

Report of the Communications Research Advisory Board 1981-82

Canada

COMMUNICATIONS

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Government of Canada
Department of Communications

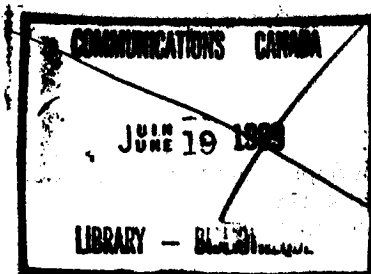
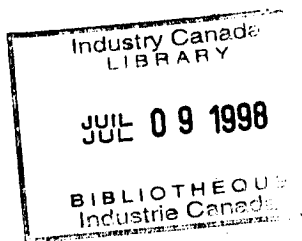
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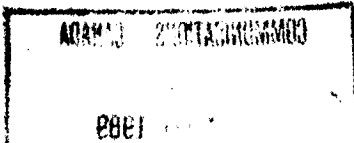
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Preface

The annual report of the Communications Research Advisory Board (CRAB) is made public in the interest of promoting a greater understanding of the issues involved in publicly funded communications research in Canada.

The Communications Research Advisory Board (CRAB) was established in 1974 to advise on the research program of the federal Department of Communications. Its members, distinguished experts in fields related to communications and culture, 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 and management of its research program and on its relevance to departmental goals in the areas of information, communications and space technology, spectrum management and government telecommunications, telecommunications policy, and arts and culture. It also recommends measures to improve coordination with similar programs in industry, universities and elsewhere in government, and offers advice on matters specifically referred to it by the department.

May 1, 1982

Mr. Pierre Juneau
Deputy Minister
Department of Communications
Ottawa, Ontario
K1A 0C8

Dear Mr. Juneau,

On behalf of the Communications Research Advisory Board I am pleased to submit the Report of the board for 1981-82.

We welcomed the opportunity given to us this year to comment on the integration of Arts and Culture within the Department of Communications. It is our view that the availability of appropriate content is critical to the acceptance of the new communications technologies and that the two must evolve together. The related issues are understandably complex. Without the high degree of cooperation and the many contributions of my colleagues, the preparation of this report would have been impossible.

The comprehensive briefings provided by the members of your staff were particularly helpful in providing us with the insights so necessary for our deliberations. Finally, my colleagues and I would like to say how much we appreciated your personal interest in the work of the board, the time that you gave to our initial briefings and the many courtesies shown to us.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'T.R. Ide', written in a cursive style with a large, sweeping flourish at the end.

T.R. Ide
Chairman
Communications Research
Advisory Board

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1

Sweeping changes

The adjectives most frequently used to describe the new communications technologies are "ubiquitous", "pervasive" and "transformative". In a prescient study, published in 1973, the Science Council of Canada described the emerging computer/communications technologies as transformative technologies because they "give impetus to fundamental change in human thought and action".¹

There is no lack of speculation and forecasts regarding the sweeping changes that the new communications technologies are bringing about. The marriage of low cost microelectronic systems, computers and high capacity transmission facilities such as optical fibres offers the delivery of a large range of new services to homes and offices. Personal computing, electronic mail, satellite delivered television programs, non-broadcasting cable delivered services, not to mention the "stand-alone" units such as Texas Instruments' "Speak & Spell" are here!

These technologies are already causing radical changes in the organization, structure and strategies of enterprises. Some unemployment is appearing particularly in manufacturing industries. What is not so apparent is the likely impact on the nature of work itself. Any society which hopes to adjust without major dislocation must recognize that it is the quantity, quality and application of content which will be the principal product of new and innovative industries. Costs of production are increasingly related to software rather than hardware with

¹ Science Council of Canada, "Strategies of Development for the Canadian Computer Industry," *Report No. 21*, Sept. 1973.

software interpreted in its broadest sense to include content and data bases and not simply the operating instructions provided to the computer.

Communications technologies will continue to be developed at a rapid pace simply because people want to take advantage of the services offered. In the final analysis, user response and other market forces will determine the success of any one service, but there is no doubt that our "communications environment" will be very different by 1985.

While we no longer doubt our ability to innovate technologically to generate new communications configurations, there are growing concerns about our ability to provide appropriate content for these new technological systems.

Generating content is the challenge!

