National Planning for Canadian Science and Social Science Information Systems

H. C. CAMPBELL

One of the basic requirements of every industrially developed country is a network of public and non-public agencies that specialize in planning and coordinating the growth of scientific and social science information systems necessary to meet the needs of economic and social development. Unlike some countries, Canada has not established a policy to govern the growth of such services, but has continued over the years to set up ad hoc specialized regional or national information services dealing with particular subjects or meeting the needs of separate regions or provinces. It has been pointed out that there is a wide difference between the information resources of the various regions of Canada, and that only a small amount of money has been spent in past years in developing and maintaining these resources.1 With the population of Canada now over twenty million, it is clear that such methods will need to be changed.

Since 1963, there have been a number of important changes in the factors effecting Canadian information organization. There has been a great increase in the amount of money provided by industry, education, and governments for this purpose. One of the important results of the International Exposition held in Montreal in 1967 was the effect it had on the design of new methods of communication of information in Canada. The Exposition, responding perhaps to the problem of bilingualism and multi-lingualism, evolved an educational style based on visual displays, supplemented by non-verbal communication and electronics. Such a powerful concentration of effort in designing these systems has had a lasting effect on planning information services in Canada and on the development of electronic communication methods.

The growing school age population in Canada has brought about

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H. C. Campbell is Chief Librarian, Toronto Public Libraries, Toronto, Canada.
increased education spending and the need to design new methods for transmitting knowledge. Instead of being offered in small amounts knowledge must now be channelled in larger and larger quantities, and must be available to a larger number of citizens. Although such changes are having a radical effect on planning for education services in various sections of the country, they are not always taken into account by established libraries and documentation services.

In 1965, the Canadian Association of College and University Libraries adopted a “Guide to Canadian University Library Standards” which, among other things, recommended that during the next ten years 10 percent of the institutional operating budget of each university should be considered as a minimum for the ordinary operation of the established libraries in the universities and colleges of Canada. Expenditures by universities and colleges had risen to $30,667,951 in 1966-67 (of which the book purchases amounted to $13,648,679) compared with $5,986,023 in 1960-61.

The projected budgets for 1967-68 for the library services of thirty-three Canadian universities amount to approximately $40 million, of which book purchases will require $16.5 million. The percentage of library expenditures in relation to total university expenditures has been as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total library expenditure</th>
<th>Library expenditures as a percentage of institutional expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958-59</td>
<td>$ 4,022,494</td>
<td>5.8%</td>
</tr>
<tr>
<td>1960-61</td>
<td>5,986,023</td>
<td>4.3</td>
</tr>
<tr>
<td>1962-63</td>
<td>10,513,654</td>
<td>4.7</td>
</tr>
<tr>
<td>1964-65</td>
<td>18,907,572</td>
<td>6.7</td>
</tr>
</tbody>
</table>

These figures indicate that as far as higher education in Canada is concerned, there has been an effort to bring library services to a more adequate level.

The situation among the technical and secondary schools, and among the small number of post-secondary schools is far less satisfactory. There has been a rise in the population of those who are eligible for post-secondary technical and vocational education. This rise has not been matched by a rise in the number of institutions able to receive them. Efforts in two of the largest provinces, Ontario and Quebec, are now being made to remedy the situation, and a series of colleges of applied arts and technology are being instituted. However, the library and information services of such colleges are still
of a rudimentary nature and to a large extent the students of these colleges are entirely dependent on the local community information resources to meet their needs. In 1965, less than 1.5 percent of all the expenditures of provincial trade schools and technical institutes in Canada was devoted to library services, and only fifteen full-time professional staff were available in all these institutions in Canada.4

In the past ten years, Canadian industry has greatly increased its expenditure for research and development, as may be seen by the following listing:

*Industrial Research and Development Expenditures* 5

<table>
<thead>
<tr>
<th>Year</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>$113,982,961</td>
</tr>
<tr>
<td>1962</td>
<td>124,508,210</td>
</tr>
<tr>
<td>1963</td>
<td>160,170,833</td>
</tr>
<tr>
<td>1964</td>
<td>190,015,514</td>
</tr>
</tbody>
</table>

Among the various product groups, the largest percentage of research and development expenditure in 1963 was set aside for the electrical group, which accounted for 22.9 percent of the total. The chemicals group, including drugs and medicines, amounted to 10.6 percent. The transportation equipment group as a whole received 18.8 percent of the total, of which aircraft and aircraft parts accounted for 16.7 percent.5

The major Federal government agencies concerned with planning and coordination of research activities in Canada include the Canada Council, which functions in the fields of the social sciences and humanities; the Economic Council, which is concerned with trade and business; and the Science Council, which is concerned with all fields of science and technology. All three of these bodies have their headquarters in Ottawa, and are of relatively recent origin. The Science Council was established in 1966.

