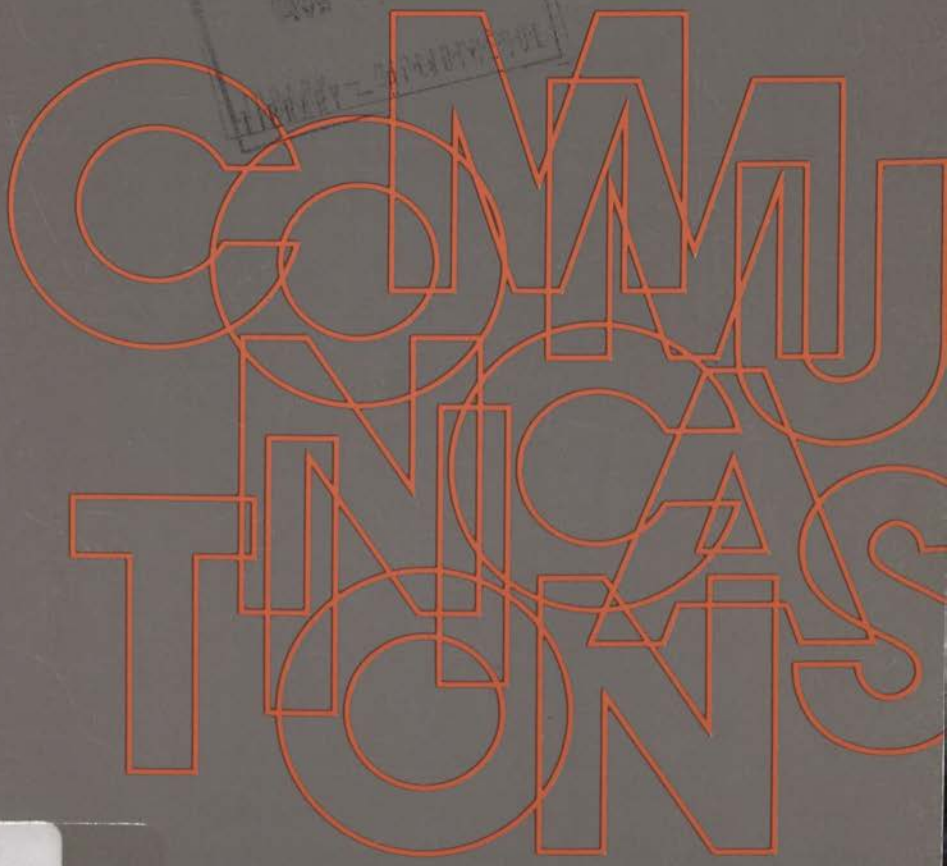
1979
Report of the Communications Research Advisory Board



Government of Canada
Department of Communications

Gouvernement du Canada
Ministère des Communications

1 Canada. Communications Research Advisory Board.

~~1979~~

2 **Report of the Communications Research Advisory Board** = Rapport du Comité consultatif de recherches en télécommunications. Ottawa, 1979.

March 1980

Cat. No. Co 1-4/1980
ISBN 0-662-50763-0

Preface

Last year, for the first time, the Communications Research Advisory Board made public its annual report to the Department of Communications in the interest of promoting a greater understanding of the issues involved in publicly funded communications research in Canada. This 1979 report is being made public for the same reasons.

The Communications Research Advisory Board (CRAB) was appointed in 1974 to advise on the research program of the federal Department of Communications. Its members, distinguished experts in the fields related to communications, are appointed by the department for terms not normally exceeding three years.

The mandate of the Board is to advise the Department of Communications on the quality, management, and relevance of its research program to departmental goals. It also recommends measures to improve co-ordination with similar programs in industry, universities, and elsewhere in government, and offers advice on matters specifically referred to it by the department.

February 13 1980

Mr. Bernard Ostry
Deputy Minister
Department of Communications
Ottawa, Ontario

Dear Mr. Ostry:

On behalf of the members of the Communications Research Advisory Board, I have the honour to submit herewith the report of our Board for 1979.

As agreed when I accepted your invitation to serve again this year, this will be my last report. It has been my privilege to lead CRAB's efforts since its beginning four years ago and I hope that our recommendations have been useful to you and to your department. For my part it has been a great experience in every respect and I would like to express my appreciation for the confidence you and your department have placed in my efforts during this period of extraordinary development in communications.

As I leave, I am more than ever conscious of my indebtedness to all those who, as members of the Board, have so freely given their time, expertise and good will to what is after all a challenging exercise in collegiality. I am particularly grateful for their cooperation and patience in making my job as chairman so pleasant and rewarding.

Sincerely,

Alphonse Ouimet

Alphonse Ouimet
Chairman
Communications Research
Advisory Board

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In Memory

Dr. John Chapman

All members of the Board were saddened to learn of the unexpected death of Dr. John Chapman.

As The Globe and Mail said about him in a special editorial October 19, 1979 "Canada is not up among the leaders of many of the technological frontiers. It is in space communication, and in great measure because of the work of Dr. John Chapman. . . . Canada does not always know its heroes."

We were among the privileged to know him. He was an outstanding scientist and public servant. Our deepest sympathy is extended first, of course, to his family but also to those colleagues who worked with him and shared in the success he achieved.

The Communications Revolution

Society is in the midst of a technological revolution in communications and information processing that is having an impact that may well be as great as if not greater than that of the industrial revolution of the 18th century. New markets are appearing while others become obsolete. Respected organizations such as Arthur D. Little, Inc. predict that sales for optical fibres and the components associated with them will exceed one billion dollars within five years. North American sales for word processors are expected to double that amount by 1982. Japanese and U.S. industries are engaged in a major struggle for supremacy in the manufacture of large-scale integrated circuits. The non-technical Saturday Review predicted in June 1979, that America would be operating 10,000,000 microprocessors by 1980.

