CANADIAN ONLINE USE: TRENDS, IMPLICATIONS, POLICIES

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ABSTRACT

The advent of widespread use of online textual databases is seen to pose specific problems for information dependent countries in regard to intellectual and technological sovereignty. Widely used databases, large scale vendors, and efficient computer support systems have developed principally in the United States and international use of and access to these systems is of concern. Before individual national policies and cooperative international agreements are formulated, it will be necessary to determine trends and patterns of online use and policy attitudes in individual nations. Canada's position is examined, problems discussed and recommendations made.

1. INTRODUCTION

For some time information scientists have been talking about the problems posed by the information explosion; but although these problems seemed serious enough to those writing in the late 1950's and through the 1960's, only in the last few years, with the advent of wide spread and increasing online use of databases, has the full magnitude of our difficulties begun dimly to appear to us. We have said that we live in an information age, that information is "the" commodity of the present and the future, that it can be bought, and sold, and packaged and repackaged, but we have not realized the full implications of these statements. We have not understood that those who control the most sought after databases, the most efficient support systems, and the most satisfactory and widest communication networks, supported by efficient selling campaigns, may become the new imperialists and the ultimate users may be relegated to the position of information colonies.

The problems associated with such national information dependency have recently been broached by Tomberg (1977) and further discussed by Alley (1977).

An investigation into the development of Canadian online systems and into patterns of Canadian online use will illustrate many aspects of these problems. Canada has been dependent upon outside sources of scientific and technical information for some time and certain of the difficulties associated with this dependency have been discussed in the journal literature (Alley and Heyworth, 1974) and by task forces and special committees: Tyas (Science Council, 1969-1970), Katz (Science Council, 1969) and Lamontagne (Canada, Senate, 1970-1973). The advent of widespread online searching, especially of textual databases, may

intensify this dependency; and the figures given for large and increasing Canadian online use by Tomberg (1977) may be a signal for concern rather than one of congratulation if these figures are linked to increased Canadian reliance on foreign sources. Certainly the need to formulate national online and database policy and to obtain adequate national figures and an adequate national picture of use on which to base such a policy becomes more rather than less urgent.

The present paper will explore and summarize certain aspects of Canadian online use of textual databases and will raise questions in regard to present problems, future developments, and national policy. The authors have different backgrounds and sometimes sharply contrasting interests and opinions; but they are united in their concern with Canadian information handling policy and problems.* They hope that this paper will elucidate certain trends and contribute to the development of an enlightened national information policy. A list of those whose assistance is gratefully acknowledged will be found in Appendix C.

It is hoped that an expanded version of this paper with further tables and figures will appear in a succeeding issue of the Journal of the Canadian Association for Information Science. The authors believe that a widespread exposure of this discussion is necessary at this time.

2. CANADIAN INFORMATION TRENDS AND ATTITUDES

2.1 Confusion and Ambiguity

Canadian information handling has been unevenly and curiously split between the private and public sectors and Canadian attitudes to various kinds of information have been ambiguous. On the one hand, we do not have the heavy concentration of mixed size industries, often with their own information systems, within close geographic proximity to one another, as are found in Europe; neither do we have the large, powerful, governmental or industrial organizations, often with sophisticated information systems, that to a large extent compensate for geographical separation, of our neighbour to the south. We have not had, therefore, powerful or even adequate information sources and resources related to the private sector. In contrast, our information strength has been concentrated in the public sector (government and universities).

The imbalance is being continually intensified because of the nature of our developments in industry, science, and technology. In certain respects we are an underdeveloped nation (Lapp, 1970). Many of our high technology industries are branch plant activities and their information sources are generally centred in their headquarters in other countries, a characteristic of underdeveloped nations. Canadian information policy,

*Opinions, conclusions, and recommendations are those of the authors. They do not necessarily reflect the views of Concordia University or of CISTI.

such as it is, often seems to endorse and support this reliance on outside sources (Alley and Heyworth, 1974). Further, the building of Canadian textual databases, especially Canadian scientific and technical information banks by industries themselves, has not appeared to be of primary importance. For example, such activity is not mentioned in Lamontagne's discussion of science policy in the sections on information handling (Canada, Senate, 1970-73). The need for Canadian databases, however, has been evident to some people and has been discussed in the literature (Heyworth and Mercier, 1973; Pietrzyck, 1973). Also, more theoretical investigation is now being carried out into why Canadians have been so passive in their approaches to scientific and technological innovation and its associated information (Clement, 1977).

2.3 The Public Enterprise Approach

For various reasons, large scale Canadian reliance on other countries' databases is not as incomprehensible as it may seem at first sight. To understand the basis of such reliance one must both investigate Canadian information handling traditions and one must keep in mind that Canada is, as has been implied, a strange mixture of a developed and underdeveloped country (Alley and Heyworth, 1974, pp. 16-18). It has been postulated that, in moving towards independence from colonialism, Canada has chosen to be a "public enterprise" country (Hardin, 1974; Roberts, 1977) rather than a "private enterprise" country. It is true that in the past Canada has been well served by many of her "public enterprises", Crown Corporations and related organizations, such as large federal departments. For example, the Geological Survey of Canada was one of our early information producing, gathering, storage, and dissemination agencies and its contribution to the collection of Canadian knowledge has been very important. At the time of the early surveys there was no other feasible way to collect data except through a government organization. The computer-based Canadian Index to Geoscience Data has moved the Geological Survey's contribution into the present day (Burk, 1973; Gunn, 1975). Atomic Energy of Canada, despite present criticism, contributed both to the development of Canadian nuclear information and to the establishment of a world nuclear information system; John Woolston went from Atomic Energy of Canada to perform a vital role in the setting up of INIS in Geneva. (Woolston, 1967, 1977).

