THE REMOTE SENSING INFORMATION CENTRE: A NATIONAL INFORMATION NETWORK AND NODE (LE CENTRE D'INFORMATIONS SUR LA TELEDETECTION: UN RESEAU ET UNE COMPOSANTE D'UN PLUS GRAND RESEAU.)

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ABSTRACT

The field of information handling will undergo fundamental and dramatic changes over the next ten years as a result of the linking of existing information services into a national network. This paper discusses information networks in the Canadian context, and the information services of the Canada Centre for Remote Sensing as a specialized node in a national STI network. (Le champs de la manipulation des informations subira une évolution importante et fondamentale au cours des dix prochaines années. Cette évolution sera le résultat de la liaison des services d'informations actuels avec un réseau national. Le présent exposé traite des réseaux d'informations dans le contexte canadien et du service d'informations du Centre Canadien de Télédétection comme une composante spécialisée dans le réseau canadien STI.)

REMOTE SENSING INFORMATION CENTRE

INTRODUCTION

In the current climate of rapidly escalating costs, slashed budgets, and eager administrators preoccupied with various techniques of systems analysis, many library managers are discovering that they too operate in a market environment. It is ironic that libraries have long promoted their services as necessary preventives of wasteful duplication of scientific effort, while at the same time being most guilty of wasteful duplication in handling the information which that effort produced. In A Policy for Scientific and Technical Information Dissemination (1969) the Science Council criticized, severely but accurately, the handling of Scientific and Technical Information (STI) in Canada:

> ...Canada (can) not expect to continue to operate with a plethora of underfunded unconnected libraries and technical information systems with an almost complete lack of forward planning on a national scale and simultaneously avoid losing ground in the race for technological and hence economic advance in which the other developed nations of the world are competing.

Many of the most significant recent advances in the field of information handling have resulted from the implementation of policies which were recommended in that visionary report. The key recommendation was that existing information services should be linked into a national network operated under decentralized control. Such a network would bring about fundamental and dramatic changes in the everyday operations of libraries and information centres, and its framework will be substantially completed within the next ten years. This is an outsider's estimate, based upon recent activities in Canada and abroad. It may well be a conservative estimate.

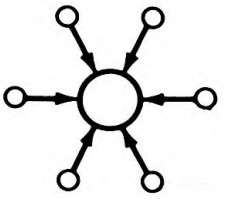
The above emphasis on networks as a means of eliminating wasteful duplication is only one advantage among many. Some additional advantages would be:

1. Pinpointing of gaps in the national information resources (the converse of the above).
2. Equalization of access to services, by bringing all users into contact with a larger information base.
3. Minimization of the effects of distance from library resources through the use of modern data processing and communications technology.
4. Cost reductions through regional sharing of hardware and software to perform many technical processes such as ordering, cataloging, and circulation in an on-line timesharing system.

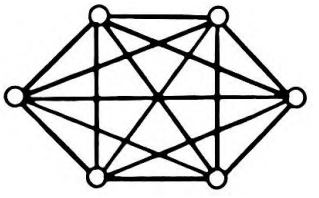
NETWORK TYPES

Before going further it will be necessary to define a few terms. In this paper an information network is a pattern of information exchange among three or more participants through communications for some functional purpose (Becker and Olsen 1968). Of the many network models which have been described in the literature it will be useful to consider three basic types: the monolithic, the free-unorganized, and the coordinated (Brown and Liston 1974).

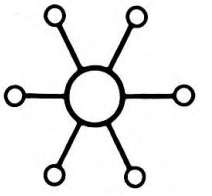
1. The monolithic draws many functions or systems into one highly-centralized unit.
2. The free-unorganized is made up of a set of diverse independent nodes which cooperate informally according to need and ability.
3. The coordinated is made up of a set of diverse independent nodes which employ a switching or referral centre to direct internodal communications. The switching centre uses the resources of the network to respond to the user; the referral centre merely brings about contact between the user and an appropriate information source.