2

New directions and priorities

The policy environment

In Canada, the communications policy environment is one of the most difficult for policymakers. Not only do they have to face the geographical challenges of a large, sparsely populated land mass, two languages, the jurisdictional issues related to two levels of government, and the spillover effects from the United States, but they also have to deal with technological change that makes the communications environment increasingly difficult to regulate. Videocassettes, videodiscs, home computers, fully interactive systems and low-cost earth stations present new opportunities for the individual to control his or her information and entertainment environment. Technology "push" makes it imperative that we develop imaginative policies that will enable Canadians to compete effectively in this area. Canadian produced information and entertainment programs are but a small fraction of the total programming that Canadians are exposed to daily. Technological change therefore poses serious questions related to the direction of cultural and social policy in Canada.

Some issues facing Department of Communications at the present time relate to:

- earth-station ownership
- extension of broadcasting services
- microwave licensing policies
- broadcasting policy
- telecommunications policy
- new services (e.g. pay-TV)

- transborder issues such as data flow, broadcasting and satellites
- spectrum management, domestically and internationally
- potential economic impact of communications policy
- policy responsibility
- structural issues such as the relationship between Telesat and Teleglobe
- inconsistent regulations between the federal and provincial levels of government

Obviously, the large number of issues must force the setting of priorities. All issues cannot be treated equally; there are not the time and resources to do so.

In order to arrive at priorities, objectives need to be sharpened and the trade-offs between them made as explicit as possible. This requires an overview — a vision — as to where communications policy should be going in Canada, against which the issues of the day can be tested. Through this type of interaction issues can be clarified and discrete priorities arrived at. But without such a vision and a process which clearly establishes a set of values, goals and objectives, all issues remain equal and compete equally for the time of policymakers.

Planning and setting priorities

The development of an overview and the setting of priorities require a planning function. As we mentioned in last year's report "senior management alone has to set the strategic mission of an organization". We are gratified to learn that Department of Communications has appointed a senior planner reporting directly to the Deputy Minister.

We see three major tasks facing the planning group:

- *the development of a vision and overview* — To be effective this vision must be a clear, goal oriented, well articulated statement that links future directions to issues facing policymakers today.² Without that link there is a risk that the overview will be dismissed.
- *the development of an explicit priority setting mechanism* — Such a mechanism needs to be "transparent" to all those involved in the policymaking process. Only in this way can clear objectives and explicit trade-offs between them be developed and priorities arrived at. To be truly "transparent" the priority setting mechanism will need a set of criteria against which priorities can be evaluated.
- *the development of a process to bridge the gap between the arts and the sciences* — The scientific and artistic cultures are usually considered as opposites, the rational versus the creative. But good science is very much a creative process; discovery comes from insight more than from

² In fact, under the Department of Communications Act, the department is charged to "compile and keep up to date detailed information in respect of communication systems and facilities and of trends and developments in Canada and abroad relating to communications matters". This directive must be interpreted in the broadest possible way (i.e. including socioeconomic dimensions) if a comprehensive overview is to be developed.

random experimentation. In a department where technology and art are becoming increasingly intertwined, the traits common to both "cultures" need to be made more explicit and integrated at the highest policy levels.

These are major challenges. The planning group will need the respect, support and collaboration of all sectors of the Department of Communications if the exercise is to be successful.

3

Content: The key

The content challenge has been recognized for some time in Canada. "Canadian content" is a national issue. The CRTC sets down Canadian content rules, the Applebaum-Hébert Committee is reviewing the state of our cultural health, and the federal government is reorganizing itself to meet this new challenge³. As we mentioned in last year's report, we welcome the transfer of the Arts and Culture Sector to the Department of Communications because this move signifies that content and technology can no longer remain solitudes, that form follows function and that the two must evolve together.

In our view, however, the implications of the content issue go beyond our cultural health and support to the arts. The content issue affects the viability of the Canadian economy itself.

Appropriate content, for example, is key to the eventual success of Canada's Telidon technology. The question is more complex than just the creation of Canadian data banks. It includes the development of software and interfaces to permit individuals to not only interact more effectively with the system but also to input their own content to it. In addition, applications must be acceptable in both economic and human terms. The desire of the participants in the Elie field trial to create their own pages is a case in point. Good behavioral research is needed and its results must be associated with an assessment of the eventual market potential.

³ As Deputy Minister Juneau explained at the December 7/8, 1981 meeting of CRAB, Canada is unique in formally establishing new governmental structures that integrate content and technology.