While there is no agreement that accelerating automation will necessarily increase unemployment in the communications sector, there is a growing consensus that there will be at least a substantial degree of disemployment as electronic funds transfer, electronic mail and other economically attractive services are introduced. Canadians will need to acquire new skills to meet the needs of a changing market place. Entrepreneurs will have to recognize and exploit new opportunities. Above all governments, both federal and provincial, will have to provide incentives and the appropriate regulatory and policy environment if this country is not to be a major loser in the highly competitive contest that is evolving so rapidly.

It is not only in the high technology and industrial areas that Canadians will be affected. Broadcasters, both public and private, have serious difficulties now in competing with an almost overwhelming number of expensively produced programs from abroad which blanket our major population areas. The new communications technologies, if not introduced within a social policy framework designed to serve the needs of all Canadians, could dangerously fragment a market which, compared to the USA, is relatively limited. This would make even more difficult the task of encouraging an increased number of high quality Canadian

productions which reflect the interests and aspirations of this young but complex nation.

We were pleased to observe that the nature of the revolution has been identified and articulated by the senior officials of the Department of Communications. Their pioneering efforts in space technology and videotex are cases in point. Despite a change in government during the year, the ministerial position has been consistent. The Deputy Minister has warned in numerous public statements of both the dangers and opportunities inherent in the many challenges contained in the many complex changes faced by Canada.

Unfortunately, this concern does not seem to be generally shared. Existing Canadian policies do not encourage innovation. There was general agreement that modern industry is a complex system—and since it is a system it is not generally practical to isolate segments for independent study leading to the setting of policies. The point is an important one and one that we will come back to later in the report.

The word "revolution" in this section was used advisedly for it not only connotes change it also implies rapid if not violent change. The impacts of the revolution to which we refer are major. They include product innovation, process innovation in industry and process innovation in the service sector. The first relates to the change from mechanical to microelectronic elements, the second to significant modifications within the work place, while the third implies a reversal of the employment growth trends in the service sector of the 1960's and the 1970's.

The employment and cultural development implications are serious. Policy makers, at all levels of government, must come to grips with questions such as optimum industry structure, the consumer interest, vulnerability, employment, energy and sovereignty if we are to ensure our economic and social survival. As the Science Council of Canada said in 1978 "We do not have the luxury of time."

The Role of the Department of Communications

While we understand that our primary responsibility is to comment on and make recommendations related to the research activities of

the department, and much of this report will in fact be devoted to that objective, we believe that to be effective our remarks and recommendations must be considered within the context of the overall role of DOC. The Deputy Minister in his response to the Board's previous report said ". . . the subject of mandate, organization, policy frameworks and the place of research in those frameworks, should be given attention by the Board each time it meets since to do otherwise is like pouring wine without checking that the glass is there to receive it." Certainly we concur with this suggestion.

Canada faces a decade of both dangers and opportunities. Communications, in a broad and general sense, is at the core of the new information based society. It is imperative, then, that there be a focal point in government to which concerned Canadians can turn for the policy decisions and the research support so urgently required.

During the excellent series of briefings we received this year the objective of the department was described as follows: "To foster the orderly development and operation of communications for Canada in the domestic and international spheres". Specific areas referred to included: optimum systems architecture; role and responsibilities of TCTS and record carriers, CATV companies; the complex relationships between federal and provincial governments; standards; the industrial role and ownership of information suppliers.

While we do not disagree with the above there was a general feeling that the department should take a broader view of its mandate. The overall policy picture is fuzzy. The government must do everything in its power to ensure to Canadians individually and collectively the provision of the best communications services possible within the technological, economic and cultural resources available and to keep related industries in the forefront of the international market place. This is clearly the role of the Department of Communications and can best be accomplished through a strong department clearly designated as the lead agency responsible for overall policy development.

In interpreting the above statement, we understand government to include both the federal and provincial levels, but until powers are delegated or constitutionally changed the federal level obviously must play the leading role. We would also like to stress that "to ensure... the provision of ..." is not the same as "to provide". The latter sense would widely involve government in actual operations which we believe would be unwise. The words "individually and collectively" were used to recognize that in telecommunications there are both individual and collective rights and needs which are

not necessarily the same and which may at times actually be in conflict.

In the rapid and complex context of the communications revolution only government can establish the clear policy framework and the economic climate in which private enterprise can flourish without being exposed to unreasonable risk. Obviously the responsibility of the government and the Department of Communications in telecommunications can only be exercised by keeping ahead of or at least in step with national needs through research, long term planning, policy formulation, and leadership.

As Walter Light commented to the 1979 meeting of the Electrical and Electronic Manufacturers' Association of Canada[1] "Canadians have led a very sheltered life for the past few decades. They have become, in many respects, quite insular and removed from what is going on in the international market place." He quotes some telling figures. Of industrial R & D Japan subsidizes 90 per cent, West Germany 80 per cent, France and the United States 60 per cent, Great Britain 50 per cent, Sweden 45 per cent and Canada 12 per cent. He added that: "The Canadian total does not include the impact of tax credits and therefore is slightly higher, but the total does accurately reflect the difference in past Canadian government attitudes and philosophies and those of our international competitors".

The Business Council on National Issues and the Canadian Manufacturers' Association argue for a tax incentive rather than grants in their report on industrial R & D in Canada. But they add a salient point. Present actions of foreign government limit Canadian access to markets in electronics and communications, while Canada appears reluctant to take similar steps to protect its own markets.

