

SCIENTIFIC AND TECHNOLOGICAL INFORMATION
TRANSFER SYSTEM FOR CANADIAN INDUSTRY

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ABSTRACT

The objective of this paper is to outline the ten years of experience behind the Canadian Subject Retrieval Program (CAN/SRP), and the Canadian Technological Awareness Program (CAN/TAP). The perspective of related systems and services will be outlined in order to show that a continuous spectrum of services is needed to satisfy the information requirements of clients. Emphasis will be given to the costs of the services since the development of information science is particularly sensitive to economic aspects. Feedback from users will be given, and future plans outlined.

INTRODUCTION

The role of the Technical Information Service is to supply Canadian manufacturers promptly with information which is required in making decisions affecting the progress and advancement of their technical and related functional operations. Two programs which are related to each other have become important in carrying out this role. The Canadian Subject Retrieval Program (CAN/SRP) introduces some 45,000 Canadian manufacturers to the Technical Information Service each year. They are given a list of 100 different subjects - from air conditioning to woodworking, and are encouraged to select areas of concern for more in-depth information. A list of selected titles covering a period of five years is sent on each subject requested. The client then selects the titles he desires and technical articles in the form of TECH BRIEFS are sent to him by return mail. The manufacturer then reviews, adopts, and applies the information in his operations. CAN/SRP is designed to BRING HIM UP TO DATE.

The Canadian Technological Awareness Program (CAN/TAP) is designed for the client to KEEP HIM UP TO DATE. He has to register his profile of interests which, after editing, are matched word-by-word with the words of the titles we have given to the selected articles which have been entered into our system. Individualized lists of Tech Brief titles are sent to the client on a monthly basis. He chooses those most appropriate for his needs, and requests the Tech Briefs for review, adoption, and application in the same way as the CAN/SRP program. CAN/TAP has 4,500 registered clients. New registrations are accepted as vacancies occur.

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In 1973, 138,092 Tech Briefs were requested by clients. The breakdown between the two programs was: 56,607 Tech Briefs for CAN/SRP, and 81,485 Tech Briefs for CAN/TAP. During the nine years of operation between 1965 to 1973, 557,611 Tech Briefs were requested. Demand rate jumped 82% from 1971 to 1973.

Demand for the services of these programs has not been a function of need but rather our allocation of limited resources of equipment and personnel. If we were to serve the whole of Canadian industry and not just the manufacturing division, demand would jump tenfold. Even now we are using restrictive techniques to limit demand. However, we feel that our limitations tend to improve focus and concentration of our clients in benefiting from the information provided. We do not want to "sell" these programs because we are unable to provide any more service. We simply present these programs as practical means of handling the growing resource of information. By the use of microfiche, the International Development Research Centre (IDRC) is attempting to benefit six southern Asia countries from their office in Singapore: Malaysia, Indonesia, The Philippines, Hong Kong, Thailand, and Singapore itself. Mexico and Brazil have copied these programs quite precisely. We have given training to representatives from Venezuela, Colombia, Peru, Bolivia, Chile and the Argentine. We have also worked with representatives from the Organization for American States (OAS). Information programs in Norway, Sweden, Ireland, Denmark, Holland, and England have been modified within the limitations of political structures to utilize the experience we have gained.

PRINCIPLES OF OPERATION

The Technical Information Service has always been closely associated with the National Science Library. Although we have had direct access to this large scientific and technological resource, we were separate as an entity, and had no need to promote this information source. We have always been very much USER-ORIENTED. This is the key principle lying behind CAN/SRP and CAN/TAP. LEARN WHAT YOU WANT TO LEARN was another principle we had to follow mainly because we could not do anything else. We recognize that INDIVIDUAL FUNCTIONING CAN BE EFFECTIVE IN ACHIEVING BUSINESS, ECONOMIC, AND SOCIAL GOALS. Democratic group action brings up the rear.

Progress is a sequential series of activity and consequently time is of the essence in making decisions. Therefore it was easy for us to recognize the principle of MINIMUM DELAY in our information system. PRE-SELECTION OF CLIENT-USEFUL MATERIAL IS NECESSARY TO AVOID DUPLICATION, AND "HIGH-GRADE" INFORMATION. In other words, it is better to take the needles out of the haystack than to leave them buried in it. Following our selection of material comes another important principle: CLIENT SELECTION IS ESSENTIAL FOR ELIMINATING INFORMATION KNOWN ALREADY, FOR ELIMINATING INFORMATION WHICH CANNOT BE APPLIED BECAUSE OF THE LOCAL SITUATION, AND FOR ESTABLISHING PRIORITIES.

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Both the experience of our professional staff and the continuing comments from clients made us realize that both scientific and technological information was needed in an information system if it were to be useful. SCIENTIFIC INFORMATION IS NEEDED TO AID IN THE SELECTION OF APPLIED RESEARCH PROJECTS AND TECHNOLOGICAL INFORMATION IS NEEDED TO AID IN DAY-TO-DAY OPERATING DECISIONS.