The need for an overview of content policies

The new communications technologies require information and entertainment content. Where will it come from? How will it be developed? The strategy needed for the development of Canadian content parallels that needed to support Canadian industrial development: a favorable regulatory environment, tax incentives, direct support through grants and contracts, government procurement and so on, to make Canada's knowledge and cultural industries internationally competitive.

At the moment, content issues and policies are not analyzed in a comprehensive manner. Broadcasting, film, recording, publishing, copyright, data/information policies and so on are all discrete areas of policy development where the Department of Communications has established working groups. This is both logical and necessary. But if we are to move towards a strategy for content and software development, then we need to have a sense of overview as to types of content that are compatible with the new technologies and the complementarity (or possible conflict) among the policies aimed at the development of discrete sectors.

Therefore, we recommend that the Department of Communications establish a Task Force that would have the following terms of reference:

- assess the needs and demand for information and entertainment content for the new communications technologies and systems that are being and will be set in place in the 1980s
- evaluate current policies in light of the demand with particular emphasis on their impact on GNP, export sales and employment
- make recommendations on how best to develop Canadian content and applications in those areas (1) where we can become internationally competitive and (2) where there is a particular Canadian need

Obviously, such an undertaking would have to draw heavily on the work and personnel currently involved in the departmental working groups previously mentioned, the CRTC, and the Applebaum-Hébert Committee which is undertaking the first full-scale review of Canada's cultural policy since the report of the Massey-Lévesque Commission in 1951. The purpose of the work would be to develop policy directions based on demand for content. These directions would, among other things, indicate:

- the "niches" where Canadians can show excellence (we cannot do everything!)
- the strategies that must be set in place to be internationally competitive (protectionism is not viable over the longer term)
- the level of resources that should be diverted from existing research programs to new content development programs (e.g., perhaps some 10 per cent in the first year and growing in following years)
- the type of mechanisms that are needed to monitor performance against declared policy directions
- the returns to Canada in both socioeconomic and time scales.

The role of the Arts and Culture Sector

An important dimension of content is of course cultural/entertainment content and the cultural industries generating this content. In total, it has been estimated that they currently represent about \$10 billion or 3.3 per cent of Canada's GNP. Possibly the most critical issue facing Canada's cultural industries is the market niche that they will occupy in a communications environment dominated by information and entertainment coming from all parts of the world. This will require a thorough understanding of the new information and entertainment markets. Evaluations of commercial potential, market studies and market trials are badly needed. For example, the federal government spends more than \$1 billion on Canada's cultural industries without much assessment of the benefits of this expenditure. Is it money well spent? Could it be spent more effectively in emerging areas that would give Canadian firms and artists an edge in the international markets? Such questions must be addressed. But to answer these questions requires the development of appropriate criteria against which such an assessment can take place.

The proper vehicle to address these issues is the Arts and Culture Sector. The sector is mandated "to advise on the optimum allocation of resources to and among the arts and culture programs". To do this effectively, it needs to undertake assessments of current programs and market studies related to new opportunities. We feel that the Arts and Culture Sector should devote more of its resources to such studies.

By focusing on demand studies, the Arts and Culture Sector would provide a valuable input to the Task Force referred to earlier as well as ensuring its place as an integral part of the Department of Communications.

The intent of the Department of Communications to enhance the interface between technology and content and to create new content is illustrated by the proposal to form a new Electronics and Humanities Branch, which would make available to Canada's artistic and cultural community sophisticated communications equipment (e.g., videodisc, computer-aided design systems) for experimental purposes. This is commendable. However, given the fact that the Arts and Culture Sector is already in place and if it is to integrate itself within the department over time, we do not see how another branch, however complementary, can be integrated at the same time. The department needs time to digest its organizational changes. Therefore, in the short-term, we feel that those tasks destined to be undertaken by the proposed Electronics and Humanities Branch, and which could be undertaken by the Arts and Culture Sector, should be assigned to that sector. Also, we feel that before embarking on this new venture, the department should undertake a feasibility study to establish if the need for such a new branch exists as measured against other priorities.