It is perhaps not sufficiently understood how difficult it is to innovate in today's market. There is an urgent need for specific data on the start-up problems for new ventures in the field of communications. Recent studies in the United States indicate periods averaging eight years before profitability is achieved for typical new ventures. Without such data for Canadian ventures it is difficult to develop policies fostering innovation.

Uncertainty in Canada's regulatory environment is also hindering the development and introduction of new and improved services. In the absence of a definition of new service categories that are non-regulated and competitive, regulated but competitive, or monopolistic it is not surprising that Canada's potential for new

1 Light, W. F. (1979). Attitudes, The Real Challenge of the 80's. *Electrical and Electronic Manufacturer's Association of Canada.*

technology, high risk ventures and associated capital projects is not being realized. The lack of policy direction and regulatory ground rules has had a dampening effect on the planning and development of promising new service areas and the extension of improved communications services.

In short, then, we see a broader role for the department. Its objectives should continue to stress research but it must also include greater emphasis on the role and importance to Canada of traditional services such as broadcasting and telephony, and on the development of the appropriate communications policies for recommendation to the government. These policies must recognize the challenges associated with the communications revolution —for Canada, and for Canadians as consumers, producers and manufacturers for both the national and international market places.

Planning and Its Relation to Research

Last year we stressed the importance we attached to the policy and planning function of the department and recommended that consideration be given to ways in which it could become more closely integrated with the research program in terms of both organization and personnel. While we recognize that such changes often create problems, we feel that the need is even greater this year because of the revolutionary changes the communications industry is experiencing.

To underline our concern we point out that it is doubtful if the "watershed" policy decisions by Bell Canada and Northern Telecom to go digital in the Sixties and Seventies could have been taken without a high degree of co-operation and co-ordination between planning and research. We are convinced that if a similar relationship between those two functions could be achieved within DOC that significant benefits would accrue.

Long range plans do exist within sectors, and these, as seen from the perspective of Space and Research, have contributed to much of the success that has been achieved in the satellite and videotex

projects. What has been missing are the critical interrelationships between sectors and the overall planning of the department. As one of our members pointed out, planning is a process. It is a continuum involving a variety of individuals with a variety of responsibilities, many more, for example, than the analysts and comptrollers—important as these two groups are. As another member put it "... the single most important issue which is to set out clear government policies regarding the development and commercial exploitation of all the business which will be created by this information revolution [has been ignored]. No business man ... would risk his money on projects which would never lead to commercialization. However a lot would ... fund high risk projects if they knew they would be allowed eventually to benefit .... Every day which goes by without a statement of policy works against a strong communications industry in Canada and allows foreign competitors to take the lead."

We were naturally gratified, therefore, to learn that the Deputy Minister has established a Planning Secretariat and that he had specifically charged it with the responsibility of setting up and managing a *process* (italics ours) for establishing and reviewing the overall goals and priorities of the department. This is an important step. We were also pleased to see the evaluation and monitoring component included.

It is in this context that we would also like to stress the importance and need of social and economic research of the highest quality. The fate of new technologies, however desirable, depends largely on the degree to which the public will accept them. We cannot overemphasize the need for market-oriented research directly related to special projects within the Research Sector. As the Deputy Minister so correctly pointed out in his response last year "... coordination must be accepted as a daily fact of life." We do recognize however the enormous contribution that the Research Sector has made to technological innovation. We encouraged the initiatives last year, and we do so again.

Technology Transfer and Industrial Strategy

The need for the development of an industrial strategy for fostering a strong Canadian presence in communications should receive continuing emphasis, as proposed in last year's report.

We have been stressing throughout this report the overriding importance of the policy setting role of DOC. Key to the process of setting strategy is a list of policy items upon which DOC intends to make policy recommendations. This list is then the platform on which the research program can be set. The industrial strategy and hence supportive technology transfers can in turn be built upon the research program.

We feel that successful industry can evolve under almost any set of self-consistent and stable policies. Unclear policy guidelines or rapidly shifting guidelines are a great disincentive to industry. Again, we see the importance of enunciating policies.

Given appropriate and published criteria, such as regular assessment and duration of support, the "chosen instrument" approach has much to recommend it. Using the broad brush economics of likely market size, tariff structures, likely efficiencies and financial structure, a chosen instrument can be supported initially through government procurement of the initial product. To the extent posssible, field trial equipment should be Canadian made so as to foster Canadian manufacturing experience early in the life cycle of the proposed product. Currently the time interval between developing a plan and its implementation would appear to be too short to allow for maximum participation by domestic industry.

In our efforts to implant communications related products into Canadian industry, we should also encourage important segments of the component supply industries. Specifically, communications projects could indirectly support an evolving Canadian silicon chip industry — the custom large-scale integrated circuit in particular. There is also an opportunity to support and develop a Canadian optical fibres manufacturing capability. Segments of the evolving office communications industry should also be supported as a result of technical work undertaken in support of the development of policies in this area. In general, we would urge the department to ensure that as many members of the Canadian industrial community as possible be involved in the discussion of such new opportunities.

An overriding consideration in the generation of industrial enterprises is their ongoing ability to compete in world markets. For both large and small companies, the support available in Canada for up front investment in R & D and capital must be comparable with that available to companies established in countries which are likely to be our competitors. This does not say that the form of assistance available to Canadian owned companies must be identical to that available in other countries, each of which has a somewhat different social and financial infrastructure. However, the net effect must be to be competitive on a world wide scale. Although

such a distinction will not hold in all cases, in the Canadian situation large companies should be supported through tax incentives for research and development, but some specific support programs may be appropriate for special projects entered into by promising small enterprises.