In a certain sense CAN/SDI and CAN/OLE, the automated information services offered by CISTI (Canada Institute for Scientific and Technical Information), and later online and batch searching services in the humanities offered by the National Library are in this "public enterprise" tradition (Wolters and Brown, 1972; Brown, 1975). Wolters sees CISTI's role as that of "providing an advisory and information service to the industrial, business, scientific and medical communities of Canada. In support of this function the Institute operates services to provide for the collection, storage, retrieval, analysis and transfer of scientific and technical information and support for the publication of journals of research in engineering and science". The Data Clearing House for the Social Sciences may also be considered as partially in this tradition. (Data Clearing House, 1975).

Although, as we shall see later, some other public searching and database services predated the efforts of CISTI, the National Library, and the Data Clearing House (Heaps, 1972; Foster, 1977; Heyworth and Mercier, 1973) Canadian users, on the whole, when they began to see the need for access to large information banks, expected a central government information body to fulfil this need, even though in the process that government body dealt with large commercial-type databases, essentially produced by the private or semi-private sectors of another country. Certainly, the Tyas, Katz, and Lamontagne recommendations, although they sometimes look to different organizations within the government to do the job (eg. Ministry of State for Science and Technology, National Research Council, Department of Industry, Trade and Commerce), still envisage the public information organization as performing at the very least the co-ordinating and planning function. Strangely enough, Lamontagne's emphasis on "contracting out" does not extend to the contracting out of a national information system or to any part of it. Perhaps, this is an example of the Senate Committee's own ambiguity about Canadian science policy, or it may indicate lack of comprehension of the intricacy and importance of information handling in the national context. Recently, however, a change has taken place and the Ministry of State for Science and Technology has stated that information services are to be "contracted out" (MOSST, 1976; Lawford (McLaughlan) 1977). Further remarks on the efficiency of the contracting out procedure in Canada will be made later in the paper.

This emphasis and reliance on the "public enterprise" has been strengthened by the feeling of many professional librarians, especially those with liberal arts and humanities backgrounds, that information is closely associated with the academic and/or literary world (Fisher, 1974). This attitude has found expression in the development of relatively large resources in academic libraries. The libraries may not be large in comparison with some of the world's greatest libraries, but they have massive resources when compared with other Canadian holders of information, and this preeminent position has led to demands for open access to university library stacks by industry.

Also, Canadian librarians, on the whole, have tended to believe that information should be a free resource. Profit sometimes seems to be a dirty word (Bandeen, 1977). The resistance of Canadian librarians to the pressure of Canadian authors and publishers to initiate a "royalty" type charge for public library use, as is done in Sweden, stems from this belief that information should be both "free" and internationally available, (Audley, 1977; University of Alberta, 1972; Tangye, 1970). This attitude is related to what Holmes (1977) calls "the old dreams of international scholarship".

The absence of a significant number of librarians and scientific information officers from industrial installations as a result of the lack of a powerful secondary industrial sector means that the attitudes described above have not been widely challenged (Carver, 1974/75). Further,

the information supplied to small and medium sized industries by NRC through TIS (Technical Information Service), now part of CISTI, in certain instances, may have contributed to rather than lessened the absence of such a countervailing force. TIS was designed to aid the small, information poor industry, but even industries that might profitably install their own systems will not do so as long as governments act as suppliers. Also, at a certain point it becomes difficult to dislodge a government bureaucracy (Sandler, 1977); consequently, it is likely to become extremely difficult for new "private industry" information managers to appear in the system. There is some indication that new information education programs, stressing marketing and management and the political considerations of information production (cf. McGill (1977) and Dalhousie (1977) announcements) and the emergence of private consulting librarians (Schick, 1977) as part of an emerging information industry may, in time, lead to a change in attitude so that information will be recognized as a commodity. It should, however, be mentioned that the prevailing attitude towards information as described above is probably shared by a sizeable portion of the public.

2.3 The Impact of Competition

The present attitude, with its reliance on governments and universities, might lead to efficient national online systems and to international open access to information if all the world were to see the matter in the same light and if the "public system" would also further subsidize the production of information, as it undeniably did in the instance of the Geological Survey of Canada, as well as subsidize its dissemination. Also, there would have to be some assurance that each national government would have some reliable manner by which it could determine its information priorities. There would also have to be international agreement on the overall priority ranking (cf. Thrippleton, 1977; Heaps, Ingram, Mercier, 1975).

Unfortunately, perhaps, it appears that competition exists in the real information world and it also appears that information will not be produced equally in all sectors. Further, it seems that at least a partial "free enterprise" approach to the handling of information, and some relationship to the profit motive, produces the most information and that most in demand, if we are to judge by demand and use statistics as they are available to us, and if we are to judge from the success of the American databases and from the American achievement of control of the world scientific and technical literature. For example, only the profit motive prompted Eugene Garfield to supply the world with ISI databases. It is undeniable that the profit motive combined with "contracting out" and "hidden" government subsidies has given American online users systems such as SDC (Systems Development Corporation) and LIS (Lockheed Information Systems) and has contributed to the strength and international clout of American database vendors and has led to such virtual monopolies, for example, as that exercised over chemical databases by the Chemical Abstracts Service (Cacaly, 1977). Strategic subsidies granted to private

or semi-private corporations (sometimes designated, it is true, as non-profit corporations) coupled with judicious assistance of some government databank build-up, eg. NTIS, MEDLARS, have assisted very materially in the production of marketable databases of worldwide appeal (Williams, 1975).

The procedure of granting subsidies and contracting out, supported by tariff rules, has been handled with great sophistication by the United States. There is a certain artless naivete in related Canadian procedures. For example, a government contract had been given to an American firm to conduct a market survey to ascertain whether there existed a Canadian market for an information product. A favorable market was shown to exist and an American related firm then set up the organization to sell to that market (Lawford, 1977). This lack of sophistication in Canada contributes hourly to the decay of technological sovereignty. The implications of this decay have recently been discussed by Kates (1977).

