

SCIENTIFIC AND TECHNICAL INFORMATION
A STUDY OF THE PRESENT AND FUTURE NEEDS
OF CANADIAN INDUSTRY

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SCIENTIFIC AND TECHNICAL INFORMATION
A STUDY OF THE PRESENT AND FUTURE NEEDS
OF CANADIAN INDUSTRY

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DECEMBER, 1977 report no. / rapport n°. 124

prepared for / préparé pour **Ministry of State for Science & Technology**
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FOREWORD

FOREWORD

The study on which this discussion paper is based was conducted by Mr. J.E. McLaughlin, on behalf of the Ministry of State for Science and Technology (MOSST).

This paper corresponds with the report delivered by Mr. McLaughlin in December 1977, with the following exceptions:

- (i) Recommendations which were made specifically to MOSST by the author and which dealt with possible courses of action by those Departments and Agencies most concerned with the subject, have been omitted from the present report so as not to detract from its essentially descriptive rather than prescriptive nature.
- (ii) A few changes of an editorial nature have been made to improve readability, but in no case to change the tone or tenor of the author's remarks.

Therefore, the opinions to be found in this paper are those of the author and his consultants, and while not specifically endorsed by MOSST are offered for further discussion and consideration at this time.

Mr. McLaughlin has clearly made a valuable contribution by marshalling a wide spectrum of opinion in a very readable manner. Because the study illuminates some attitudes and expectations of external users of government STI services, it deserves attention in the further development of such services. This is why the discussion paper is being made available to a selected readership. This paper is not yet in final form, and therefore should not be further reproduced or distributed.

January 16th, 1978

INTRODUCTION

If we do not deal with the need for an STI policy, we will find ourselves in real trouble 10 years down the line. (Direct User)

This is a report on a one-year study of the state of Scientific and Technical Information (STI) in this country - in terms of its scope, availability and usefulness for the long-term economic benefit of Canada.

The study involved:

1. Personal interviews by me with information specialists from several countries.

2. Questionnaires addressed to senior personnel in about 4,000 Canadian private-sector companies. (This was carried out under contract by Market Facts of Canada Limited, a market research company based in Toronto.)

3. Direct-contact workshops, held in various Canadian cities, with about 115 executives from business and industry participating.

I tried hard to avoid the trap of jargon, not only in this report itself, but in the survey questionnaires and workshop discussions that contributed to it. In the past, jargon restricted discussion and involvement in STI matters to the specialist groups, who in talking only to each other frequently

did not get through even to themselves. The voice of the STI user has not been clearly heard.

The author has provided separately to MOSST some personal recommendations arising out of his report. Since they are addressed to MOSST and not to the community at large these recommendations have been omitted from the report as circulated.

This present document is in two parts:

First, an expanded executive summary which contains: the author's conclusions; a summary of the findings from the surveys, as carried out by Market Facts; and a distillation of the opinions of workshop participants as recorded by the project team.

Second, source data: copies of the questionnaires; the report from Market Facts; further analysis of survey data done by MOSST; and the edited workshop proceedings, which were reviewed to ensure the anonymity of participants. We tape-recorded the workshops, audited the tapes to ensure that rapporteurs' notes were accurate and that nothing was missed; then the tapes were erased. This second section of the report also explains the survey methodology and workshop organization.

CONCLUSIONS

CONCLUSIONS FROM:

"Scientific and Technical Information" (STI);
A Study of the Present and Future Needs of Canadian Industry.

The author's leading conclusions are (a) that the STI needs of Canadian industry are not now adequately met, particularly from government's own STI "products," and (b) that unless better organization and management of federally-funded STI, to reduce duplication and randomness and to lay the ground work for more private-sector involvement, are implemented, the future will not be significantly different.

Another conclusion of the report is that STI should be considered in a broader context. It should embrace both "hard" and "soft" science and include management-type information such as economics and statistics.

A third conclusion of the report is that a co-ordinating mechanism within the departments and agencies of the federal government for scientific and technical information activities is essential.

DISCUSSION

DISCUSSION

THE PROBLEM OF DEFINITION

*STI is the base from which
to create something new.
It is the something new that
is really important. (Direct User)*

No one really seems to agree on what Scientific and Technical Information is - what elements of knowledge the term should embrace, and what costs it should include. The search for a truly satisfactory definition continues in this country, and probably everywhere else for that matter.

Early on in this project, Canada's science counselors were asked to ascertain, from the appropriate authorities, how nine other countries "officially" defined STI. Their reports showed that STI viewpoints fall into two broad categories:

1. Most countries define STI to include only scientific, technical and engineering information, and not the humanities, arts, politics or law.