An interesting viewpoint on the subject of technology transfer (in relation to the problems of the Third World) has been provided recently by Rodney W. Nichols, Executive Vice President of the Rockefeller University, New York and a member of the UN Advisory Committee on the application of Science and Technology to Development[2]. He states that:

> Technology transfer almost always conjures up wrong images of packages of know-how being identified cleanly, transported around tidily, opened up easily, and used efficiently. The phrase ought to be abolished, for it never clarifies anything. It compresses too much into a code which scrambles many of our messages. **The crucial issue is to recognize how much work, over a long time, is needed to build up a technical base where now no such base exists.**
>
> Most technology is available at low cost from open sources, but it must be sought with a sharp awareness of what is needed.

Dr. Nichol's comments are applicable to Canada. A good deal of "technology" is already available in Canada at low cost. This can be confirmed by visiting the NRC grantees in Canadian universities. Our Canadian problem is not that we lack the technical base in industry, but that we lack the new ventures capable of exploiting what is already being developed.

The Science Council Study, Number 24[3] was helpful in showing how technology transfers have been accomplished in the past, not only from government laboratories but from universities and from other countries. We need to re-examine the problems associated with making such transfers successfully. As Nichols points out, there are critical uncertainties, including gaps in our knowledge, that complicate policy-making even when it is well informed.

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2 Nichols, Rodney W. (1979). For want of a nail? *Technology in Society*, Vol. 1, No. 2, Pergamon Press Ltd. New York.

3 Science Council of Canada (1975). Technology Transfer: Government Laboratories to Manufacturing Industry. *Science Council of Canada, Report No. 24*, Information Canada.

Department of Communications Research Program

As mentioned earlier in this report the Board received a comprehensive set of briefings regarding the nature and extent of the current activities of the Research and Space Sector. The list of topics either covered in material distributed in advance or discussed in the meetings was impressive both in scope and detail. They included: Telidon, Office Communications, Optical Communications Program, Rural Program, Mobile Radio, Image Communications Systems, Data Networks, High Frequency Communications, Propagation Studies, New Spectrum Usage Techniques, Radar Systems, Space Segment Industrial Policy, Satellite Ground Station Policy, International Space Activities, David Florida Laboratory Management Options, Chosen Instrument Policy, Direct Broadcast Satellite Experiment, Tele-education, Telehealth, Public Service, Community Communications, TV Broadcasting Distribution and Anik 3 Pilot Projects.

It is impossible, given the time available, to comment on all of these subjects. Nevertheless the members appreciated the open manner with which often difficult and sensitive matters were dealt. There are some points we wish to make which we hope DOC will find helpful and constructive.

In general we were dismayed to learn of the erosion of Canada's share of the telecommunications market. To see our trade balance for equipment in this area fall from a positive 70 million dollars in 1970 to a negative 100 million dollars in 1978 is disturbing. While we have done relatively well with regard to telephones, we did not capitalize on the public demand for CB radios. Obviously the Department of Communication cannot be blamed for Canadians' lack of initiative in this area, but it reinforces our argument for the need for planning and market-oriented research and is a timely warning not to neglect potential areas of growth in videotex, optical communications, office communications, mobile telephones and other high technology communications areas.

(1) **Telidon**

The Department of Communications has done an outstanding job in the development of Telidon. It is an excellent technology which presently leads the world. The fact that it can transmit its data by any one or all of broadcast, cable or telephone is an obvious advantage. Certainly the unique graphics capability justifies its claim to be a "second generation" videotex system. However, it

lacks the market base necessary to secure itself internationally. DOC should explore the possibility of encouraging the federal government to become an information provider, using its own considerable resources of material, thereby creating a substantial data base for the system.

In addition, DOC should examine the environment in the United States with the object of ensuring the adoption of standards for this type of technology so that Telidon will have a place in that critical market. Such action will probably imply that the question of interfaces with a large variety of existing data bases and other systems will become a priority research requirement. The system that can provide the maximum flexibility of access by both information providers and users will be the one most likely to win out in the end. Whether this implies a single or a modular terminal requires further study.

The establishment of the Canadian Videotex Consultative Committee was an important step. We hope that they will be able to bring in their recommendations on technical standards, information providers and the range of options that the technology will support at an early date. The setting of standards will aid designers and manufacturers in the development of suitable terminal, computer and carrier hardware.

While we recognize that field trials are critical to the successful development of new technologies such as videotex, and that they should not be unnecessarily hampered by the conventional regulatory process, we also recognize the need for all interested parties to be informed of the opportunities for participation well in advance of the proposed trials.

(2) **Mobile and Radio Systems Program**
We noted that the recent reallocation by DOC of frequency bands to mobile communicators not only should relieve congestion but also provide an opportunity for the orderly development of a national system designed to meet the needs of a country whose population density is relatively small. We were glad to see that private capital will be available along with public investment. Hopefully there will be an opportunity to develop a viable Canadian industry in a market which has been for so long dominated by the United States. We were concerned, however, that the objective of doubling the present domestic share of 10 per cent may be too low given the enormous potential for growth in mobile radio.

(3) **Rural Services**
The efforts of the Department of Communications to improve communications services in rural areas are an important part of its primary role. Nevertheless, its specific activities have tended to be

diffused. It was suggested during the discussions that the promotion of an integrated service in rural areas along the lines of efforts in the United States (e.g. REA) would prove to be more successful. In order for rural areas to become attractive sites for the development of new technology, larger market bases must be developed in communications services. Therefore, the department should consider ways and means of providing federal incentives or appropriate rate adjustments for the development of communications services (perhaps on the DREE model) in concert with the various carriers who would provide the services.