In summary, then, Canada's weak industrial position and Canadian reliance on an unaggressive "public enterprise" system and the emphasis on the value of academic information has not led to the production of significant saleable databases, either within government, industry, or academia. Consequently, Canada goes elsewhere for much of its online information and for its handling. It is evident that similar widespread dependency, nationally and internationally, poses specific national and international online information policy problems. These are problems associated with charging, the use and protection of intellectual property, and of intellectual and technological sovereignty. These are problems that we, in Canada, cannot expect the United States, which has contributed so much to the technology and sociology of information science, to solve for us. As Meisel (1977) states, "Viable solutions to Canadian social, economic, political, and national problems will emerge only if Canadians recognize that these problems, individually and particularly in their totality, differ from other people's and that solutions to them cannot always be borrowed, even if it is cheaper: they must be found by Canadians willing to venture forth along paths untried by others,". We must also remember that individual national solutions may conflict with each other and that international harmony in online information handling may be difficult to establish.

3. ELEMENTS OF THE SYSTEM

Before one can examine Canadian online use and discuss in any detail the final implications for national online and database information policy, the elements of the system must be identified. These may be defined as listed below:

1. Producers of databases, who may or may not be connected with an information centre, network, or system. (eg. WATDOC, CODOC).

2. National vendors or distributers of online systems offering databases produced in-house or obtained through various agreements.

These vendors may develop their own software (eg. QL systems, CAN/OLE) or may use purchased software (eg. University of Alberta use of the SPIRES system).

3. External vendors or Canadian representatives of external vendors of online systems who offer commercial access to collections of databases (LIS, INFOMART (SDC)).

4. Co-operative groups or co-operative vendors, who supply certain online services and/or databases, usually in connection with academic library housekeeping duties or with access to academic library holdings (BADADUQ, UNICAT/TELECAT) (See also Canadian Library Directory, 1974).

Note: 2 & 3 are concerned with "outside" use, 4 with "inside" use.

5. Purchasers of online services, who may or may not become vendors in turn.

6. The ultimate user, who may or may not be an intermediary purchaser.

7. Search editors or other intermediaries between the user and the database.

8. Other instructors in online use of bibliographic databases such as are found in university schools of library science or in library orientation programs (cf. Piternick and Simmons, 1974; Pearson and Black, 1975).

9. Computing science departments or computing consultants who are concerned with the development of improved online and related computer programs and who supply staff to those vendors who wish to develop or improve their systems. Staff is also supplied for other related computer projects.

10. Data networks - (DATAPAC, TYMNET, etc.)

The essential components of this overall system are the databases (often initially produced for other purposes), the supplier and his system (he may or may not be a commercial vendor), the data network, the purchaser, and the user.

It has been customary to use the term "vendor" as the designation for those who run commercial databases for a fee, via an online system. But, any operator of an online system, whether he is charging or not, is concerned with the "sale" or promotion or vending of that system and and is in competition with others who may offer a better service or similar services at a better price. Similarly, organizations such as WATDOC, which are called information services, are also concerned indirectly with the promotion or "selling" of the online system that they

chosen to run their databases. There is, thus, overlapping in the elements of the overall online picture, with conflicting interests and ambitions being present.

4. HISTORIC BACKGROUND AND THE COLLECTION OF DATA

Because of the unusual character of the Canadian need for information and because of varying attitudes towards information, as discussed above, especially in regard to the mixed free enterprise/public enterprise aspects of the Canadian scene, the prospect of formulating online and database policy, of collecting reliable data so that the significant characteristics of use can be ascertained is extremely daunting. It is hoped that the following brief discussion of the development of online use in Canada will illustrate both difficulties to be faced and the types of services that have developed, and that it will also provide further support for certain of the statements made in Section 2 of this paper.

The authors of the paper have been connected with the online use of bibliographic databases from the first appearance and use of such databases in Canada. Therefore, their collective knowledge should illuminate certain aspects of Canadian online development. A BADADUQ co-author would have provided us with expertise in a French-Canadian academic online database and rounded out our "equipe". However, we shall place the BADADUQ system in its proper context and we acknowledge the assistance we have received from BADADUQ personnel.

Canadian online use, as might be expected from the comments in the sections above, first began in an academic environment and not in private industry. It surfaced almost simultaneously in widely separated sections of the country. For example, the University of Alberta, Department of Computing Science, with the University's acquisition of one of the first IBM 360/67's delivered in North America, began, in 1967, the development of several online databases and provided training in their use for both computing scientists and librarians; training was also provided in computer system production for computing scientists, with emphasis on database construction and computer support programs for online use (Heaps, 1968; Heaps and Heaps, 1968; University of Alberta, 1972; Halpin, 1967). At this time, the Department was also concerned, in co-operation with other organizations, such as the University of Calgary, the Alberta Research Council and the Alberta Information Retrieval Association, in providing public or open access to databases (Heaps, 1972). The offering of CAN/SDI public services followed the offering of public batch database searching services by the Alberta co-operative group. Graduate students went on to other jobs and to other sections of Canada and assisted in the development of WATDOC (Batteke, Heaps, Mercier, 1974) and in the building of other distinctive Canadian databases (Lo and Cooke, 1973; Cooke & Schick, 1973; Guttman, 1974), some of which are now available online through QL Systems.

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At about the same time as online programs were being written at the University of Alberta, QL Systems had its beginnings as an online research project at Queen's University under Professor Hugh Lawford's direction (Foster, 1977; Rushbrook and Lawford, 1976), and the computer search programs were developed by the Lawford research team. This research project's provision of online searching services, with the databases being primarily concerned with law, predated CAN/OLE's public offerings. In a certain sense, QL Systems is the Canadian equivalent of SDC or LIS in that a federally supported research project was of eventual benefit to a commercially oriented company operating for profit. The significant difference lies in the fact that the initial funding was not in the form of a contract given to an existing commercial-type firm, but was in support of an academic research project within a university. In the American situation, the existence of private or semi-private enterprises who performed contract research and development strengthens the present day position of these companies. University research teams did not have to be changed into profit-oriented companies. Further, these American companies generally had a research component integrated into each company, as has been indicated; the conflicts that arise between university research and industrial research were not present.