2. The minority include in the definition all natural and social-science disciplines, all technologies and all applied areas of social-sciences (for example, education-planning and industrial-management information).

Officialdom aside, however, what do the users think? An important goal of this study was to determine how the major user group in Canada - business and industry - defined through

practice what STI is, what it means, and how it is used.

It may come as a surprise to some, but we found that the majority of STI users in business and industry in Canada place themselves in the second category.

Two kinds of people use STI in business and industry: (a) those described as indirect users (the line managers); and (b) direct users (the scientists and technicians). The two groups differ in terms of what each needs from any STI system, and in the priorities each places on particular knowledge elements in a system. But, as the reader will discover, these differences are not irreconcilable nor are they significant enough to require separate STI systems to meet the collective need.

The information itself is always secondary to the people that use it. Those that do something with it create a new product, a new service or do something more efficiently. (Direct User)

THE SUGGESTED DEFINITION

Given those findings, the term Scientific and Technical Information as used in this study refers to a definition of STI covering these fields:

1. Physical sciences (chemistry, physics, astronomy);
2. Mathematics (and statistics);

3. Computer sciences and engineering;
4. Environmental sciences (geological, atmospheric);
5. Engineering (chemical, civil, aeronautical, electrical, etc.);
6. Life sciences (biology, chemical, medicine);
7. Psychology (biology, social);
8. Social sciences (anthropology, linguistics, economics, history, law, political science).

And that DEFINITION is:

STI is the recorded end product (books, documents, films, tapes, etc.) of research and development in all these disciplines. STI systems are the channels that link STI users to the end product.

SOME IMPLICATIONS

There are significant implications associated with this definition. Among them: the need to take account of Statistics Canada's activities in gathering and disseminating information; and needs for co-ordination of STI programs in federal departments and agencies generally - for example, those that have evolved in support of departmental missions in Canada Agriculture, AECL, the Geological Survey, and elsewhere.

The problem we've had is that it is very much "pot-luck" with whom one finally ends up in contact with in Ottawa. (Direct User)

SOME BENEFITS

We need such a clearly understood, broadly based definition of STI before we can cheaply and efficiently coordinate the STI activities of federal departments and agencies - important work, but fragmented and often duplicative.

First, the definition would encourage the development of multi-disciplinary information systems of a kind that would make STI available in a useful form to the non-technical user, the policy-maker in business and government. The need is urgent. Canada must be able to use every available tool to improve its economic vitality.

*The very valuable component
of STI is the "how-to-do-it."
Any system which evolves must
emphasize it. It is crucially
lacking. (Direct User)*

This definition also broadens the traditional viewpoint by stating the increasingly obvious: that data from the "hard" and "soft" sciences (say, chemistry and sociology) are mutually compatible; that they are applications-oriented, not disciplines-oriented, that they can be treated in the same ways, and that both are necessary in a truly user-oriented system. This interdependency has been overlooked or avoided in the past. And we have continued to focus on narrow and specialized STI systems, basing our rationale on problems

that existed long before the advent of modern information technology. Today, it is no longer necessary or useful for each field (that is, hard or soft science) to have its own special machinery. The old perspective makes for duplication, waste and ineffectiveness, and it shrouds needed information from potential users.

WHO USES STI - AND HOW

We should emphasize the distinction between science and technology. Scientific knowledge tends to move around by itself. The know-how element must be encouraged. (Direct User)

We can more clearly understand STI and its links to the industrial process by thinking about it simply as a resource or commodity. Science and technology, both inseparable from any discussion of STI, do differ, though, in that technological information converts more readily into industrial power than pure scientific information.

A recognition of this difference underlies the approach and philosophy of the National Technical Information Service (NTIS) operated by the Department of Commerce in the U.S., and it probably explains the unanimous approval that participants in this study's workshops gave to the NTIS.

I admire the U.S. NTIS system - we use it extensively. It could be a model for Canadian practice in actively gathering and disseminating government sponsored R&D material. (Direct User)

Industry needs STI for three major purposes:

- To stay informed on a regular basis in a particular field.
- To become fully informed on a specific point.
- And to acquire some grasp of an unknown or unfamiliar field.

Some very sophisticated studies have been done on user needs for STI, but, as far as we have been able to discover, none has ever attempted to measure the needs of both direct users (scientists and technicians) and indirect users (line executives). In this sense this study provides some unique information.