If an Electronics and Humanities Branch is found to be justified, then the department would have to study the best way of making it operational. If the purpose of the proposed activity is to interest

Canada's cultural community in experimenting with the new communications technologies, then the technology should go to the artists rather than the artists come to the technology. This means that an Electronics and Humanities Branch need not be centralized in Ottawa; it could be administered from Ottawa, but through appropriate communications networks flourish where the nodes of cultural activities are found across the country. In this way:

- the department would be placed more directly in touch with the field
- the cultural and technological aspects of the department would relate to common purposes
- government resources would be made more accessible and the costs and benefits of research would be spread more widely
- increased support would be available for a variety of promising professional applications such as information services for the disabled, medical teleconferencing and soft publishing for the scientific community
- the working potential of an interactive networking environment would be tested and explored
- human and technical resources would be mobilized across Canada to focus on a wide variety of research
- industry would benefit from related projects
- the innovative capacity of Canadians would be substantially increased relative to high technology
- new possibilities for research and development would surface
- increased public awareness, support and participation would be achieved
- new patterns of collaboration and interface would be established.

4

Industrial policy

The Department of Communications has an enviable record of scientific and technological achievement. The relevance of the department's research program is well demonstrated by the relationships that the department is able to establish with Canadian industry to transfer its technology in such areas as Telidon, office communications, space and spectrum management (to Saudi Arabia).⁴

In a rapidly changing communications environment, *field trials* have emerged as the mechanism to test public acceptance of the new technologies. The department is very much involved in these trials and has gained much experience in working with Canadian industry in general. As well, the department has experience in working with specific firms such as SPAR Aerospace Ltd. While such relationships strengthen the technology transfer process they do raise some issues. These include:

- the proper use of intellectual property resulting from the expenditure of public funds
- the long-term implications of taking the lead in developing industrial capabilities. The commercial development of a new technology, such as Telidon, may take a decade. What is the department's industrial support role over such a time period? Does the department accept "a lead agency" role to ensure the success of a venture over time or does it pull out once it has alerted industry to the potential of a new technology?

⁴Ministry of State for Science & Technology, "Transfer of Technology, by the Department of Communications: Eight Innovations," *Background Paper No. 12*, 1980.

- the manpower implications of technology transfer. Technology transfer is as much the transfer of knowledge as it is "hardware". This involves people. Therefore, the department needs to plan the involvement of its research staff in the technology transfer process. Should it be expected that staff will follow an innovation into industry if so, under what conditions (e.g., part-time, secondment)?

These are important issues that will keep surfacing since the Department of Communications will continue to produce marketable innovations. However, the department needs to set in place an industrial policy that will clearly give it a "lead department" role in the communications area. Such a policy will have to include a clear statement of the department's technology transfer role and where its responsibilities end in the technology transfer process leading to the commercialization of a given technology.

It is our view that the Department of Communications should operate more at the research end of the innovation spectrum than at the commercialization end. Marketable technology should be transferred to the private sector at the earliest possible moment so that the department is free to undertake research on the next generation of technology. For example, since the Department of Communications has contributed to the development of Telidon and Vidacom (an integrated system for cable distribution) and has transferred the above technologies to the private sector, we recommend that the department assist Canadian industry in maintaining its leading edge in international markets by developing special application software for teleshopping, home banking, telesecurity, medicalert and pay per view pay-TV services. This would require new technology, and it is in such leading edge areas that the department should be developing research programs.

As the "lead department" in the communications area, the Department of Communications will have to develop an action plan that ensures that the research paid for by the public is commercialized in such a way as to optimize Canada's interests. This will require coordination of research strategies with public agencies such as the CRTC and the private sector to ensure that the regulatory environment enables rather than inhibits indigenous industrial development to the extent possible under existing legislation and that the views of the private sector are taken into account in formulating research plans.

For example, the area of office communications presents a major opportunity for Canada. But to maximize the industrial benefits from this sector will require not only an enabling regulatory framework, but also close collaboration between the Department of Communications and the private sector to establish research directions and to facilitate the early commercialization of this technology. Such developments will also require further study of human factors and the man-machine interface (ergonomics) if they are to be commercially successful.

5

The future of the Communications Research Centre (CRC)

As we stated in last year's report, we believe that the role of the CRC should be that of a national centre for communications research excellence. The CRC's innovative capability is second to none and in a number of areas it has demonstrated world scale excellence. The present juncture in the CRC's research activities (e.g., a number of projects soon to be completed) and in federal communications policy development (e.g., the space program) presents a major opportunity to shape the CRC's program so that it can build on those areas of proven excellence in a way that will support policy development.