In the early 1970's an interesting development in the Province of Quebec led to the building of the BADADUQ (Banque de Données à Acces Direct de l'Université du Québec) database. The University of Quebec was formed from many diverse existing educational institutions and the decision was taken to build an online catalog to serve the widely separated campi. The database was not confined to monographs and both it and the computer support system were built in-house. BADADUQ is accessible to users outside the academic community and thus forms a major Canadian public database. A summary of the development is given by Cowan (1977).

The pioneer work of Guy Forget in Quebec, in the late 1960's, which led to the establishment of the Centre de Documentation at Laval University, also resulted in the production of distinctive databases, among these are RADAR and ACTUALITÉ. Gautier and de Varennes (1975) and Blais (1977) discuss the building of these databases. These bases will soon be available online through INFOMART.

The CAN/OLE project has already been discussed in regard to certain specific points raised in this paper. Peter Wolters has been associated with it and with CAN/SDI from the initiation of both projects (Wolters and Brown, 1972: Wolters, 1974). The CAN/OLE project came online in May 1974 with preliminary planning begun in late 1972. CAN/OLE made available to Canadians, through a central location, and supported by government subsidies, online access to commercial-type American and British databases; later several small government supported Canadian databases were added. The system was developed to allow equal access, in terms of cost, to all Canadians regardless of their geographic location, with query possible in both official languages. It was also

regarded as important that CAN/OLE would interact with and complement CISTI's other functions as an information supplier and a net lender in the national inter-library loan system. Similar principles had guided the development of the CAN/SDI service.

At present, the CAN/OLE Bulletin (1974-) offers the only reliable and publicly available statistics on current Canadian online use. CAN/OLE, as already indicated, has a network of search editors. Training sessions are regularly offered. The databases around which the service was built were commercially acquired, but the computer support programs were written in-house. Note that CISTI (previously the National Science Library) and the National Library have provided and are providing services in Canada, as government bodies, that would have been provided in the American system by private enterprise. The American "public enterprise" system supports, in a direct manner, mainly referral services, the National Library of Medicine being a notable exception. The future of a system such as CAN/OLE will be largely determined by the formal or informal policy decisions that will emerge regarding Canadian online use. Aspects of such policy formation will be discussed in Section 6 of this paper.

Various other small in-house online systems were in the process of development about the same time or shortly after those described above. Some of these later became public systems. Also, various individual or co-operative university systems were being built up, largely through trial and error. Some of the early in-house systems were those found at the Department of Communications (McMullen, 1972), at Carleton University (Riordan et al., 1971; Riordan and Smith, 1972; McGurrin and Silcoff, 1976), at the Department of National Defence (Amey, 1970; Currie, 1973), and at the University of Western Ontario (University of Western Ontario, 1976). A paper on Canadian direct query systems that were in the public domain was prepared by Janice Heyworth for the Special Libraries Association Meeting in Toronto, June 1974,(Heyworth, 1974). The small in-house systems and the specialized larger government in-house systems, such as the Department of Defence's SOCRATES, did not affect the general user. Neither did the university systems, which were largely concerned with library housekeeping applications.

5. CANADIAN ONLINE USE: FACTS AND FIGURES

By and large, the majority of Canadian users of automated search services, at first principally scientists and engineers, were introduced to the idea of the availability of computerized databases through the CAN/SDI system. A convenient publicity network was then available to CAN/OLE through the CAN/SDI search editors, who had been running CAN/SDI on their files. Since CAN/OLE is probably, at present, the best known Canadian online system, it is perhaps inevitable, then, that the figures for Canadian online use in the Tomberg paper (1977) are largely drawn from the CAN/OLE Bulletin (1974). However, it appears from the authors' investigations that these figures have been misinterpreted by Tomberg. The definition of a search as used in CAN/OLE is not the same as the

definition of a search as used by Tomberg. This error would initially lead to a significant decrease in the Tomberg totals as they are presently reported (from 200,000 to 40,000?) (illustrative figures will appear in the JCAIS paper) though the pattern of increasing growth would remain the same. The CAN/OLE totals certainly indicate rapidly accelerating use.

However, the CAN/OLE figures do not represent the total figures on Canadian use. Therefore, the figures given by Tomberg are not comprehensive, in addition to the fact that they have been misinterpreted. For example, the figures do not seem to take into account searches performed on other systems of the same databases covered by CAN/OLE. Certain of the databases searchable through CAN/OLE are available via Lockheed or via INFOMART (SDC). It is also not clear whether Tomberg's figures for American use of Lockheed and SDC separate out the Canadian use (Mauerhoff, 1977). A cursory check made in connection with the preparation of this paper, including an examination of the COIN Directory (A Directory of Computerized Information in Alberta) (AIRA, 1977) suggests that the Canadian use of these systems outside CAN/OLE is quite significant (Mauerhoff, 1977). Therefore, it is important to know whether the relevant totals were subtracted from American use figures before these figures were made available to Dr. Tomberg.

Further, figures for QL Systems are not included in the Tomberg paper. Preliminary checks indicate that the use of the WATDOC, law, and other databases supported by QL Systems is also quite significant. The use of QL Systems is also growing. QL Systems estimates an increase of 50% a year in new accounts and is adding one new database per month.

It clearly appears that all Canadian sources were not taken into account in Tomberg's figures. In conclusion, we estimate that, if the use not originally counted in Tomberg's statistics were added to the corrected lowered total that would result after the original total had been adjusted to take account of the misinterpretation of the search definition, then, the new total would be about the same as the total first quoted. The errors would cancel out.