In 1968-69 the Canadian Federal government will spend an estimated $400 million on scientific research. The amount spent by the government has been rising steadily. In 1965-66, there was an expenditure of $294 million divided as follows:


<table>
<thead>
<tr>
<th>Category</th>
<th>Expenditure (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military Science</td>
<td>$100.3</td>
</tr>
<tr>
<td>Agriculture, Fishing, Forestry</td>
<td>57.9</td>
</tr>
<tr>
<td>Nuclear Science</td>
<td>44.9</td>
</tr>
<tr>
<td>Health and Hygiene</td>
<td>21.0</td>
</tr>
<tr>
<td>Industry</td>
<td>18.8</td>
</tr>
<tr>
<td>Space Travel and Communications</td>
<td>9.4</td>
</tr>
<tr>
<td>Other</td>
<td>41.7</td>
</tr>
</tbody>
</table>

Total | $294.0 |
The National Research Council of Canada, in Ottawa, which includes in its budget the work of the Medical Research Council, had a total expenditure of $103 million in 1966-67. Of this amount the National Research Council spent $34 million on scholarships and grants-in-aid of research; the Medical Research Council spent $12 million; and assistance toward research in industry amounted to about $4 million.\(^7\)

Of the National Research Council's 2,760 employees, 788 are scientists and engineers. In order to serve the staff of the Research Council, there have been extensive information services built up in Ottawa. The National Science Library, which received formal status as such by the National Research Council in 1966, has developed its services in a variety of fields and is making these available to persons throughout Canada. The work of the National Science Library supplements the work being done by the National Library and other major Federal government departments in Ottawa, in the field of both pure and applied science and the social sciences. The National Library opened its new $13 million building in Ottawa in June 1967, with space for over 13 million books.

In the social sciences and the humanities, there has been much less expended on an annual basis in research and development in Canada by either governmental or non-governmental agencies. The Canada Council is currently spending approximately $6 million a year in grants-in-aid and supplementary assistance for a variety of projects in the fields of social sciences, the humanities and the arts.

While Canada is not considered as an underdeveloped country on the same basis as the newly-emerging nations of Africa and Asia, having achieved its present national identity over 100 years ago, still it is characterized by having a great dependence on foreign countries, principally the United States of America, for the supply of investment capital and finished goods. Its export economy based on raw materials and foodstuffs is undergoing changes, and steps have been taken to bring about increased manufacturing capabilities. However, productivity of Canadian manufacturing in comparison to manufacturing in the U.S.A. and Europe is not high. There is a general lag of about 18 percent in basic productive output per worker and in some manufacturing industries this is as high as 27 percent.\(^8\)

One of the problems Canada faces in the diffusion and documentation of scientific knowledge is due to its bilingual French/English culture. There has been a steadily growing realization that preference in the development of scientific information services has been given
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to those in Canada who use the English language, and steps are being
taken to provide greater access to information in French.

At a time when the Canadian government has promised to provide
$30 million in aid in five years to the former French colonies in Africa,
there is considerable concern within Canada about the role of scientific
and technical development among French-speaking Canadians. There
is some complaint that French Canadian scientists have not been sup-
ported either by the government of the Province of Quebec, in which
Province French is spoken by the majority, or by the Federal govern-
ment of Canada. According to an estimate of the Quebec government,
the government expenditures of that province on scientific research in
1962 amounted to only $3.5 million, which was 0.36 percent of the
budget of the province. During the same period, the Federal govern-
ment spent approximately 3.9 percent of its budget for the same ends.
There is no provincial research council in Quebec and there is a
lack of governmental organization for the coordination of scientific
development. It was not until 1967 that the first center of industrial
research was created by a Quebec government agency, Hydro-
Quebec's Research Institute, near Boucherville.

A further critical issue in Canada is that of the "brain drain" of
Canadians who emigrate. A recent statement by the chairman of the
Medical Research Council of Canada points out that Canadian med-
ical specialists often leave Canada because of the lack of full-time
medical research centers. There are at present 1,000 Canadian physi-
cians training in the United States and it is likely that most of them will
stay there. It is gradually being realized that there is a close re-
relationship between the development in Canada of research centers
which are able to carry on research as well as exploit research from
other countries, and the development of scientific and technical in-
formation.

Since 1963, there have been a number of efforts to improve the
scientific information services in Canada. In 1965 a survey was carried
out under the auspices of the National Research Council to provide
a picture of Canadian science and technical information resources,
not including those in the field of medicine. The survey covered
forty-eight institutions across Canada, including thirty-three university
libraries, eight public libraries, five provincial research councils and
the libraries of a number of industrial concerns. One of the purposes
of the assessment was to decide on the value of a strong central collec-

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LIBRARY TRENDS
It was one of the principal recommendations of this survey that under the direction of the National Science Library of Ottawa, a voluntary network of libraries should be established across Canada in such a way as to make sure that every populated region, regardless of size, would be covered by the provision of scientific and technical information. A criticism of this scheme was that a voluntary network would lack the resources necessary to build up the opportunities for access to scientific and technical knowledge in all parts of the country.