The research base

The development of excellence requires a viable research base. This means that a critical mass of R&D activities must be sustained in key areas within the CRC. This is why, for example, we recommended last year that 15 per cent of the budget for research in radio technology and systems be targetted for fundamental research and that research related to Telidon technology be continued and expanded even though certain aspects were being transferred to industry. It is imperative that the research base not be sacrificed because of the pressure to transfer technology to industry.

CRAB is very concerned that the Department of Communications' research base is eroding. To help redress this situation and to ensure a continuing capacity to innovate, we recommend that at least 15 per cent

of ongoing R&D funding should be devoted to basic research.⁵ Only in this way will the CRC maintain and develop its role as a centre of excellence and ensure that new innovations will be forthcoming. It must be remembered that Telidon emerged from basic research undertaken at the CRC.

New projects

A number of R&D projects will be reaching completion in the next few years (e.g., Telidon, Elie field trial, CBC-teletext). This presents a major opportunity to shape the Department of Communications' research program so that it is consonant with the development of the CRC as a centre of excellence.

There is no lack of ideas regarding possible new programs. However, the choice of programs must be in keeping with departmental priorities as well as supporting areas of excellence. CRAB did make a number of recommendations last year regarding research directions of the department, some of which are worth repeating here:

- research in telecommunications standards should be increased
- research on mobile radio systems should be strengthened⁶
- research work on the SYNCOMPEX and RACE systems should be continued at an adequate level

These are examples of nodes around which research excellence can develop. Of course, there are other emerging areas that present major opportunities. The use of teleconferencing services, both audio and visual, will increase due in part to increasing travel costs. We recommend that this area become a priority in the current research program and that research projects such as those listed in the Appendix be undertaken. While new programs, such as teleconferencing and office communications, as mentioned earlier, should strengthen the CRC's role in the development of R&D excellence, the final choice must be made within a context that recognizes the Department of Communications' priorities and the expectations of Canadian industry.

The space program

Space research is another node of research excellence that needs to be maintained within the CRC. However, while the research should remain within the CRC, we believe that the coordination of Canada's space effort should be through a separate organization.

As noted in last year's report, we favor an organizational form that has both public and private sector involvement. Such a body would

⁵ Basic research is original investigation undertaken in order to gain new scientific knowledge with the primary purpose of contributing to the conceptual development of science. (Science Council of Canada, "Policy Objectives for Basic Research in Canada," *Report No. 18, 1972.*)

⁶ At the December 7th briefing of CRAB, the ADM Research indicated that Cabinet had not approved new funding for this activity. CRAB considers this area of research to be of high priority and urges the Department of Communications to obtain adequate funding.

help minimize overlapping responsibilities among government departments and, through the involvement of industry, deal more effectively with some of the present concerns of the Department of Communications' Space Sector.

At the December 7th CRAB briefing, the ADM Space asked for advice on two points: (1) how to structure a partnership with industry, especially the telecommunications service providers and (2) how to demonstrate and maximize the spin-off potential from space technology. We believe that answers to such questions would be easier to come by if the space program was situated in a separate organization with both public and private sector involvement. For example, the development of contacts and partnerships with the relevant sectors of the Canadian communications industry is very much facilitated through an organization charged with maximizing the commercial development of Canadian space technology. The participation of the private sector will ensure that the organization is market driven. This would ensure that a major priority would be the identification of commercial opportunities related to any space program. The fact that Canada is a world leader in ground station technology, for example, is an indication that the potential for commercially-oriented industrial capabilities related to Canada's space program exists. What we lack, however, is the international marketing strategies to take full advantage of these.

On specific space activities we reiterate our recommendations of last year: (1) Canada continue to participate in the European L-SAT program and (2) Canada participate in the MSAT program with the United States.

The radar research program

While the CRC is the natural home for defence-related communications research, it is contended that the same cannot be said for radar research. The current radar research program relates almost entirely to the objectives and missions of the Department of National Defense (DND), rather than to those of the Department of Communications. There has always been a historical link between the radar research program and the Department of National Defense. Also, the major military radar procurements planned for the 1980s (more than \$1 billion) will necessitate close collaboration between Department of National Defense procurement officers and radar research personnel. Therefore, we recommend that the agreement between the departments of Communications and National Defense be reviewed at the earliest possible date and amended if need be.