However, these conclusions represent tentative estimates and the authors acknowledge that a complete and accurate estimate of Canadian use is not available at present. The investigations carried out for this paper have only begun to identify account holders and systems and to isolate conflicting nomenclature. It has been reported to the authors that the National Library, in co-operation with Statistics Canada, has recently begun the process of initiating a nation-wide study of online searches as carried out by library search editors. This study is to be completed in several steps (Rogers, 1977). It is hoped that this study will eventually provide very necessary statistics. Related National Library studies on databases and information suppliers, in process or planned, should also be helpful (Silkoff, in press). Even though at present there are no figures adequate to form the basis for a comprehensive and detailed comparison of Canadian, American, and European

online use, nevertheless, it is the authors' opinion that Canadian online use is large in terms of the population of the country and that it is increasing rapidly.

6. IMPLICATIONS AND POLICY

6.1 Dependency and Competition

What does the rapidly accelerating growth curve for Canadian online use mean? Does it mean that Canadians are better online users than are Europeans or does it simply mean that Canadians are becoming increasingly dependent upon foreign literature or that they believe they must be increasingly dependent upon foreign literature? Even a cursory survey of databases offered to and used by Canadians certainly shows the predominance of American databases. As stated, the investigations carried out for the preparation of this paper represent only the beginnings of necessary research. A comprehensive survey is not yet at hand. Therefore, various statements are being made on incomplete evidence.

Listings of databases that have been available or that we have made, notably those furnished by CAN/OLE, QL Systems, and the Alberta Information Retrieval Association, through their COIN Directory (A Directory of Computerized Information in Alberta), confirm the American predomiance. Appendix A gives a tentative list of Canadian online databases, which can easily be compared with the imposing American list found in the June/77 issue of the ASIS Bulletin, (Williams and Brandhorst, 1977).

Various other lists in preparation will probably offer similar comparisons. These include the following: a list of online databases available to Canadians through selected "citation retrieval network centres" compiled by the National Library (Silcoff, in press), a comprehensive list of Canadian machine-readable databases compiled by the National Library (Rogers, 1977) and a list of Canadian online databases compiled by CRIQ (Centre de Recherche Industrielle du Québec) (Carrier, 1977). Deschatelets is surveying selected Canadian online searching centres and the position of the intermediary (Deschatelets, 1978). It is reported that his research will cover the use of two American systems and one Canadian system.

The increasing reliance on online searches, with databases being largely American, and the advent of increased competitive selling of databases forces us to find the answers to a series of questions. What is going to happen in a competitive market? How competitive should the market be? These are some of the questions that can be asked. The fundamental question, of course, is what should happen in a country such as Canada. It is vitally important to all Canadians that wise decisions are made in regard to our on-line and database information policies.

For example, we have discussed the development of CAN/OLE. At present, this "public enterprise" offers Canadian online users access

to large American databases, mainly of a commercial type, as well as to some small Canadian bases. As stated above, the CAN/OLE network has provided a "promotion" network. Therefore, as international and national data communication networks become more widespread and as American vendors wish to extend their market penetration and to sell directly or through branch plant operations to the Canadian online user, and so to compete with CISTI and with QL and similar systems, we shall find that the Canadian user has already been educated by the "public" system to the advantages of online use, especially of American databases. Similarly, one can say that Canadian users and suppliers of scientific and technical information, as a whole, have been educated by Tyas, Katz, and Lamontagne to believe that they must rely on the world's information and a "selling" job has been done there also, especially to our two national libraries (cf. CISTI, 1974-77, p.3).

Foreign vendors will not have much resistence to overcome if they can offer cheaper and more efficient services than CAN/OLE; they may be able to do this because they may have benefited from hidden subsidies, or it may become policy to offer these databases to organizations such as CISTI at a price that will make CAN/OLE non-competitive. In such an event, the non-Canadian vendors will take over the services from CAN/OLE and the development costs for the computer support system, for the training of search editors and so forth, which have all been supported by the Canadian taxpayer, will have been money spent to support increased foreign penetration of all aspects of the market.

Further, it may well soon seem obvious that the various support functions presently performed by CISTI as part of a proposed national bibliographic network might also be performed better by foreign organizations (cf. Silkoff's concern with the support function, 1976). The parlous state of Canadian publishing has partially been the result of subscribing to such a philosophy (University of Alberta, 1972).

Is this what Canadian online users want? Do we wish now to discard all "public" systems? If the answer is "yes" and we decide to forego these public systems, should we ensure that the "private enterprise" substitutes be members of the "Canadian" information industry? Should we ensure then that they be in a position to offer comparable service and that they be in a favourable position to compete vigorously for the opportunity to offer the service? Hugh Faulkner, speaking as the Minister of State for Science and Technology, at the August 1977 IFIP Conference in Toronto, discussed in some detail both the balance of payments problem and the loss of social and political control when computer services leave Canada. The Computer/Communications Secretariat has estimated that if the present loss of computer services continues, over a span of the next 5 to 10 years, 30,000 jobs will be lost (Steklasa, 1977). The online and database loss is part of that problem.

As can easily be seen, similar difficulties will face Canadian suppliers of Canadian databases. There may be pressure on them to sell

their databases to American systems and they may do so without understanding the full consequences of their actions. Similarly, Canadian information gatherers may place their information on American databases also without realizing the full implications (Campion, 1977). These difficulties will be discussed in greater detail in the following sections of this paper.

6.2 The Alternatives

In an ideally free market we might be able to say that the user will eventually decide what systems are to survive and which will fail; but the ideally free market does not exist, as Freeman recognizes (1977). Although user decisions will be variously affected by factors that seem to be part of the free market environment, these factors can be made more or less significant as the result of tariff or subsidy policies or the lack of such policies governing overall information planning.

For the sake of illustration consider the following factors, which could influence users in their decisions on which databases to choose to answer their questions:

1. Quality of retrieval systems (including types of bases offered).
2. Reliability, price and availability of telephone services.
3. Funding available to users.
4. Pricing of retrieval services.
5. Language of communication with users.
6. Simplicity of contracting procedures for becoming a user.
7. Promotion or support by government.
8. Efficiency of marketing.