Another important principle of our information system is that COPIES OF THE SELECTED MATERIAL (not references) MUST BE SUPPLIED TO THE CLIENT PROMPTLY. The diversity and magnitude of information sources and the lack of complete resources within easy reach of the client would make the quotation of references an aggravating frustration for the client and a reduction of information transfer to zero.

Perhaps our most important guiding principle is: TO ELIMINATE WHAT THE CLIENT DOES NOT WANT IN ORDER TO MAKE WHAT HE DOES WANT MANAGEABLE. We try to protect busy key personnel from unwanted information which could waste their time and hence misdirect their efforts. We are strong in wanting TO PROVIDE THE CLIENT WITH A FAMILIAR ENVIRONMENT IN WHICH HE COMES TO A FINAL FOCUS ON WHAT HE NEEDS.

Finally, we know from experience that the MECHANICS OF OPERATION OF AN INFORMATION SYSTEM IS THE CRUCIAL FACTOR IN ACHIEVING EFFECTIVE TRANSFER OF INFORMATION TO USERS. A mail strike, the sickness or vacation of staff, inadequate shelving, the breakdown of the duplicating machine at the output end of the system, or a fire, bankruptcy, or death at the receiving end can disrupt the system.

SPECTRUM OF SERVICES

Any information system can be considered in relation to six different kinds of information. The first three are included within the system:

1. information of interest to the client
2. information known already by the client
3. information desired and included but not at the right level of sophistication (and therefore not transferable).

Then there are the three kinds of information not included:

4. information desired but not known by anyone (planning for research may be undertaken)
5. information which is known and may be desirable but which has been rejected, has not been selected, or has been inadvertently missed
6. information which is neither desired or known and no research is planned.

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If the designer of an information system addresses himself to all of these kinds of information he is bound to have difficulty in completing the design. Fortunately for us, the available time by the client (about one hour per week maximum) is the determining factor in our design.

The choice of the abstract title of the Tech Brief is critical for both the computer and client selection. We try to reveal the level of sophistication of the article in the title so that he will be turned on if it is within his level of education and experience but turned off if it is too elementary or too advanced.

In editing the client's interest profile, we endeavour to exploit other programs and services which are available to us and which may be better related to the client's current information needs. We recommend the CANADIAN INDUSTRIAL REFERENCE GUIDES (CAN/IRG) if we feel he needs basic technical background or a mini-library in an area in which he is unfamiliar. Usually we prefer that a client be familiar with the Canadian Subject Retrieval Program (CAN/SRP) which gives him a five-year orientation in modern technology and scientific advances before registering in the CANADIAN TECHNOLOGICAL AWARENESS PROGRAM (CAN/TAP) which gives him current manufacturing awareness in products and processes. Where it is obvious that he has a unique application or problem we encourage him to complete a REQUEST form outlining his objective and the problem he is trying to solve so that one of our information officers can be assigned on an individual basis to do a special information search or draw on his experience for a solution. In cases where the client appears to have a unique operational or organizational problem we encourage him to seek technical assistance from our Industrial Engineering group who would send a representative from one of our sixteen field offices to visit the client and help him analyze, diagnose, and solve his problem. Motivational and training problems can often be helped by our CANADIAN AUDIO CASSETTE TAPES (CAN/ACT). Many clients and their employees respond better when they are told something. They prefer not to read. With the growth of radio, television, and cable communications, the number of clients desiring information in NON-HARD-COPY form is likely to continue to increase.

The spectrum of services available to complement our programs is being extended. The CANADIAN ON-LINE INFORMATION SYSTEM (CAN/OLE) allows retrospective retrieval of references from the Engineering Index and Inspec over a period of years. The CANADIAN SELECTIVE DISSEMINATION OF INFORMATION (CAN/SDI) gives scientific and research references to world literature through commercially available tapes. These two services are operated by the National Science Library. Much wider government referral services and a national network are being planned as a result of a federal cabinet directive to the National Research Council which are being called SCIENTIFIC AND TECHNOLOGICAL INFORMATION SERVICES.

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COSTS OF SERVICES

For nearly thirty years small and medium-sized Canadian manufacturers have received FREE services from the Technical Information Service of the National Research Council. Because of this tradition, CAN/SRP and CAN/TAP have also been free to our clients. Even though the units of costs will vary greatly between different information systems depending upon the definition of "unit", we have found that our total unit cost has remained substantially fixed at \$1.00 per Tech Brief. Our low initial costs of salaries and equipment were balanced by low client demand. The total staff for these programs has grown to ten, and although our expenses have risen also, the demand has expanded to such an extent that the cost ratio has remained substantially constant. Since the cost of providing individually-searched answers or giving the clients a series of personal visits (which is done by the Inquiry and Answer and Industrial Engineering groups respectively) is relatively expensive, we are wise to endeavour to handle as many of the information needs of clients by the use of TECH BRIEFS as we possibly can.