The Association of Universities and Colleges of Canada and the Canada Council commissioned a survey by Robert Downs of academic library resources in Canada in 1966. The report of this survey was issued in 1967 and its principal recommendations reveal the need for much larger amounts of money by university and college libraries. This report echoed the general feeling among many academic librarians in North America, that the contents of large encyclopedic research libraries are not likely to be reduced to machine records, and that the traditional book will continue very much in its present role.

In 1967, the Science Council of Canada, through the Science Secretariat of the Privy Council of the Government of Canada, initiated a study of scientific and technical information in Canada which will have a far-reaching effect. This study has been carried out by specialists who have visited all parts of Canada and have sought information from many hundreds of organizations and individuals across the country. One of the main functions of this study is to determine a policy for the development of Canadian scientific and technical information services, particularly those under Federal government auspices. The preparation and distribution of Canadian government scientific and technical report information at present leaves much to be desired. It has been suggested that a Federal clearinghouse should be established to speed up the distribution of such reports to users in all parts of Canada.

There is evident need for a policy at the Federal and provincial levels to provide for the use of certain standard information methods and compatible information systems. This is particularly important at a time when there is a growing activity in planning information services in other countries.

In the past five years there has been a very great increase in the
interest of Canadian business and government in the organization of information centers and services which would make use of the most up-to-date method of information exchange, including machine-readable records. The growth of this interest in computer-based information services has been assisted by the knowledge that such services are rapidly increasing in other countries. The product of these foreign services should be able to be of direct application in Canada, if suitable means are available to adapt the information produced to the needs of Canadian users. An important concern in Canada is the matter of access to such machine-readable records by users whose language is either French or English.

A certain number of services are being developed in Canada using machine-readable records, particularly by the Federal government and by some of the primary industries across the country. The Geological Survey Branch of the Department of Energy, Mines and Resources is preparing a computerized data file to make available the results of tests produced by the Geological Survey Branch laboratories. A Canada Land Inventory Geo-Information System is being operated by the Agricultural and Rural Development Administration of the Federal Department of Forestry and Rural Development. This inventory contains a description of the use of the settled land in Canada, as well as its evaluation for use as agriculture, forestry, grazing or recreation. Several of the provincial governments, such as the Department of Mines of the province of Ontario, have started computer data files. This department has placed on record the metal deposits of the province of Ontario, in particular, silver. The data on oil and gas wells is also available. The Alberta Conservation Board maintains computerized information on 30,000 wells drilled in the province of Alberta.

Various Canadian institutions of higher education have become active centers in the development of new information services. Laval University, Quebec, has developed the Asyvol System (Analyse Synthetique par Vocabulaire Libre) and applied it to index sixty current periodicals in the French language as well as to prepare a daily index of the newspaper Le Devoir, published in Montreal, and other publications.

The whole question of the evolution and design of various national scientific information systems in Canada which will utilize both English and French and respond to the needs of users from various walks of life is now under active consideration. It is clear that Canada will
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require a national scientific and technical information organization which will permit it to receive information from its own research establishments, as well as from various scientific, social science and technical information services abroad. This agency must facilitate the assimilation and use of such services in Canada, and provide for the needs of local services.

The development of Canadian educational television networks has enriched the curriculum of students in schools and made possible continuing education in the home. One major source for the educational television programs is scientific and technical information; new methods for its diffusion and application through the media of television must be worked out.

Expansion of a national information distribution system in Canada is inevitable, and a great many long-distance electronic transmission channels will be required in future years. Communication satellite transmission will need to be considered in the design of any future systems. Although Canada extends over several time zones, the transmission delay inherent in the use of communication satellites will not affect the sending of information between the various centers and regional facilities.

A network of information retrieval and dissemination services must be created and should be attached to various specialized educational, industrial, commercial, business, and other institutions across Canada. Such services should be directly in touch with users from all walks of life and should provide a range of services which are not now provided by the established libraries in universities, schools, or industry.

There is some evidence to show that in various parts of Canada interest is growing in the planning of information services, seen as integrated network operations. While in the past the main responsibility to develop these services lay with libraries, it is clear that new users in special fields who wish information are prepared to finance their requirements and to employ the necessary staffs to maintain these services. It is also evident that with the increasing cost of such services the Federal government must establish more effective plans for the management of existing government libraries.14

There is also growing awareness that the practices now used to develop information systems outside of Canada are going to have a great effect on the manner in which Canadian services will operate in the future. While there is as yet little widespread consultation be-
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tween Canadian users and the various systems being developed abroad, there is concern within Canada that the product of these information services should include information relevant to Canadian use, and that Canadian information should be organized in a manner that will be compatible with such services.

References

4. Ibid., p. 34.
6. Ibid., p. 411.