Although, as we have implied, many of these factors seem to be "competitively" free on the surface, most of them are subject to influence and can become more or less important as the result of policy decisions. Therefore, it is necessary for us to understand what policy alternatives are open to us and how they will influence factors such as those listed above.

There are three paths that we can choose among in formulating online information policy. These are:

1. A completely free enterprise system.

2. A completely government controlled and supplied system.

3. A mixed system.

6.2.1 Completely Free Enterprise System.

Alternatives one and two can be disposed of fairly rapidly. A completely open system, that is, open internationally, would leave us entirely at the mercy of the most powerful information nation, that is, at present, the United States. Tomberg is concerned with similar information dependency when he discusses the penetration of Europe by American systems. Similar concern is also found in the recent article in Documentaliste (Cacaly, 1977). Quite naturally, Carlos Cuadra of SDC supported an open system in his paper to the 1977 Cranfield meeting (Cuadra, 1977) because such a system would ensure optimum benefit to corporations such as SDC and their affiliates. Also quite naturally when such companies are confronted with the threat of tariff walls or other impediments, the threat is met with a threat of withdrawing information sources. Despite the theoretical attractions and the intellectual appeal of statements that define information as an international resource, at the present time, the totally open approach will have to be rejected by all nations who are concerned with intellectual and technological sovereignty and a quid pro quo will eventually have to be formulated. Issues of the Euronet Newsletter illustrate aspects of the search for a solution (Euronet Newsletter, 1977).

6.2.2 Completely Government Controlled.

A completely government controlled and supplied system is also not feasible. It cannot be contemplated in a so-called pluralistic, democratic society, despite the Canadian preference, already discussed, for "public enterprises". In addition, in Canada a further difficulty would arise in apportioning the responsibilities between the provincial and federal governments. This difficulty is sufficiently severe in any type of mixed system, but it would be impossible to overcome in a system where all decisions would be made by federal and provincial governments.

6.2.3 The Mixed System.

The disposal of the two previous alternatives leaves the third option, a system of mixed responsibility and mixed contributions. In the long run, we might look for a composite network of textual and numeric retrieval mechanisms that would be linked to other systems that would identify human expertise and also to systems that would identify, deliver, and produce documents. This network would eventually serve both specialists and the general public. As has been indicated, the spelling out of the practical details of a mixed system to achieve these ends will be very difficult, especially for the sections of it which deal specifically with online problems. Similarly challenging will be the reconciliation of conflicting interests that must take place before a wise information policy for such a mixed system will emerge. Further, this policy must be based on an appreciation of what is best for Canada as a whole, with special emphasis being placed on the protection of Canada's intellectual and technological sovereignty. The following sections will discuss some of the points at issue as they relate to on-line use.

6.3 Decisions and their Consequences

In formulating a policy for online information handling that will work for a mixed system, the effect of the policy on certain distinctive areas of activity and interest must be considered. Some of the more important of these are listed below:

1. The position of the Canadian information industry, including any branch plant type operations.

2. Questions related to the build-up of Canadian databases.

3. Questions of co-operation with other nations and with international organizations.

4. Recommendations to government regarding the most efficient use of government subsidies, tariffs, grants, and other interventions.

5. The balance of payments problem and questions of intellectual and technological sovereignty.

In this paper, we shall not discuss all these points in detail, but we shall try to outline some important considerations.

6.3.1 The Canadian Information Industry: Online Suppliers.

It has already been noted that the efficient use of subsidies, of contracting out and of similar procedures, especially when these are supported by the immense technological capability of the United States

and by vigorous advertising campaigns, has contributed greatly to the power of the American database distributers or vendors.

If Canada is to have competitive firms in the online branch of the information industry, then both government protection and government support of a nature similar to that used in the United States and currently being developed in Europe will have to become available and information and publicity initiatives taken. Just as the computer industry, as a whole, is soliciting government support to ensure the continuing existence of a viable computer industry (both consulting firms, and hardware manufacturers) (Loewen, 1977; Steklasa, 1977), so should the developers of Canadian online support systems define their needs and requirements for government protection and support.

For example, a member of the information industry, such as QL Systems, may have its own computer installation and, therefore, will employ computer professionals. The efficiency and the consequent competitiveness of the computer support systems is of great importance and competent computing scientists must be available. Interaction and liaison with computing science departments and complementary or joint research and development grants may be of significance in maintaining the system's competitive status. If the system is competitive both the quality of the retrieval system may be improved and the price lowered (See Section 6.2). Such installations may also build databases and questions associated with this activity will be explored in the following section. Open tendering and fair competitive bidding are also important for the development of the information industry, as has been previously indicated in Section 6.1.

Other installations, such as the Computer Centre at the University of Alberta, may enter the field of supplying online services, perhaps by leasing available commercial packages, such as the SPIRES system, but using local computer facilities. This approach will also mean that additional staff positions will be available. The University of Alberta Computer Centre estimates that at least three positions would be needed to maintain an online service centre (Bent, 1977). In instances such as these, where a university offers services for a fee in competition with private industry, there are many policy problems connected with pricing and competition that must be resolved.

There are other types of Canadian vendors, such as INFOMART, who may be licensed by a non-Canadian company to sell access to specific selected non-Canadian databases (Gray, 1977; Heyding, 1976; Mauerhoff, 1977) through a specific system. If these vendors are regarded as part of the Canadian information industry, all the questions bearing on branch plant operation that have been raised by the Canadian public in similar situations will arise again here. The confidentiality of statistics, which may be needed for Canadian policy formation, will present a particularly thorny problem in these instances (Mauerhoff, 1977).

The entrance of companies such as INFOMART into the information industry poses much wider problems that those associated with the vending of specialized online American databases. INFOMART is jointly owned by the Toronto Star and Southam. Heyding of INFOMART states that, "Both companies are committed to expanding the horizons of the communications industry and INFOMART represents one of their first steps in electronic publishing," (Heyding, 1976). If INFOMART represents the first steps, not only in electronic publishing, but in the entrance of large media interests into online dissemination and control of databases, linked to television and newspapers, then, the problems and the need for wise decisions will be greatly magnified. This paper cannot deal with such a subject, but the future waits in the wings.