We agree that the approaches should not be fragmented and that there is a need for a national strategy. The long range economic importance of primary industry products in a world of rising resource scarcities is quite clear. We believe that after three years of research the department has the necessary information to articulate the strategy and recommend it to those with the respective jurisdictional responsibilities.

(4) **Optical Communications**
We referred earlier in this report to the importance that we place on fibre optics as a major growth area. DOC has played an important role not only in tracking developments in this relatively new technology since 1970 but also in funding longer term research projects that could only be carried out by a few of the major multinationals.

In addition, in cooperation with the Canadian Telecommunications Carriers' Association, the sponsorship of a relatively sophisticated field trial in Elie, Manitoba, is a most interesting experiment. The level of activity in fibre optics is encouragingly high in this country with cable companies, many of the provincial systems, as well as Bell Canada, Canadian Pacific and others, actively engaged, but Canada's tenuous lead in this technology needs to be nourished by appropriate government policies. We were pleased to note that the Clyne Committee urged initiatives and support of this promising infant industry.

(5) **Digital Television**
Eventually, there will be a demand for a blend of information provided by videotex systems and television. While at the present radio spectrum saturation is an inhibiting factor in the introduction of digital television transmission, the future availability of virtually unlimited band width at low incremental cost through the use of optical fibres promises a ready solution to the existing problems.

We were pleased then to learn that the Research Sector is planning to work closely with Canadian industry to develop means of

providing digital television pictures compatible with the standards established for Telidon. We hope that a broad spectrum of industry interests will be informed of the possibilities inherent in this new development.

Space Program

The DOC briefings indicated that there were a number of government departments interested in space and satellite matters. It is understood that an Interdepartmental Committee has been in existence for some time. Nevertheless, suppliers and manufacturers continue to express concern about a lack of focus in this field.

There are both advantages and disadvantages associated with the establishment of a separate space agency. Certainly an agency would give this most important area the focus which it presently appears to lack. On the other hand, if the elements concerned with space were removed from DOC, then there is a real possibility that the research centre might lose that critical mass which is essential to its success.

Because of these problems we recommend that the various elements concerned with space within the Government of Canada be re-examined in consultation with industry and the other government departments involved with the objective of considering whether or not they might function more effectively under a single jurisdiction. This might take the form of a space agency, a space council or a special division of some administrative unit probably but not necessarily within DOC.

In addition, it was felt that the space program should broaden its emphasis to stress the earth segment for Canadian hardware development. While pilot projects in the area of health, education, etc., are important there was a feeling that business communications has been neglected. In the United States, Satellite Business Systems, for example, is expected to spend about 100 million dollars to develop its satellite system. A substantial research effort will be required to develop Canadian capabilities with respect to the earth segment for these new services.

Other Issues

There are a number of policy issues which relate directly or indirectly to the research program. They include the follow-up to the World Administrative Radio Conference, de-regulation, growth in competition in the delivery of telecommunications services, jurisdictional issues and direct reception and distribution of TV programs from US satellites. We have not had an opportunity to discuss all of these fully during this series of meetings. We have selected three topics however, for special comment, as a result of discussion.

(i) **Transborder Statellite Transmission**
One of the most pressing areas of concern related to problems connected with transborder satellites appears to be a lack of policy and at the very best an unwillingness to enforce such regulations as presently exist.

Continuing uncertainty regarding policies related to transborder satellite transmission will adversely affect the cultural and industrial sovereignty of Canada, the viability of Canadian broadcasters and cable companies as well as that of the Canadian satellite system itself.

(ii) **The Carriage/Content Dilemma**
This question was addressed by the Clyne Committee. The question is whether it is desirable that the participation by a company in the carriage of signals should exclude it from the business of programming and vice versa. Or is there a dual role?

We recognize that the question is difficult and that the Minister has put forward a set of objectives and guidelines to the CRTC to guide them in the hearings planned for satellite distribution of television programming and the question of the introduction of Pay TV in Canada. We believe that the time is appropriate, but we also urge that any decisions made recognize the complexity of the services which could be offered. In an information society the opportunities for abuse are great. Whoever controls both the content of the message and the method of transmission is in a position of unique power. If information bases are centralized and distribution facilities are limited, as the market will inevitably dictate, then the concept of freedom as we know it is seriously threatened. The question regarding the content (the message) and the container (the carrier) is fundamental and urgent. It requires resolution.

If there were specific policies on these points they would provide a sound basis for a communications infrastructure in which the traditional carriers, the cable companies and the broadcasters could work together with better productivity than is now developed through the present adversary approach.

(iii) **Federal-Provincial Relations**
We endorse the recent moves towards greater co-operation between the federal and provincial governments and the private sector in the field of communications. It is important that the provinces contribute to the development of new communication policies in a meaningful way in order to ensure that the services provided will meet the diverse needs of *all* Canadians. This is particularly true with respect to those areas which are traditionally and constitutionally within provincial jurisdiction. In addition to the guidelines and objectives referred to in the previous paragraph, we also understand that working groups have been established to review Canada's technological capabilities in areas such as space, fibre optics, interactive TV and microelectronics.

It is equally important, however, that such co-operative efforts acknowledge that communications have a national perspective and are subject to international arrangements. Given the present level of technology the national interest must be paramount.

Conclusions

The meetings held this year were particularly interesting. We enjoyed working with staff members who, as we mentioned earlier, were always knowledgeable, open and co-operative. Needless to say the time spent with the Deputy Minister was particularly valuable. The experience of working on this Board has enriched our own knowledge and experience.

In conclusion we would like to point out a few of the recommendations contained in the text of this report for special emphasis.

1. Policy makers at all levels of government must come to grips with questions such as optimum industry structure, consumer

interest, vulnerability, employment, energy and industrial and cultural sovereignty which relate to a communications and information revolution.