If I go to Washington for data, I can get it faster and better and that's because their whole policy is to assist business. (Indirect User)

The trade analysis section of industry, Trade and Commerce are the most effective government information disseminators. (Indirect User)

Within organizations, the indirect-user executive typically needs information that is broad and probably oriented to economics and statistics, even when the problem is technological (for example, the decision to substitute one material

or process for another). The indirect-user executives delegate "pure" STI responsibilities to direct users, and executives normally do not apply formal cost-benefit analyses to scientific and technical information. But it seems they do tend to allocate resources to STI on a performance basis. That is, the better the direct users acquire a reasonably consistent flow of commercially relevant information (as measured against the number of "turkeys" hatched), the better will be their budgets, staff and manoeuvring room.

STI is an emerging asset in this country, we are starting to pay more attention to it. Maybe we should show and think about STI costs as an asset rather than an expense. Maybe we need a change in our attitudes. (Indirect User)

In general (although not in all cases), this kind of approach produces a relatively short-term view - among both direct and indirect users - that information is a problem-related cost, and not an asset to be worked, developed and exploited over the long-term.

Our tendency is to look to other countries for R&D and STI. It's self-defeating. (Direct User)

Technological and industrial development are not inevitable. Unless a society has the expertise to modify the technology it imports, and thus create not only what it needs

but also what it can export, it will be locked into a technology-dependent role and will not evolve. An industrially oriented STI system is part of technological evolution.

*The U.S. or Japan or the EEC
are not going to worry about
the STI problems of the North.* (Indirect User)

STI is now of interest and will become more important to other than the scientist and technologist. Multi-disciplinary systems will form an integral part of the policy-makers' resource base in both the public and private sectors. It will have particular significance in industrial and economic planning.

OTHER IMPORTANT THINGS PARTICIPANTS WANTED TO TALK ABOUT

*We've learned nothing in 150
years. There must be a better
way to spend our money than by
building transportation systems
to ship raw materials out of
the country.* (Indirect User)

This project studied the STI needs of business and industry in a country that characterizes itself as underdeveloped in R&D (to which STI is a hand-maiden) and at a time when Canadian industry, particularly secondary manufacturing, is experiencing deep-seated problems. The problems are fundamental. They deal with Canada's ability to innovate, to compete in world markets, to survive and prosper as an industrial nation.

The thrust of government policy should be to develop STI in support of the "next step" activities, coal to coke, oil to petrochemicals, etc. (Direct User)

The responses of participants reflect their urgent concerns about the problems. The structured survey questionnaires allowed for open-ended comments, and these communicated the mood. Workshop discussions that focussed on specific STI topics were influenced by these concerns, and they also dominated coffee-break conversations.

Attitude of government staff needs changing. I have the feeling when I leave a meeting or a call in Ottawa it will be filed and forgotten. (Indirect User)

Readers of this report, however, should be aware of the framework in which study participants made their views known on such issues as perceived government regulation and interference in private enterprise, excessive reporting burdens, high taxes, non-competitive wage rates, and the absence of a coherent industrial policy.

It's important to incorporate a review or sunset concept on all government information-gathering programs. (Indirect User)

We've frequently had requests from more than one agency for the same precise information. Where does it all end up? (Indirect User)

It is not within the scope or mandate of this report to dwell on such issues. However, they should be noted, in part because they formed a consistent background.

Those who participated in the three phases of the project, completing two questionnaires and participating in a three-hour work group, spent a lot of time and gave the questions a great deal of thought. Looking across the seminar rooms, I was frequently struck by the dollar cost to the firms represented. Participants also were aware of this, but they felt that to be invited to discuss and influence government's policy formulation before the fact was an opportunity not to be dismissed.

*We've had enough analysis.
We're analyzed to death; we
need to make something happen.* (Indirect User)

*We have been looking at STI
in Canada as a sub-critical
resource - federally and
provincially. Because of
this, each agency involved
is struggling for its own
survival and they don't work
together. They're more con-
cerned with defending bound-
aries. The effective appli-
cation of these resources would
be insured if somehow we could
put them together. We need
"critical mass."* (Direct User)

Workshop participants were optimistic that Canada can solve its industrial problems, and that a coherent STI

policy, as part of an industrial strategy, could be an important element in achieving the goal.

WHAT MOTIVATED THE REPORT

This report was undertaken for the Ministry of State for Science and Technology, in response to concerns of several kinds:

1. Expenditures on scientific information constitute a significant fraction of the total federal expenditures on science. Sums earmarked by federal departments and agencies in 1977/78 amount to some \$100 million out of a total of \$1.664 billion budgeted for scientific activities of all kinds. For the most part, the identified information scientific expenditures are elements of larger and broader departmental programs, contributing to such things as support of research, training of highly qualified manpower, to regulatory functions (e.g., in environmental quality) and resource management or conservation.

2. STI-related studies (TYAS, KATZ, the OECD and the Lamontagne reports) called for policy leadership by the federal government to maximize Canadian benefit. This is not happening.