Contracting-in

The Department of Communications is considering a "contracting-in" policy to give Canadian industry access to CRC facilities and resources. The ADM Research raised a number of administrative problems related to the implementation of this policy (e.g., additional resources, fee structure). However, we feel that there are fundamental issues related to "contracting-in" beyond the administrative ones. These include the following:

- is there a sustainable demand for this service from Canadian industry? Or will the CRC have to actively market its research capability?
- does the nature of work at the CRC and the "internal culture" of the laboratory lend itself to providing a commercially-oriented service?
- would the CRC be competing with the private sector?
- is there any conflict with the government's "contracting-out" policy which was set in place explicitly to stimulate the development of R&D capabilities in the private sector?

We feel that these questions need to be answered before a contracting-in policy is set in place.

In sum

With the space program in a new organization and radar research oriented towards the needs of the 1980s, the CRC mandate will be clarified and the laboratory will be well positioned to pursue new areas of research that are in keeping with departmental priorities. And with a renewed commitment to basic research (i.e. at least 15 per cent of project funds) the CRC will be able to develop and maintain its role as a national centre of excellence in communications research.

6

Conclusions and recommendations

The Department of Communications now faces a major challenge: that of integrating content with technology. We believe that the following recommendations will help the department bring about this union without adversely affecting existing strengths.

- 1 The new planning group should address the following tasks immediately:
 - the development of a vision and overview
 - the development of an explicit priority setting mechanism
 - the development of a process to bridge the gap between the arts and sciences.

- 2 The Department of Communications should establish a Task Force charged with the development of a strategy for Canadian content. The terms of reference of the Task Force should be to:
 - assess the needs and demand for information and entertainment content for the new communications technologies and systems that are being and will be set in place in the 1980s
 - evaluate current policies in light of the demand with particular emphasis on their impact on GNP, export sales and employment
 - make recommendations on how best to develop Canadian content and applications in those areas (1) where we can become internationally competitive and (2) where there is a particular Canadian need.As well, the Task Force would indicate the level of research resources that should be diverted from existing programs to new content development programs.

- 3 In order to accelerate the integration of the Arts and Culture Sector the Department of Communications should undertake a number of policy studies, including market studies, that would support the activities of the Task Force referred to above as well as on-going policy development within the department.
- 4 Before setting up the proposed Electronics and Humanities Branch, the department should undertake a study to establish if the need for such a branch exists. Such a study should focus on the wider needs of the artistic community in relation to the new communications technologies. Any task proposed for the Electronics and Humanities Branch which could be more effectively undertaken by the Arts and Culture Sector should be undertaken by the latter. Also, if an Electronics and Humanities Branch is established, it should not be centralized in Ottawa but flourish where the nodes of cultural activities are found across the country, using the increasingly sophisticated networking capabilities of communications technologies.
- 5 The Department of Communications should develop a comprehensive industrial policy so that its role vis-à-vis Canadian industry is clear to everyone, particularly as it relates to the department's technology transfer commitments.
- 6 Related to recommendation 5, the department should develop an action plan indicating how it will interact with the CRTC and the private sector to get their views and positions vis-à-vis industrial development.
- 7 To ensure that the CRC maintains its role as a national centre of excellence for communications research, at least 15 per cent of on-going R&D funding should be directed toward basic research. This level of funding should be considered as the necessary base budget to sustain the excellence of the CRC's research program and the department's mandate in the longer term.
- 8 The choice of new research programs should be made within a context that recognizes the department's priorities and national needs.
- 9 The choice of new research programs and overall research directions should be in keeping with the specific research program recommendations made in previous reports.
- 10 Teleconferencing should be a priority area of research for the CRC and research projects should be developed in concert with Canadian industry.
- 11 Space research should be maintained within the CRC.

- 12 The coordination of Canada's space effort should be done through a separate "arm's-length" organization which has both public and private involvement as recommended in our last report.
- 13 The objectives of the Radar Research Program should be reviewed and amended if need be.
- 14 The Department of Communications should address a number of issues related to possible conflicts with other government policies and to market demand before implementing a "contracting-in" policy for CRC.

These are our principal recommendations at this time. They illustrate the need for the Department of Communications to develop a comprehensive planning framework that will facilitate program choices and lead to the integration of content and technology.