2. DOC must take a broad view of its mandate. It must place greater emphasis on the development of appropriate policies related to the communications revolution.

3. DOC should be designated as the lead agency responsible for policy development with respect to communications.

4. Greater emphasis should be placed on critical interrelationships between sectors in the overall planning of the department. We hope that the new Planning Secretariat will prove a valuable facilitator in this regard.

5. There is a need for further development of high quality economic and social research including market-oriented research to complement the excellent work being done within the Research Sector.

6. To the extent possible, field trial equipment should be Canadian to foster Canadian manufacturing experience early in the life cycle of the proposed product. Currently the time interval between developing a plan and its implementation would appear to be too short to allow for maximum participation by domestic industry.

7. Support available in Canada for R & D and capital must be comparable with that available to companies established in countries likely to be our competitors.

8. Although such a distinction will not hold in all cases, it seems likely in the Canadian experience that large companies should be supported through tax incentives for R & D but that some specific support may be appropriate for special projects entered into by promising small enterprises.

9. DOC should explore the possibility of encouraging the federal government to become an information provider, using its own considerable resources of material, thereby creating a substantial data base for the Telidon system.

10. A priority research requirement for Telidon will be to develop the interfaces necessary to ensure access to the large variety of existing data bases and other systems.

11. To ensure that rural areas become attractive sites for the development of new technology DOC should consider ways and

means of providing incentives for the development of services in concert with the various carriers.

12. The various elements concerned with space within the Government of Canada should be re-examined in consultation with industry and other government departments involved with the objective of considering whether or not they might function more effectively under a single jurisdiction. This might take the form of a space agency, a space council or a special unit probably but not necessarily within DOC.

13. The space program should broaden its emphasis to include the earth segment for Canadian hardware development.

14. The "chosen instrument" policy is supported, provided there are appropriate and published criteria, including regularity of assessment and duration of support.

15. A substantial research effort is needed in Canada to develop Canadian capabilities in the area of business communications.

16. Policy is urgently needed with respect to trans-border satellites, the respective federal-provincial roles in communications and the carriage/content dilemma.

Government of Canada Gouvernement du Canada

Deputy Minister of Communications Sous-ministre des Communications

Ottawa K1A 0C8

Mr. Alphonse Ouimet
Chairman
Communications Research Advisory Board
227 Lakeview Avenue
Pointe-Claire, Quebec
H9S 4C8

Dear Mr. Ouimet:

I think that you and your colleagues on the Communications Research Advisory Board are already aware of the many initiatives in the department which your 1978 report provoked. Some of these have been exploratory, others catalytic, still others have involved substantial commitments of public funds.

Without attempting to be exhaustive, I might mention a few of these initiatives. A precedent has been established in assisting the development of a prime contracting capability in Spar Ltd. In two short years since the first Delta meetings on new services, and less than that since the 1978 report of your Board, we have passed from words to action in the experimental introduction of new services. We will be making substantial matching investments with industry in a fibre-optic rural field trial in Elie, Manitoba and in the Telidon program for new services. In mobile radio telephony and record communications, we are well into the detailed planning of similar joint initiatives. It is satisfying to be able to say that the 1978 CRAB report has not gathered dust.

When I first met your Board, it was shortly after I arrived in the department. I can admit without apology that, while I sensed then that there was scope for initiative and improvement, I did not imagine how much. I therefore delayed this response to a time when the early consequences of several of our initiatives could be evaluated. It would have been premature had I tried to reply earlier in the year as has been the custom in the past.

While the Board focussed primarily on technological transfer and industrial development in its 1978 report, it also discussed departmental organization, mandate and policy frameworks. These are important matters. We are acutely aware of the need for

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co-ordination with other departments and agencies. While I agree with your view that "DOC's prime concern is with the purveyors of communications, not the purveyors of hardware", the exact partitioning of responsibilities is complex. To begin with, the purveyors of content must be added to the mix. They depend on the "purveyors of communications" to reach the general public, but the department has few direct responsibilities for the policies which govern information production and dissemination. In turn, the viability of the "purveyors of communications" is strongly influenced by the capacity and technological adaptability of their suppliers. These issues are of concern to the Department of Industry, Trade and Commerce. On the other hand, the viability of the "purveyors of hardware" is critically dependent on research and development, for which the department has a mandate. So interdependent are the issues in the communications field, that this co-ordination must be accepted as a daily fact of life.

In my opinion the subject of mandate, organization, policy frameworks and the place of research in those frameworks, should be given attention by the Board each time it meets, since to do otherwise is like pouring wine without checking that the glass is there to receive it. In particular, the department is endeavouring to give "increased priority in the research program" to "social and cultural implications of technology". Your comments as to how well we are succeeding will be most welcome.

I would now like to address the three key sectors of the report titled respectively "Technology Transfer", "Industrial Strategy", and "Elements of the DOC Research Program".

Technology Transfer

Your remarks under this heading of your report concerning items (2) transfer of personnel to enterprises with the transfer of technology, (3) start-up periods for high technology companies, (4) the high risk of new ventures and (5) need for an active role in the financial affairs of a company, are welcome confirmation of lessons the department has learned in its short lifetime. A number of companies have now made it past the critical start-up period thanks to government action in these areas. A half dozen examples (SED, MDA and IMDI, AES, Norpak, CANSTAR, Spar) come to mind of firms which have become autonomously successful. Any one of these might have floundered had support terminated too early, had risk capital not been marshalled and, to a lesser extent, had personnel transfers not occurred. By the same token, I think that initiatives which are not successful should also be recognized and that if an enterprise shows no signs of making it in five years or so - due to any number of reasons - support should be reconsidered. I would interpret your remarks in item (8) with respect to "unrealistic expectations" as supporting that proposition.