To return to the Canadian online supplier, problems also arise if a government body is actively engaged in online activity; one of these is related to the formulation of online policy. If the government body's internal policy group makes recommendations regarding information policy, then it must be clearly understood that these are made on behalf of the government body. The policy group must not be in the position of both judge and jury. This type of problem has been discussed at some length by the Senate Committee on Science Policy; it is especially relevant to some of the CISTI/NRC and National Library advisory groups.

Even the short overview presented above makes it evident that policy planning and regulation of this industry is related in its complexity to the difficulty of regulation of radio and television. Who is the regulatory authority to be? What is the online equivalent of the CRTC? Whatever regulatory authority evolves, it must be impartial and must be seen to be impartial. The difficulties, once more, are compounded by the weakness of the industrial sector and by the predominant place taken in information handling by universities and government. At present, it would be almost impossible to staff an impartial regulatory body.

6.3.2 Building Canadian databases.

The resolution of various difficulties related to databases is fundamental to the wise formulation of online information policy; all machine readable databases are now candidates for online use. Decisions must be taken regarding the types of databases to be built and regarding the co-operative arrangements to be made in conjunction with database building and use. A suitable definition of databases is also necessary. In this paper, we have been concerned with textual type databases, which include those bases that are essentially bibliographic references and those that allow searching of portions of full text. Other types of databases, for instance, numeric databases with census series or oil drilling information,are equally important but are not considered here. In this paper, we shall take the position that it is essential to build Canadian textual databases. Two main reasons are given:

CANADIAN ONLINE USE

1. There are certain areas in which Canada has distinctive information; this information can come only from Canadian sources and it fulfils particular Canadian needs. Examples of such distinctive information would be found in the material collected by various Royal Commissions and task forces, notably the Berger Commission and the Senate Science Policy Committee. These two sources of information will be needed constantly for Canadian decisions and use. There are other related examples. Canadian case and statute law and Canadian water resources information presently available on QL Systems, grant information on CAN/OLE, the University of Quebec holdings information on BADADUQ, Canadian government document information available through CODOC (Gilham and Presser, 1977), French language bases developed at Laval (Blais, 1977). Databases such as these must be built to satisfy Canadian needs. Such statistics as we have checked indicate a surprisingly high use of Canadian data bases, especially where it is possible to make a comparison with a relevant American database. Figures and tables on this use will be found in the succeeding JCAIS paper.

2. Both distinctive national databases and databases in less distinctive fields are necessary as a bargaining tool.

It is admitted that differences of opinion surface in regard to the second position and in regard to certain aspects of the first position. Some Canadians feel that we should contribute all our information exclusively to already existing databases, either to the commercial databases such as those run by SDC or to the international databases such as those developed by INIS and that we should not duplicate the information under any circumstances by building our own databases.

We shall consider these varying viewpoints. As stated, in the opinion of the authors of this paper, in certain fields Canada must be responsible for the production of distinctively Canadian databases. This responsibility cannot be abrogated. This position does not exclude cooperation, but it does mean that, before cooperation can take place and before we can undertake the rational building of our own databases more information regarding what databases are presently available or planned must be collected. There must also be some consensus about what databases are necessary.

The planned building of Canadian databases involves the formulation of specific details of policy. Will these databases be built for instance, directly by governments, or indirectly through contracts, or by professional bodies, or will the present existing adhoc development continue? If the databases are built by governments may they in turn be expected to offer the database at cost to a Canadian online vendor, somewhat in the manner in which U.S. government agencies, through the subsidization of certain abstract services, which commercial services receive at low cost, assist commercial vendors. Or will the Canadian government contract out to private industry the building of the databases and then allow vendors

to tender for the use of the databases. Will the tenders be restricted in any way so that Canadian companies will be in a preferred position?

The preceding questions suggest that Canadians must be alert to the possibility that their competitors, either from outside the country or through branch plant operations, may tender, from a position of strength, for the use of such Canadian built databases, especially if these databases have a use beyond the borders of Canada. It is economically feasible, for example, for a large and powerful extra-national competitor to run these databases at a marginal profit and, therefore, be in a position to underbid the Canadian online supplier to whom the obtaining of the Canadian database may be of primary importance for economic survival. Unfortunately, American periferal use can generate, sometimes, more revenue than Canadian general use. As noted, a very similar situation exists in publishing.

Other considerations will arise if the federal or a provincial government, after building or assisting in the building of a database, decides to run it through a government system such as CAN/OLE. This may either supplement the services provided by the private online suppliers or it may supersede these, depending on the overall policy chosen and the mix of government and private sources. Regardless of what answers evolve to the questions posed above, it is evident that databases are valuable commodities and as such can be used as bargaining tools. As Kates says, "...it is becoming evident that if a nation wants to obtain technology (information or hardware) one has to have technology with which to bargain and trade," (Kates, 1977, p.26).

6.3.3 Cooperation and Cooperative Agreements.

As has been indicated, certain aspects of decisions regarding forms of cooperation in database building must be spelled out. For example, a Canadian government agency may decide that their policy will be to contribute their data, that is document references and/or abstracts, to an existing American commercial or government assisted database (Campion, 1977). If such a choice is taken the terms of cooperation should be carefully worked out and there must be a valid reason for the decision not to build a Canadian database in that field. Although it is true that the information from the American scientific and technical press has been available in Canada for many years, a price has always been paid for this and there have been economic returns to the country of origin. Information has never been donated, has never been truly "free", even though parts of its production may have been subsidized. All countries subsidize to protect their intellectual sovereignty. Canadians, for example, have seen fit to subsidize the production of journals such as the Canadian Journals of Research and the Journal of the Fisheries Research Board of Canada, even though such production might be regarded as redundant because there are other core journals in these fields. Canada has not considered ceasing publication of these journals and the consequent issuing of instructions to Canadian authors and all others to

submit their manuscripts to American or so-called international journals, which would then have to be purchased by Canadians and the page charges paid by Canadian institutions. (Economic Council of Canada, 1971).