3. Canada can improve the degree of co-ordination in international, intergovernmental and interdepartmental STI arenas.

4. There is inadequate knowledge in both government and the private-sector of the needs and roles of the private-sector in STI.

5. There is no effective federal focus.

WHAT THE REPORT IS TRYING TO ACCOMPLISH

The thrust of government policy should be to develop STI in support of the "next step" activities, coal to coke, oil to petrochemicals, etc. (Direct User)

The main thrust of this report concerns the current and future STI needs of industry and business, the role of government and the private-sector in meeting those needs, and the ways by which government can more effectively serve the STI needs of industry from its unique resources.

I defend a central information agency if only because, without one, industry will not have systematized information available within Canada, or any international clout. I would rather the private-sector had control: It would probably be better run and less costly, but why would it want to be involved without the profit motive? (Indirect User)

This report is not aimed at creating new institutions. Rather, it is directed at obtaining a more effective, results-oriented, management of what exists now and will be produced

in the future in the way of data, systems and institutions. It is also aimed at encouraging the use of STI in Canadian industry. In looking at the results of the surveys and the workshops a particular attempt has been made to consider in the conclusions those who have the greatest need for, and the most difficulty in obtaining, STI; the entrepreneur, the successful technological innovator. The author's preference is to minimize government involvement in the dissemination of STI, and encourage the private-sector to become more involved in that dissemination, as well as in the determination of content and presentation of STI for industry needs.

Canada must realize that in areas such as international information exchange, we are dealing with universal principles, emerging and present. We must be prepared to make an investment ourselves. And we can only do this through a unified system. (Indirect User)

Such involvement seems warranted if we agree that Canada's private-sector must apply the best available science and technology to stay competitive. True, such involvement might tend to blur further the already blurred distinction between public and private-sector roles (a major concern of seminar participants), but it does help to moderate the fear that central control of information will affect corporate

and personal privacy and freedom. Public and private-sector teamwork, therefore, is a key element of a strong STI capability in Canada.

THE FEDERAL GOVERNMENT'S STI ROLE

More and more, the only way to get current STI from government is to go to Ottawa, develop the personal contacts. I am not always pleased with the results, but it is the only way to do it.

STI responsibilities in Canada over the past fifty years have been largely delegated to the National Research Council (NRC), which by bringing its National Science Library (NSL) and Technical Information System (TIS) together in 1974, formed the Canada Institute for Scientific and Technical Information (CISTI). This step was taken to better implement 1969 Cabinet Decision, which came in response to the Science Council studies of TYAS and of KATZ. NRC was instructed to develop a national STI system, under the general direction of the National Librarian. This national system was to be user-oriented, quickly responsive to specific requests (in either official language), and built on existing resources and systems. A separate vote of Parliament was later established to support the NRC's STI Program. NRC was also authorised to establish an advisory board responsible for developing policies

for STI services; this was the Advisory Board for Scientific and Technical Information (ABSTI), which first met in 1960.

CISTI has considered itself a focal point in the development of a network of scientific and technical information Services. It has carried out a limited publications program, created computerized access tools such as the CAN/SDI alerting system, and bibliographic tools such as the Union list of Scientific and Technical Serials, developed and operated other information delivery and services such as TIS, carried out research, planning and network development activities and operated a pilot referral service in Toronto. As a result, many of the STI problems Canada faced in 1969 have been examined and some have been solved.

We are free-loading on American expertise in handling information, making it useful. And we are vulnerable. (Direct User)

But many problems still remain unsolved, and there are new ones to be addressed. By and large, the industrial STI user in Canada is not fully aware of the services offered by CISTI. Or the user prefers, particularly for on-line services, to use commercial American systems which are more complete, easily accessible and supported by efficient service and marketing resources. Some also feel that CISTI's presence in the small Canadian market as a disseminator of

information has discouraged the investment of capital by the private-sector in the development of on-line and other systems for Canada.

The discipline of the profit motive has to be part of any STI investment in Canada. (Indirect User)

Equally important, information sources are in flux. Printed scientific and technical information continues to increase, and non-print STI from satellites and other electronic sources is increasingly available. Within government, STI activities appear to be emerging in departments and agencies without overall co-ordination or planning.

SOME PROBLEMS ABOUT MAKING STI AVAILABLE

CISTI is in a peculiar position. Its responsibilities are many and range over the delivery and transfer of documentary STI, the operation of the Technical Information Services of NRC, information systems design and development in support of their program and associated research, planning and network development, and the bibliographic processing of scientific and technical literature in the CISTI Collection.