Monolithic

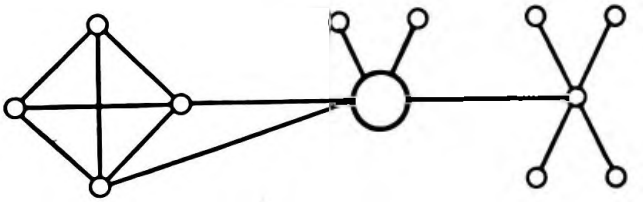


Free-unorganized



Coordinated

Upon examination, most large networks are found to be non-homogeneous, quasi-hierarchical agglomerations of these basic types (as below).



REMOTE SENSING INFORMATION CENTRE

NETWORKING IN CANADA

The free-unorganized model best describes the systems which have evolved in the U. S. and Canada, and which may be characteristic of countries with federal political systems. (The Soviet Union's VINITI is a monolithic system.) It should be pointed out however, that unorganized does not necessarily mean disorganized. In cases where all the network participants are known to one another it may be a highly efficient configuration. Evidently the likelihood that this will be so is inversely related to the network's size.

During the past decade great strides have been made toward the improvement of communication links among Canadian libraries, for example through the compilation of the Union List of Scientific Serials which functions essentially as a referral medium. More significantly, some important groundwork for a co-ordinated system has been prepared through the development of the two national libraries, and the formation of the NRC Advisory Board for Scientific and Technical Information. Nevertheless, it should be noted that the tendency for a few large libraries to bear the brunt of the interlibrary loan traffic does not de facto make them either switching centres or monoliths. The excellence of their collections and their adaptability in filling a service vacuum should not lead to a permanent distortion of their true function in the network hierarchy. Using the national collections as a first resort instead of a last resort can only compromise their efficiency.

The communications links for a national STI network are now being forged, and Canada's first official referral centre is now alive (and hopefully) well, and living in Toronto. Its success will depend not only upon its own energy and imagination in connecting information users with information suppliers, but also, ultimately, upon the support which it receives from the network nodes.

I will now proceed to an examination of one of these, a node which was designed to function efficiently in the climate created by the Science Council policy recommendations mentioned above.

CANADA CENTRE FOR REMOTE SENSING

Remote sensing is a relatively new field which deals with observation of phenomena from a distance. It observes with photographic cameras, as well as with a host of more exotic sensors, usually mounted on aircraft or spacecraft, to observe and monitor the environment. It has major applications for most earth sciences including agriculture, glaciology, hydrology, geoscience, geography, oceanography and many more.

REMOTE SENSING INFORMATION CENTRE

CCRS was established on April 1, 1971 (there is no particular significance in the date) to administer the National Program on Remote Sensing. As part of this National Program a country-wide organization has been built up consisting of two advisory committees (one of federal assistant deputy ministers, and the other of working scientists), nine remote sensing organizations operated and financed by various provinces, and three specialty centres.

It was anticipated that the new centre would have to cope with the difficult problem of quickly gathering poorly indexed information on a highly specialized topic. The problem was exacerbated by the fact that the field cut across so many of the established disciplines; there were few relevant journals and the report literature was being issued from a wide variety of obscure sources (Riordon 1971). Accordingly a contract was given to Carleton University to investigate the feasibility of developing an interactive timesharing information retrieval system to answer to the needs of this rapidly expanding field.

REMOTE SENSING INFORMATION CENTRE

> TIS will become a focus of remote sensing documentation in Canada, and will serve as a specialized part of a national network of scientific and technical information services. (Riordon and Smith 1972)

The Technical Information Service (TIS) of the Canada Centre for Remote Sensing (CCRS) functions as an information centre, that is, a unit employing information specialists to provide indexing and computer-based information retrieval attuned to the needs of a specialized field (Hayes and Becker 1974).

Presently TIS is staffed with twelve permanent and contract personnel, including two librarians, a geologist, and various technical specialists. The services offered include the following:

1. Conventional library services for the needs of CCRS research and operational staff.
2. A library of satellite imagery.
3. A library or remote sensing documentation.
4. A collection of illustrations for lectures and presentations on 35 mm slides.
5. On-line retrieval systems for remote access to 2, 3 and 4.
6. A machine-readable personnel roster of remote sensing experts in Canada, indexed by specialty, field of application, etc.