Appendix

Teleconferencing: an opportunity

Energy conservation and productivity of the work force generally, both high profile concerns in the national interest, are making telecommunication alternatives to travel and meetings imperative, urgent and increasingly attractive.

For meetings both large and small, teleconferencing, which can bring people together on a national scale using existing telecommunication technology, is a very powerful and attractive tool.

Conservative estimates are that by 1990, 60 per cent of all Canadian businesses will use teleconferencing and 90 per cent of the educational community will offer tele-education courses. Services will range from simple dedicated audio networks, similar to that being pioneered by Memorial University of Newfoundland, to public video conferencing services now available from the common carriers in Canada, Australia, the United Kingdom, Japan, the United States and elsewhere.

This impressive growth is being significantly stimulated by the world's need for universally available continuing education. At the same time, administrations in both the public and private sectors are being compelled to seek telecommunication alternatives to escalating travel and meeting costs. Meetings and seminars using teleconferencing are proving to be impressively brief and very productive because of the efficient, business-like member interaction that teleconferencing permits and persuades.

Restated, teleconference meetings, using the existing public electronic highway for voice, video, or computer-based systems, effectively

resolve traditional costly barriers of distance and time. Associated user hardware for a wide variety of applications is, in most cases, readily available off-shelf, and new, smarter boxes are coming on stream continuously and rapidly.

The most glamorous electronic meeting is television-like video teleconferencing. These systems are designed to duplicate the feelings and mannerisms of face-to-face meetings without imposing the burden and cost of travel.

Alternatively, computer-based teleconferences are least like face-to-face meetings. Participation is via compact typewriter or CRT terminals linked by traditional telephone lines to a central computer that serves as a "meeting place."

At the other end of the scale, audio teleconferencing is a simple, natural extension of a person-to-person telephone call on a group basis. An "Electronic Blackboard" can be added to this service to provide graphic information.

New variations of the services described are closely linked to the cost of transmission. For example, there is a demand for systems which can use inexpensive narrow band transmission. Slow-scan video, which sends a still image every few seconds, is another example. High capacity conference bridges, and speed calling techniques, reduce the time needed to convene participants; for example, development of a "meet-me-bridge" by the New Brunswick Telephone Company, and other independent manufacturers, enables meeting participants to dial into the conference themselves.

With the basic development of "teleconferencing" in Canada behind us, and many needed variations already in the prototype stage, the thrust must now be the quickest and widest possible application of this very valuable yet relatively simple technology.

There is a potential affinity between the development of a digital teleconferencing system and a lower cost enhanced Telidon design and a new generation of digital high definition television. Research work done in this area could enhance the future world position of Canada's electronics industry.

Teleconferencing does not, of course, pretend to address or solve all fundamentals of meeting dynamics — although it is important to understand them — but it does afford a significant and timely solution to a universal need for a cost-sensible substitute for meetings, where appropriate.

Canada must now expand and exploit the obvious opportunity that teleconferencing presents.

To do this we must:

- establish a focal point, possibly within the Department of Communications and industry to coordinate the research activities outlined below including managing the call for proposals, awarding contracts, collecting reports, preparing recommendations, etc
- establish a "think tank" of knowledgeable people to specify what features and systems are required for a successful teleconferencing offering

- conduct comprehensive market research on all modes of teleconferencing (voice, video, data, etc.) and all other aspects (including human factors), identifying market needs and technological and economic requirements of the market place and testing these against the features and systems specified by the "think tank"
- identify competitive threats to the Canadian environment (e.g., the U.S.-based Holiday Inn teleconferencing initiative in Canada)
- consolidate existing technology and its application;
- identify suspected development voids in hardware such as compact low price Codecs, video screens, cameras, etc.
- identify voids in standards — domestic, North American and world-wide — and their relationship to Telidon and High Definition Digital TV
- develop methods for economical multipoint accessibility including the use of wire, coaxial cable, fibre optics and satellites
- research economical bandwidth utilization alternatives
- develop convenient, quick public access methodology
- research and explain the significant differences between conducting meetings face-to-face versus teleconferencing and identify special skill needs
- investigate and recommend on the viability of expanding teleconferencing, incorporating financial analysis for both the manufacturing and service providing sectors

Canada has the talent and the organizations qualified to carry out these activities.

At the same time, a real-world test bed, preferably Canada-wide, is needed to test the research findings.

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