Like other information-based organizations, CISTI is under cost pressures that reflect the difficulty of financing its more traditional library functions, acquisitions,

processing, etc. at higher and higher levels of cost and volume.

It comes as a surprise to me that our oceanographer has to consult libraries belonging to the U.S. government to tell us what the bottom is like off Sable Island. (Indirect User)

There is, despite this, some support for the notion that CISTI has attained a level of excellence recognized here and abroad, in its bibliographic role. Its collection of scientific and technical literature, exceeding one million volumes, and the uniqueness of a large number of serial publications not held by any other library in Canada, attest to its efforts. But at what cost?

Perhaps because of bibliographic responsibilities and other and different demands on its staff and resources, CISTI seems to have failed in its role of national disseminator of STI. Certainly it has not achieved high levels of use or recognition from industrial users in Canada.

Government and private-sector have to work hand in hand on STI development and use. (Indirect User)

There may be other reasons for this failure, apart from the many and varied demands placed on CISTI. One is the somewhat sterile atmosphere in which policy decisions have

made. Industry and business appear to have been under-represented on the Advisory Board for Scientific and Technical Information (ABSTI).

Sales income potential for on-line or traditional clearing-house information systems in Canada is relatively small. The investment required is very high. By attempting to serve a commercial market (at less than real costs) with both on-line (CAN/OLE) and referral services (the ASK Pilot Project), ABSTI's decisions have confused the private-sector. The already limited Canadian market was further fragmented, and government itself became a less accessible market for private-sector systems. Had the business sector been allowed equal voice in ABSTI's deliberations, made aware of CISTI's initiatives, and considered as possible contractors (in the make-or-buy context), it might well have developed systems and expertise in greater numbers and depth than it has to date in Canada.

CISTI calls upon other than its library resources for its dissemination mission (the expertise within the NRC laboratories is a resource to which it has access). And, apart from on-line systems, CISTI directs an important and under-utilized STI transfer mechanism, its Technical Information Services (TIS).

I have found that the easiest way to find out what the NRC has as work in progress is to go to U.S. sources. (Direct User)

Seen in functional terms, the question is whether CISTI as part of a Crown corporation, and given its mission, (national dissemination of STI), should be expected to support both a traditional library facility and dissemination systems? Indeed, are these appropriate tasks for the NRC at all?

To manage two such different functions (library and dissemination), expecting both to achieve their objectives, is very difficult at best. Recognizing the essentially "passive" role of a true library, and the necessarily dynamic and flexible activities of an information system (itself caught in rapidly changing technologies and user needs), the task of managing both is well nigh impossible. Objectives are seldom synonomous and are often in conflict.

A SUGGESTION

A possible way out of this difficulty is to examine a reorientation of CISTI to emphasize private-sector participation and give more effect to its active STI dissemination function. Consideration could be given to splitting off the library functions to another authority, such as the National Library. NRC would continue to need library facilities,

as does AECL or Polysar, but its holdings would emphasize and support the R&D, testing and other activities undertaken by NRC scientists in the laboratories. Such arrangements would permit CISTI to:

1. Concentrate its resources on meeting the needs of STI users in industry, at the same time actively canvassing for disseminable results of tax-funded R&D from other government departments and agencies.

We need something like NFIS where we could wrench information out of government departments in Canada. (Direct User)

2. Act as a central acquisitions and clearing-house for international STI.

3. Become a co-ordinating mechanism for standards and systems in government STI programs.

4. Become the change agent for the development and introduction of information technology and systems in Canada.

5. Initiate, support, identify and develop indigenous Canadian STI programs.

6. Actively seek out private-sector contractors to disseminate government-funded STI "packages and products", to develop an open competitive marketplace, and develop a plurality of sources for the STI user.

It is a time problem. I really am concerned that when the "freeze in the dark" begins to accelerate toward us, which it undoubtedly is, under pressure of time we may do things we will learn to regret. (Direct User commenting on the lack of fundamental STI in the Canadian North.)

A PARTNERSHIP WITH THE PRIVATE-SECTOR

All of these activities could be undertaken in active partnership with the private-sector, and it could take many forms. One possibility is to create a consortium. In this model, it would seem appropriate, since the output would be most useful to industry, to structure the financial and management responsibilities on a 60/40, private/public basis.

Government involvement in co-operative STI ventures with the private-sector would be much more fruitful, particularly if government were in a minority position with the whole thing, subject to the test of the market. (Indirect User)

By assuming financial and management control, the private-sector can ensure that its industrial STI needs are met. Government's involvement ensures that its own needs for STI, and its responsibilities to wider publics can also be met.