In deciding whether or not to contribute to commercial type databases or to internationally sponsored joint databases similar questions of prestige and sovereignty arise.

Canadians have prided themselves on their international contributions, but an international contribution that leaves one without a bargaining counter or without a reciprocal agreement does not constitute national or international statesmanship. When cooperation is undertaken, the terms should be clearly spelled out, as they are in the INIS agreement and as is often proposed in similar agreements (UNESCO, (SPINES), 1974). where the problems of ensuring fair cooperation have been realized (See Appendix B for terms of the INIS agreement).

6.3.4 Government Action: Subsidies, Tariffs, Other Interventions.

As has been suggested in the initial sections of this paper Canadians have been ambiguous in their attitudes towards information and nowhere is this more clearly indicated than in the present lack of consistent, informed, overall planning in regard to the problems posed by the online use of databases (Fierheller, 1977). As yet, no overall policy has been formulated by the federal government or by any of the provincial governments. No recommendations, either specific or otherwise, regarding master policy has been forthcoming from the information oriented societies, with the exceptions of those made by the computing societies where the problem impinges on those of the computer industry as a whole (Fierheller, 1977; Loewen, 1977). In the minds of search editors or library administrators who obtain the funds to make online services available, there is little awareness of any threat to intellectual and technological sovereignty and they do not understand that another embryonic Canadian industry may die before it is born or that Canadian databases are currency in information bargaining or that availability of Canadian jobs may be related to their choice of an information service.

Interventions by government in Canada can be very significant, hence the importance of wise policy formulation. In a small country governments and industry cannot engage in mindless competition with one another, especially in the face of threats from outside. Reasonable ground rules must be developed that allow government to perform certain tasks for the benefit of the nation, while at the same time allowing and supporting vigorous and efficient private industry. Hugh Faulkner stated at Toronto, in regard to similar problems in the computer industry, "There is a growing need for international agreement on a generally acceptable set of ground rules to deal with these perplexing problems," (Steklasa, 1977).

7. Conclusions

This paper seeks to alert the Canadian information community to the problems that exist and seeks to make clear the necessity for informed and powerful government, private industry, and personal action. In Europe, the information scientists, in their concern with intellectual sovereignty, use their access to policy-makers, and through institutional mechanisms make recommendations, which, when accepted, have the power of the European community behind them. The Americans have long understood all the implications of information politics and have continually attempted to preserve and expand their unique position.

Canadians must take similar action and the authors will welcome both suggestions and data and these will be forwarded to a policy committee of the Canadian Association for Information Science. Very soon, recommendations must be made to the Canadian government that will ensure that our online information industry will survive and become more competitive so that it, in turn, can sell online access to the world. Decisions must be made concerning the place of government funded or supported operations. Where can these perform most efficiently, both in serving Canadians and in contributing to the building of a healthy native industry, either through contracting out or through an extension of open tendering? A detailed survey of Canadian online use including identification of databases, users, and suppliers will be a first step in the provision of information necessary for the formulation of policy. When available, it will complete the initial work that has been done for the preparation of this paper. It must be stressed, however, that the information industry and information intermediaries and information users and suppliers must all actively contribute both to data gathering and to policy formation.

If Canadians do not educate themselves concerning the necessary action, abandon their ambiguous positions, and then move, they will have once more said that they prefer to be hewers of wood and drawers of water and that they prefer to live second-hand.

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APPENDIX A

Tentative List of Canadian Databases Available Online

This list draws on Silkoff (1977), the COIN Directory (AIRA, 1977), and QL Ltd. information, as well as other diverse sources. The authors know that not all sources have been surveyed and make no claims for the comprehensiveness of this list. Supplementary information will be welcomed. It is hoped that a more comprehensive and more fully annotated list will appear in the CJAIS paper.

ACTUALITE
All Canada Weekly Summaries
Les Arrets de la Cour Suprême du Canada
Bibliography of the Queen Charlotte Islands
Boreal Northern Titles
Canada Water
Canadian Business Periodicals Index
Canadian Newspaper Index
COIN (online)
CONF (Conference Proceedings held by CISTI)
D REF
Dominion Law Reports
Federal Court Reports
Fleuve St. Laurent (Test)
GAP (Government of Alberta Publications)
Hansard Oral Questions
Hansard Questions Ecrites
Hansard Questions Orales
Hansard Written Questions
IEC (Information Exchange Centre)
INDEX
LONDON
MATRIX (?)
NEWS
Ontario Court of Appeal
Ontario High Court and Divisional Court
Periodicals Publishing Record (Alberta)
RADAR
Reglement de la Chambre des Communes
RESORS
Revised Statutes of Canada
SLUTS
Statutes of British Columbia
Statutes of New Brunswick
Les Statutes Revisés du Canada
Standing Orders of the House of Commons
Supreme Court Reports
TECH BRIEFS
UNION (Union List of Scientific Serials)
Weekly Criminal Bulletin
Yukon Bibliography

APPENDIX B

Terms of the INIS Agreement*

The following policy statement was embodied in the final list of recommendations produced by the fifth consultative meeting of the INIS Liaison Officers in Vienna, 2-4 November 1954. The two relative recommendations are produced verbatim:

6. That the IAEA should continue to adhere to the policy that the exclusive rights to the use of the INIS products are granted to national authorities for application within national boundaries and that no individual or organization may offer or provide services from the INIS magnetic tapes in any other country without first having received the express approval and consent of that country.

7. That in keeping with the policy outlined in Recommendation 6 the Secretariat should seek copyright protection for the INIS products on behalf of all IAEA Member States participating in INIS.

*This statement has been furnished to the authors through the courtesy and efforts of G.P.L. Williams and J. Heyworth.

APPENDIX C

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