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The question of "chosen instruments" - item (6) - is one on which I would like to solicit supplementary views from the Board. A precedent has already been established in this respect in connection with communications satellites. It is abundantly evident in this case that the size of the market, and the magnitude of resources required to exploit it, offer no alternative to the chosen instrument option.

However, the government is not in a position to choose instruments in other areas. Some of the examples are the cable industry and its suppliers of coaxial cables, CATV electronics and satellite ground stations; the record carriers and their suppliers of teletypewriters and electronic equipment generally; and the broadcasting industry and its suppliers of transmitters and studio equipment.

In these areas, the "chosen instrument principle" would imply vertical integration, explicit or implicit, of carriage with equipment manufacture and research and development. The Bell/Northern/BNR complex is an outstanding example of the success of this formula. There are variations of this formula in Japan and Europe. At the same time, vertically integrated companies draw fire from a substantial sector of public and business opinion. When the national market is only large enough for one enterprise, the alternative to a chosen instrument or vertical integration is very clear - it is the branch plant. I would therefore be pleased if the Board were to elaborate its views concerning the "chosen instrument" principle as it might apply to the communications carriers over which the department might exercise some influence and for which it might bear some responsibility but over which it has no control as to procurement.

Is it your view, for example, that the privilege of a regulated monopoly should carry with it obligations to the economy in general, to domestic manufacture and to the creation of employment? Should such institutions be encouraged to vertically integrate or otherwise ally themselves with manufacturing research and development enterprises on a long term basis? Would such a relationship enhance the stability of these institutions, and their ability to innovate and to deliver optimal services?

My last remarks under this caption relate to your items (1) lack of competent and effectively supported entrepreneurs - and (7) environment conducive to encouragement and success of entrepreneurs. It seems to me that "environment" for an entrepreneur means the existence of a market of appropriate size, and "competence" means his ability to carve out a piece of it in the face of competition.

The telecommunications hardware market divides fairly sharply into institutional and consumer sub-markets. The first is governed through long-term planning by a relatively few regulated institutions

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This market is one in which "chosen instrument" rationales appear to have been found appropriate in Canada, the U.S.A. and perhaps in every other developed country in the world.

In the consumer-subscriber market, advertising, comprehensive distribution facilities, large scale production and services are determinants. It is in this market, with its challenges of scale, that new services and related hardware will be shaped and the winners separated from the losers.

We have seen much of our consumer electronics industry decline and disappear in Canada. This is true of television receivers, audio and video cassette recording equipment and high fidelity audio equipment. We are now - as are Britain and France - examining ways in which we might rebuild the subscriber electronics industry on the foundation of TV sets incorporating Telidon.

Technological innovation is necessary in this game, but it is not sufficient by itself. It is possible that a resource on a world scale will be needed to give Canada a presence in this market. It would have to be internationally competitive to be competitive at home, and the Canadian economy might have difficulty supporting more than one. We have begun to explore with industry alternative structures and patterns for achieving this scale of enterprise. If there is a formula which can satisfy the public and the engaged enterprises and survive in the market, it will have to be of a new and ingenious conception. We may now be in a period in which not only technological but organizational ingenuity is demanded both of governments and Canadian entrepreneurs.

We would be pleased to receive supplementary views from you and your colleagues on this concept as well. How do you see the role of the department in industry structuring? How is competition to be secured in a market just sufficient to support one viable manufacturer?

Industrial Strategy

On the whole - and I think you will agree - it is not possible to segregate sharply an industrial strategy for communications from all of the other sectors of our economy that have been penetrated by electronics, communications and information machinery. A large proportion of our gross national product, and of our employment, is now engaged in the generation, transmission and processing of information. I feel that the Department of Communications has effectively used its modest resources to inform other government departments, other governments and the public, of the scope and potential impacts of the information revolution.

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The department has been advancing along the entire front delineated under your seven points. In both the space and the research sectors of the department, the creation and development of a strong, domestically owned telecommunications industry has been a commanding objective. In all of our programs in space communications, in optical fibre systems, in business communications, in mobile radio telephony, the formula is one of collaboration and cost sharing.

There is of course very much left to do in acquainting many federal government departments as well as provincial governments with the realities of industrial survival in the communications sector and with the crucial importance of procurement policies. Although government is an important buyer of electronics equipment, it is only one of many. It has thus been very satisfying to observe how responsibly the CATV industry reacted to the government's new policy on satellite ground stations. Pluralistic as the Canadian cable distribution industry is, it has nevertheless succeeded in inventing a formula through which its many cable companies in the Canadian Cable Television Association will be collectively buying their ground stations in bulk and offering Canadian manufacturers a volume on which they should be able to bid competitively.

I have already noted that the department will be pursuing a chosen instrument policy with respect to communications satellites. It will also be placing its David Florida Laboratory at the disposal of industry.

The maximization of the use of existing telecommunications networks, the subject of your seventh paragraph, comprises a welter of sub-issues. I think that both the department and the industry realize that "maximization" in the coming decade will call for many inter-enterprise accommodations and transformations. The roles, functions and services of broadcasters as carriers, of cable distributors, of record carriers and of telephony carriers will overlap in some cases and merge in others. Cost-effective use of local drops, be they coaxial cable, twisted pair or optical fibre is a pressing preoccupation in both the carriage industry and in the department. Solutions require technological considerations as well as economic and jurisdictional ones. There are many mechanisms for finding solutions, beginning of course with those already in place within existing enterprises. The department has created consultative mechanisms, such as Delta, to encourage an industry-wide search for solutions. It will be urging enterprises to help find these solutions not only through technological research but through analysis of the economic, social and organizational factors as well. In conjunction with the CRTC, the department will have succeeded this year in encouraging the cable distribution industry to create a research institute. In the coming year it will be doing likewise with respect to the broadcasting industry. Maximization of use in today's environment calls for responsible and collective action by government and industry.