SOME ADDITIONAL CONSIDERATIONS

Clearly there are longer-range questions to be considered. The private-sector must play a major role in Canada's information systems, consistent with the principles of a democratic society. This is especially true in the age of electronic systems, which can be easily manipulated and controlled.

A central information access source, coupled with the lever of freedom of information is needed in Canada. (Indirect User)

It's important to incorporate a review or sunset concept in all government information programs. (Indirect User)

Unless we create a mechanism to encourage private-sector involvement now, the risk will be there. Few private-sector motivators for investment and involvement are present at the moment. Even assuming "normal" growth of markets for information, and diminishing costs of hardware and associated elements, it will probably take ten years at best for Canada to reach "critical mass," that point at which significant business investment in STI systems becomes attractive.

We need a bridging mechanism over a ten - or fifteen - year period, which would involve both government and the private-sector in:

- Producing the STI products industry needs;
- Seeding a private-sector information industry;
- Protecting the wider public;
- Maintaining a national capability in these sophisticated technologies and systems;
- Mobilizing and unifying national STI resources.

And the bridge must be built through voluntary co-operation.

Given that mechanism, we can speculate with confidence that in ten or fifteen years Canada would have a balanced and effective STI capability; an active private-sector involvement in place; an appropriate role for government; and an effective system of independent but co-ordinated parts functioning as a whole.

Everyone here would be willing to participate in a joint venture to contribute or pay a fee for service - we are willing to contribute, but we will have to be sold and we would have to control 60% at least. (Indirect User)

While not simple, and thus needing much careful planning, this model has many virtues. It could be attractive to both sectors, and it is also consistent with many suggestions for government reorganization made by Sen. Lamontagne's Special Committee on Science Policy and reiterated in Volume 4.

WHERE THE RESPONSIBILITY FOR STI SHOULD BE IN GOVERNMENT

(STI co-ordination) becomes a function for IT&C, tying it into an industrial policy framework, allowing fast tax write-offs for STI investments and tying in to other programs like DREE, PAIT, etc. (Indirect User)

Some feel that the Department of Industry, Trade and Commerce must become more involved in the management and dissemination of STI in Canada. IT&C represents the key player in government if STI is to be effectively developed for and directed to business and industry. Of all government agencies, IT&C can make best use of the STI tool to accomplish its own aims and objectives. It is best situated to understand industry's on-going needs, and in a strong position to elicit co-operation from other departments of government.

I am worried that in the STI area, if business cannot provide its inputs with equal weight, we will have decisions made around STI by the people in Ottawa - and those decisions will not produce what business needs. (Indirect User)

From the perspective of the users of both the formal and informal STI systems of government, the relationship is most often a frustrating one. Formal systems (such as CAN/OLE, CAN/SDI, the CISTI Library itself, and such on-line

services as Statistics Canada's CAN/SIM), which have required no small commitment of resources, have become progressively more elegant and sophisticated. They are by every measure, except that of percentage of users, impressive.

This lack of widespread use must not be confused with lack of need. There is something to the idea that those who design and manage most formal STI systems have committed the cardinal sin of talking only to themselves. The small number of users of such costly systems, compared to the large group that need the information the systems contain, cannot be dismissed by describing non-users as "information illiterates." It goes deeper than that.

*What STI is available from
government is unknown to me. (Direct User)*

One important task for those who manage and develop government STI systems is to break out of the established elegance and sophistication of access and language associated with on-line systems, and do the R&D work necessary to simplify and humanize them.

*Government seems to be making
an effort to serve the small
businessman, but they're not
pitching information to him
in a form or way he understands
or has time to cope with. (Indirect User)*

This would be a major step. To take it, systems professionals must learn a great deal more about the needs and expectations of both direct and indirect users.

It is the notion of "marketing" which is most important. Through an active program of contracting-out STI products to the private-sector, CISTI could ensure that various information packages appropriate to needs and understanding of a wide array of users are created. The private-sector provides the marketing catalyst to an effective STI delivery system.

THE SURVEYS

There was a critical ingredient in the recipe that produced the excellent response to this study's surveys; it was the involvement of the many trade associations and professional societies (p. 7, Market Facts Report). The executives of these organizations appreciated and supported the project; they acted quickly to accommodate the project's time frame, and went to great lengths to provide assistance. The Canadian Manufacturers Association, for example, allowed us to involve many members of its own R&D Committee in the development, through in-depth interviews, of the first Market Facts questionnaire.

The Market Facts report makes the point that the first questionnaire was designed to measure the degree to which existing information sources are used in business, and the degree to which they meet STI needs. There was another purpose, and that was to measure the differences in perception of these sources, and the frequency of their use by:

- Direct and indirect users;
- Large, medium and small firms;
- Manufacturing, service mining, construction, utility and communication firms;
- Subsidiaries of multi-national foreign firms and Canadian firms.