USER FEEDBACK

The nature of our system of dialogue with clients provides us with considerable feedback which helps us greatly in re-design and up-dating. Although we recognize that a particular Tech Brief may be of value only to one client - it may be extremely valuable to him. In terms of economic value to the country, that one Tech Brief may be worth more than many for which there is high demand from clients but which receive little useful application. We receive on an average about 38 requests for each Tech Brief. However, we have been able to adjust our selection so that the difference between the highest (80) and the lowest (20) is only 4/1. Comments from our client-users reflect their on-going successes, reactions, and difficulties in securing and applying information. Here are a half-dozen comments:

1. "We would be interested in obtaining details of your switch referred to in Tech Brief B30651 - Safe Electrical Capacitance Proximity Switch. Our eventual aim would be to manufacture and distribute this switch here in Canada."
2. "The assistance you can provide may well prove to be invaluable both in day-by-day company operations and in long-range corporate planning."
3. "Over the past several years we have found your technical briefs to be of considerable help in obtaining up-to-date information."

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4. "The Checklists are very useful, and are filed and used as an index. The circled items permit a fast selection and reference to the "Tech Briefs". This potential value is made available to the Research and Engineering Departments which allow our personnel to save an appreciable amount of time when technical information is required for solving engineering problems. For example, the method for "average temperature measurement" described in the Tech Brief B96826 has been used for several steam trap tests conducted for the U.S. Navy. Valve designs, described in the Tech Brief B00173 and B96548, will be investigated for possible solutions to particular steam trap or valve applications. All Tech Briefs concerning corrosion problems and plating processes are also of particular interest to our company in helping to solve a bi-metal corrosion problem for sewer corrosive surfaces."
5. "I would like to praise the Technical Brief system instituted by your organization. As the Canadian parent of a group of small to medium industrial concerns, we are intensely interested in improving our existing operations and in discovering, evaluating, and persuing new opportunity areas. Your service has been invaluable in these endeavours. Due to the nature of our interests and the diversity of our holdings, it is difficult to place a dollar and cents figure on the value of the service. It has not only served to discriminate new information, but more importantly has made available to us information from a variety of sources, the number of which we would have been unable to afford to subscribe to, or many of which we would not even have been aware of. I can most certainly assure you that the service has been of great benefit to us."
6. "All the Tech Briefs we have requested and received are relevant and of considerable value to us. We have our own information centre and our aim is to make this as comprehensive as possible. Properly indexed and microfilmed information pertaining to our industry and related fields are being constantly referred to by not only our researchers but technical management as well. While it is difficult to place a monetary value on this service, it is quite valuable to us in keeping our files up to date."

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A number of clients have indicated to us that the value of the service was equivalent to having at least one full-time competent person searching journals for articles useful to their organization. Thus, many clients estimate the value of the program for them is in THE SAVING OF SEARCH TIME. Benefit/cost ratios from 7 to 140 are indicated by comparing the clients' estimated value with our cost of providing the Tech Briefs to them. One client showed that his earnings from an application of information resulted in a benefit/cost ratio of 300. We maintain a continuing volume of CLIENT COMMENTS in order to maintain perspective about clients' problems, attitudes, needs, and complaints. Our staff find this volume both interesting and instructive in helping them to carry out their duties.

INFORMATION ENGINEERING

We have been exploring various media to determine available alternatives which are both effective and less costly than hard copy. We are experimenting with the use of microfiche for the use of our field representatives and for developing countries. Our costs are not reduced appreciably by the use of microfiche. We have been using the 98-page format. While we believe that microfiche information packages can be of considerable value, the universal availability of quality reader-printers could be the stumbling block in the practical operation of this medium.

A standard aperture card (8-page format) would be suitable for most of our Tech Briefs because the majority are less than 8 pages. Our duplication costs would be reduced to one-quarter of what they are now and thus this single step could result in a fourfold expansion of our program. On the other hand, we are in doubt as to the reaction of the majority of our clients in securing one or more quality viewers in order to make the best use of this medium.

As our resources, including paper, become scarce the use of reusable audio and video cassettes through cable communications will become economically attractive. Phonovision and computers with local terminals will undoubtedly find important places in future information transfer systems.

Information is one of the few non-depleting resources. There appears to be no limit to its potential expansion in spite of growing costs. The dilemma for the information engineer is to ensure that the lowest cost information transfer system he can design will survive in being effective in transferring the values of information to practical users. We make good use of the computer for routine clerical work in our programs, but it is by no means the heart of our present system. It is safe to predict that we will use both art and science in handling information for many years to come.