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Elements of DOC Research Program

New Home and Business Services

A great deal of progress has occurred in this area. Most of the developments have been well publicized under the Telidon program. The merits of the Canadian Videotex system have been recognized in England and France, where pioneering work on this service occurred. The CCITT is studying the Canadian system as a candidate for international standardization.

Telephone carriers, cable distributors, universities, educational institutions and a variety of information producers have procured experimental Telidon hardware for testing and evaluation. Funds, on a scale larger than we have been able to afford in the past, have been allocated to help users and manufacturers in launching a completely new spectrum of products and services in Canada in the coming years.

We have now completed the essential first phase of sensitizing the community to the nature and magnitude of new opportunities. A critical phase is now upon us. It concerns the ability of our enterprises to take risks equal to the opportunities. Much of the burden of initiative falls upon the regulated carriers and the many information industries whose futures are involved in electronic communications.

We are keenly aware, as I indicated earlier, of the enormous challenges that the production and marketing of subscriber terminal hardware entail. Few Canadian firms are capable of meeting the competition of Japanese, American, and some European firms of the scale of Sony, Zenith, Phillips, RCA, and Texas Instruments. Our strength lies in our national institutions - their resources, their direct contact with the home and business subscriber, their capacity to buy in quantities which permit economies of scale and their ability to service equipment in subscribers' homes.

We shall be tested in the coming months and years. We will succeed or fail depending on the degree to which we are able to work together and to collaborate as a nation of enterprises and individuals in a venture in which there is ample room for everyone.

We would be pleased to update the Board on developments in new services at its next meeting.

Field Trials and Fibre Optics

The foresight of the department's researchers in concentrating on the new technology of fibre optics early and forcefully has been vindicated by developments. The nation's carriers took an early lead in developing new transmission systems incorporating fibre

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optics. Canada now has experimental or operational systems in British Columbia, Alberta, Manitoba, and Ontario, under the aegis of telephone carriers and cable distributors and often with DOC participation. The Saskatchewan Telephone system is calling for bids for the first major fibre-optics network in the world - some 4,000 km of backbone transmission system. It is expected that CNCP will similarly be planning a major fibre-optics trunking system in the high density traffic corridor between Montreal and Toronto.

Northern Telecom is now producing fibre of a quality equal to the best in the world. Canstar's proprietary "Phasil" process is expected to reach that threshold in the course of this year. However, the rate of technological progress continues to be high and the burden of research heavy. Researchers now speak about one decibel fibre and 30 kilometre repeater spacing. The stakes are high and competition is strong. Both the departments of Communications and Industry, Trade and Commerce have been and are doing everything within their resources to help Canadian industry maintain and widen its lead.

Space Program

I indicated earlier that the government has taken the essential steps to support Spar in its role as a chosen instrument in communications satellite fabrication and in providing the necessary assistance to allow the company to develop as a prime turnkey contractor.

Another development has been occurring in the complementary area of communications satellite ground stations. Indications are that, following the announcement of the new ground station ownership policy, the Canadian carriage industry is organizing its procurement in packages of adequate bulk to enable Canadian manufacturers to produce stations on an economic scale. If these steps materialize, there will be substantial effects on employment, industrial strength and export potential.

Investments in space communications have been significant in Canada. Cumulatively they now run to the order of $500 million. We are motivated by the fact that there is no alternative to communications satellites in many areas of this vast country, by our commitment to technological leadership and by our desire to develop a domestic industry. The pay-offs have already been significant on each of these scores. The most remote communities in Canada now enjoy urban quality television delivered by satellite. A half dozen high technology enterprises were born as sub-contractors in the satellite program and are now functioning self-reliantly, and exporting.

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Conclusion

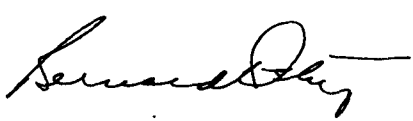
This letter in reply to your report has been uncustomarily long. The reasons are two-fold. First, your report was extraordinarily timely and concrete. And second, the department was able to react across the broad front of your recommendations. And there are still many rewards to reap.

I can do no more than thank you and your colleagues again for the important contributions you have made to the shaping of departmental priorities and to developments in the communications arena.

I understand you are planning this year's exercise for October 2-4, 1979. It will again deal with the role of government in shaping the telecommunications equipment and systems supplier industry, but viewed in the light of the many initiatives the department has taken since you last met. I have asked Mr. Halina to make the necessary arrangements, including preparation of briefing material for advance distribution, as you requested in your report. Please encourage your members to contact him directly if there are specific issues you would like to see addressed as part of the briefings.

It will be almost 18 months between meetings of CRAB. In view of the importance the department attaches to the annual CRAB exercise, it is my sincere hope that no circumstances will arise to cause such a long delay again. As you are very well aware, it was your necessary and most valuable participation in the work of the Clyne committee, which was largely responsible for the delay. I am delighted that you are willing to continue as Chairman again this year, and I look forward to receiving CRAB's advice on how to orient the department's research activities in the aftermath of the Clyne report, in response to a new Minister, and in face of the ever increasing importance of information in Canadian society.

Yours sincerely,



Bernard Ostry

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Ottawa, Ontario

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CNCP Telecommunications
Montreal, Quebec

Sylvane Walters, President
Scarborough Cable & TV
Scarborough, Ontario

*Dennis Hall, President of BNR attended the meetings December 3-4.