7. Orientation and instruction for new users of remotely sensed data.
8. Design and maintenance of in-house and travelling displays explaining the techniques and applications of remote sensing.
9. Publication and distribution of reports, glossaries, bibliographies, newsbriefs, conference information and other types of educational materials.

The retrieval system for 3. , remote sensing documentation will be described briefly in the following section.

REMOTE SENSING ON-LINE RETRIEVAL SYSTEM

The result of the contract with Carleton University mentioned in an earlier section is an interactive timesharing system called RESORS (Remote Sensing On-Line Retrieval System). It became operational in house in 1972, was offered on-line in 1973, and is now being widely used in Canada and abroad. During 1975 the system performed almost 4000 searches, and answered 3225 requests for photocopies.

The assignment of subject keywords is the only operation which is wholly manual. Subsequent system operations include the building of files using the program INPUT, verification of files with CHECK, further verification and merging with UPDATE, and retrieval with SEARCH. Auxiliary programs produce system statistics, catalogues, and indexes to selected information fields.

Users may describe any area of interest by entering broad subject categories and/or specific keywords, with optional qualifiers such as date of publication, date of system entry (current awareness), weights, or Boolean logic operators. The system produces an immediate total of relevant postings, ranked according to the degree of correlation to the search strategy. The user may then print out as many references as he finds useful. A more complete description of the basic system has been reported elsewhere (Riordon and Smith 1972).

Although TIS keeps archival copies of all the reports referenced by the system and uses them to answer requests for photocopies, the volume of requests is much larger than expected or desirable. It is evident that many large University collections lack coverage of the basic remote sensing texts. This is a situation which TIS is trying to correct through dissemination of a Basic Bibliography of Remote Sensing which will assist libraries in gathering the essential reference material, with a consequent improvement of service to users. This will allow TIS to conserve its energies to respond to "last resort" requests for obscure or unique materials.

REMOTE SENSING INFORMATION NETWORK DEVELOPMENT

The referral centre of a network must deal with three very basic problems in its early stages of development: organizational/regional jurisdictions, recognition by information users, and location of information sources. In the case of CCRS these problems were effectively dealt with by means of long-range planning which began long before the centre was established. The coordination provided by the two advisory committees prevented serious jurisdictional disputes from arising, one on the level of policy, and the other on the level of programs and activities. The latter body, The Canadian Advisory Committee on Remote Sensing (CACRS) encourages frequent exchange of views and information among all the organizations and individuals involved in the field on many levels, in both a coordinated and free-unorganized mode.

The same committee provides an excellent approach to a solution of the two remaining problems, recognition by users, and location of sources. Making services known to potential users is basically a marketing problem. It is not enough that users know of the existence of an agency with responsibilities in their subject field; they must also be made aware of the convenience of services being offered. It is axiomatic that if it seems more troublesome to get the information than to do without it, the user will do without it.

The broad based participation of CACRS provides an excellent foundation for an inventory of users since many of its members are the administrators of the organizations which comprise the principal users of remote sensing information. It is less easy to reach users who work outside of the mainstream of remote sensing, but attempts are made through public displays and exhibitions, training courses, conferences, newspaper and magazine articles, and by publication of scientific reports and newsletters.

Location of information sources is also simplified by the existence of CACRS, but to a lesser degree. Canadian sources are well identified, but the preponderance of information in this field is being generated in the U.S., and identification and liason can be very time consuming. Information is gathered through the conference activities of the research staff, assiduous collection of newsletters and such materials, and the use of whatever indexes and directories are available. Over the past two years there has been a notable improvement in the indexing of remote sensing in publications such as STAR and Aerospace Abstracts.

CONCLUSION

In this paper I have presented one view of the role of an information centre in a national network and briefly discussed some of the problems, both in development and operation. I have attempted to show that an information centre serves as a convenient network node because of its well defined subject area, its familiarity with organizational and individual information sources within its own network, and its orientation toward on-line timesharing users.

It is clear that there is a strong current flowing in the field of information handling which is drawing us inexorably into ever larger coordinated networks, and we should be making plans now for a smooth voyage toward this goal - plans for increasing levels of mechanization, increasing numbers of cooperative projects, and increased sharing of resources and services.

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