Further tabulations were done at MOSST by Dr. R. Wills and are tabled in the second part of this report.

Many of the data in the MOSST analysis are interesting and useful. They do throw a clearer light on who uses STI, what sources are preferred, and they support the notion that small firms are very disadvantaged,

Statistics Canada should be more palatable, more human in developing their information format. (Indirect User)

They show, for example, that, regardless of the individual's role as a direct or indirect STI user, and regardless of the size or kind of firm in which he operates, the user invariably turns most often to the easiest and most "socially convenient" information channels - experts, colleagues, seminars, conferences and suppliers.

Generally speaking, these data also reiterate that the degree to which STI is used in industry depends on several factors that reflect both the size of an organization and the maturity of its technology.

Maybe STI-intensive companies should receive very very favoured treatment to keep firms like Northern Telecom from locating in Tennessee because of lower taxes, etc. (Indirect User)

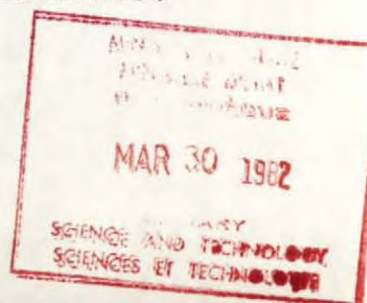
There is a relationship between the R&D activity

within an organization and the degree to which it depends on STI. The larger the firm, the more advanced its technology(ies), the more likely it is to have a formal, in-house STI system, and the more likely it is to need STI from formal and informal sources beyond its own resources. This is particularly true of innovative, high-technology industries.

Larger companies have the resources to tap government STI from the regions - air fares, etc. Small organizations are at a disadvantage. (Direct User)

The main STI problem for the small - and medium - sized, mature-technology firm is keeping up with the state-of-the-art knowledge and its rate of change.

A large organization acquires the resources to apply to its STI needs. In human terms they include scientists, engineers and librarians. But it does not stop there. It also encourages a corporate way of thinking, which emphasizes analysis and innovation. In large firms knowledge or information is more likely to be seen as an asset, to be worked, developed and exploited. This is particularly true of large firms at the high end of the technology spectrum. Within large firms there is probably little difference in this regard between Canadian and multi-national firms. There is, however, a significant difference to them in costs.



Let me make a comment as an employee of a wholly owned Canadian subsidiary of a very large multi-national. If we want STI we go to our parent. We import it and I'm not embarrassed about that. (Direct User)

Simply by plugging into its parent, a multi-national subsidiary (particularly that of an American multi-national) has access to large resources and to the efficient public/private STI infrastructure in the U.S. The process is more costly and difficult for the independent Canadian firm, particularly if it requires access to Canadian government R&D.

In Canada, users believe that the most effective way to obtain useful information from their government is to short-circuit whatever formal systems are in place. By means of personal contacts or visits to Ottawa, large firms can obtain useful information. Medium-sized firms can afford to do these things on an occasional basis. But small firms cannot do it at all. The problem is compounded, the further the user is removed from Ottawa.

Try to convince the president or chairman of the board that an information specialist is a good investment and you have got an awful job. I know, I have been trying for 20 years. I have an awful problem proving he earns his money. (Direct User)

The ability of a small or medium - sized firm to pay for STI cannot be measured simply in terms of its costs to acquire documentation of one sort or another. Much more important are the perceived real costs of executive time spent on searching for data in unfamiliar areas, analysing the content, and making the link between the problem to be solved and the information required to do it. Frequently, such activities fail because the searcher cannot state his problem precisely in information terms. Formal information systems, then, cannot respond. For many small and medium firms the alternative of hiring an information person such as a librarian to extract problem-solving information from formal systems, or a PhD, to deal with more complex data analyses, is simply not economically feasible.

What does characterize all STI users, direct or indirect, in large or small firms, is that the search for information is a by-product of the real goal - the need to solve a problem.

Those organizations that can afford to, hire information specialists and invest in in-house and external systems, from which computer print-outs, volumes of abstracts or R&D reports can be extracted and presented by the specialist. Even when such support is available, though, most users are more likely

to first ask a colleague or a supplier.

Public libraries should carry at least an index to what's available in STI from government sources. (Direct User)

The small businessman follows the same process. However, when neither the colleague or supplier have the answer, he does not have access to formal systems. Even were he inclined to use them, public libraries are of no help unless he lives in a major centre; and the technical libraries of universities are a mystery to him.

