeks before Treasury Board announcements of cutbacks or hold-the-line budgets. Promising proposals

were greeted with enthusiasm and then allowed to fade into oblivion. For example, a task force report *Branching Out*, on the status of computer communications in Canada, was received in 1972, but by 1978 no major policy decisions had been taken. Of 39 recommendations, 36 were addressed to the federal government. Action was taken in four cases. It was suggested that the Department of Communications be the "lead department" for computer-communications, but instead the government set up an interdepartmental committee to be the focal point; the committee was disbanded early in 1978.

More importantly, while progress has certainly been made in the area of space communications research, the policy which was responsible for these successes has not been expanded to provide an overall strategy for the entire telecommunications field. As a result the isolated successes such as Hermes and Telidon may very well provide Canada with only a fraction of their potential economic benefits and leverage.

Government support for Canadian industries in other areas of telecommunications-informatics has been less, as has its support of research institutions at universities. In 1978 the Science Council of Canada published *The Weakest Link, A Technological Perspective on Canadian Industrial Underdevelopment*, calling for a "wider industrial strategy incorporating the concept of technological sovereignty." The same year the Task Force on Research in Canada released a statement by the Science Council entitled *Supporting Canadian Science, A Time for Action,* in which it urged the federal government to correct a critical situation by following through with concrete proposals after the formal announcement of commitment to "measures to strengthen and encourage R&D in Canada." A year later, the Report of the Ad Hoc Advisory Committee (MOSST) concluded that "current incentives will not produce the change of attitude and intensification of effort required," while another report of the Science Council was entitled *University Research in Jeopardy.* Clearly there is a large gap between the conception and execution of an overall policy.

This is not to say that there has been no progress at all. There is increasing evidence that the federal government is attempting to intensify its efforts to promote R&D. In June of this year a $50 million policy to help high-technology industries was announced, with the first grant given to Mitel Semiconductor. Tax incentives for industrial R&D have been improved, and government funding for universities is to be increased. But the message of these recent reports is that far more effort, of a more comprehensive nature, will be needed to achieve success. More tax measures and other support for industrial research, tougher legislation to control and encourage research policies of multinationals, higher funding levels for basic research at universities and greater use of government powers such as procurement policy to support Canadian high technology industries are essential elements of a concerted science policy.

Science Council proposals summarize these and other points made in this paper, arguing that in addition to more money, the cornerstones of Canada's science strategy should be excellence, coherence, relevance, intersectoral co-operation, continuity and stability. It could be also argued that it is the field of telecommunications-informatics, where Canada has demonstrated world-class capacities, which holds the most promise for this strategy and which is the key to Canada's economic future.

SUGGESTIONS FOR FURTHER READING

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