There is a rationale for a publicly funded STI service for small business. (Indirect User)

I simply use the TIS service of NRC. It has never disappointed me. (Direct User)

The Technical Information Service (TIS) of the NRC is suited to filling the information needs of this large and important community - small business in Canada. To accomplish its task more effectively, however, several things should happen:

1. The orientation of the TIS effort should become focussed on the problem-solving nature of user needs (particularly the small businessman's). TIS should see itself and be seen by the user as a technical assistance program (TAS).

You shouldn't be more than two calls away from what it is you want to know. (Direct User)

2. The proposed Technical Assistance Program (TAS) should have ready access to formal information systems. Links to on-line STI data bases should be made available to its representatives in the field. Clear and formal channels to the NRC laboratories should be established.

*Government could encourage
the exchange of STI speciali-
alists with industry. (Indirect User)*

3. The TAS service should become the federal agent for a program of transferring highly qualified manpower from R&D and STI-oriented government departments to small business, based on the executive-interchange model, to upgrade technological competence and increase the use of STI in small business.

It is in this role (that is, dealing with problem-solving situations, characterized by time pressures and lack of human resources in small business) that TAS can be most effective and efficient.

The MOSST analysis of questionnaires for use of information channels by the entire population and all of its sub-groups shows what STI channels are used most often. It is interesting that magazines, purposely broadly described in the questionnaire, and experts are the most used channels.

"Magazines" were described by respondents as ranging from journals such as Engineering News and Contract Record,

Chemical Abstracts, The New Scientist, Journal of Petroleum Technology and the CIM Bulletin, to Business Week, Fortune and Executive. The magazine format is clearly attractive to STI users. It is relatively inexpensive, reasonably specific and topical, and its content well enough organized for an item to be retrieved at a later time by an unsophisticated user.

Among its other costs, information imposes a personal cost on the user: time. Only when he is reasonably convinced that the value of information received exceeds the cost of the time he spends getting and understanding it, will he make the effort. This is particularly true of print media.

NTIS provides us with most of our STI in a practical, cost-effective way in Canada. (Direct User)

Methods of publicizing available STI are very muddled and unco-ordinated in publications or any other form. (Direct User)

It is increasingly obvious that STI systems will, in order to cope with the rapid growth of documents, journals, reports, etc., have a central node of computer-stored data bases accessible through on-line facilities. But there will continue to be a need for traditional print media.

The National Technical Information Service in the U.S. disseminates its product in several ways: on-line, microform, and documents. However, the precision and refinement of the popular magazine format of its document service

(such as the NTIS Machinery, Manufacturing, Testing and Instrumentation Technical Notes) in the form of bulletins and abstracts on new technology generated by federal funds make these documents showpieces. They are an excellent example of the adaptation of the magazine format to STI transfer.

As the central source for U.S. and foreign government sponsored R&D and other analyses, NTIS makes available STI in appropriate forms for all users. It operates as a business, meeting the cost of product and services, salaries, marketing promotion and so forth from sales income.

Agreements between NTIS and federal U.S. R&D/STI agencies, as well as with foreign sources, ensure timely and comprehensive reports to its user clientele in both the public and private-sectors.

NTIS, with special emphasis on its publications program and its patent - and technology - licensing role, is a model for Canada. It should be incorporated into CISTI's responsibilities as redefined. Such a step would serve a wide array of present and future user needs for government-funded STI, at all levels of industry in Canada.

An effective system such as NTIS - easy to get at, simple to use - is a cornerstone for technological competence. It is an important element in what has been described by the

Science Council as "technological sovereignty."

Any STI policy should reflect our strengths in key sectors and spend our money on them - mining, energy, agriculture, the North. (Direct User)

There are serious questions about whether Canada can confidently expect to continue to export unprocessed natural resources for wealth beyond the short-term. Many factors weigh against that expectation.

Most people, most entrepreneurs, who have the ideas that could form the basis for new industries 15 years from now, are lost in STI systems today. (Direct User)

Alternate sources of raw materials are emerging all over the world. We now can mine the sea bottoms, as well as the continents. Substitutions are occurring at a mind-boggling rate - synthetic sheet for paper; aluminum for copper in wiring; pocket calculators for slide rules; digital watches for analogue movements. These are all evidence of technological change as it has and will affect industries, jobs, societies.

Some readers will want to examine user preferences for STI channels in greater detail. These data are fully presented in the second part of this report. At this juncture, one should draw attention to the most-used channels.

This has been done by developing a histogram chart which was created by subtracting the "don't use" response from

the total response in our questionnaires. Therefore, the histogram is the sum of all the frequencies of use. The chart should be viewed as the most general representation.

Use levels as indicated by all respondents are not significantly different from those described in other studies.

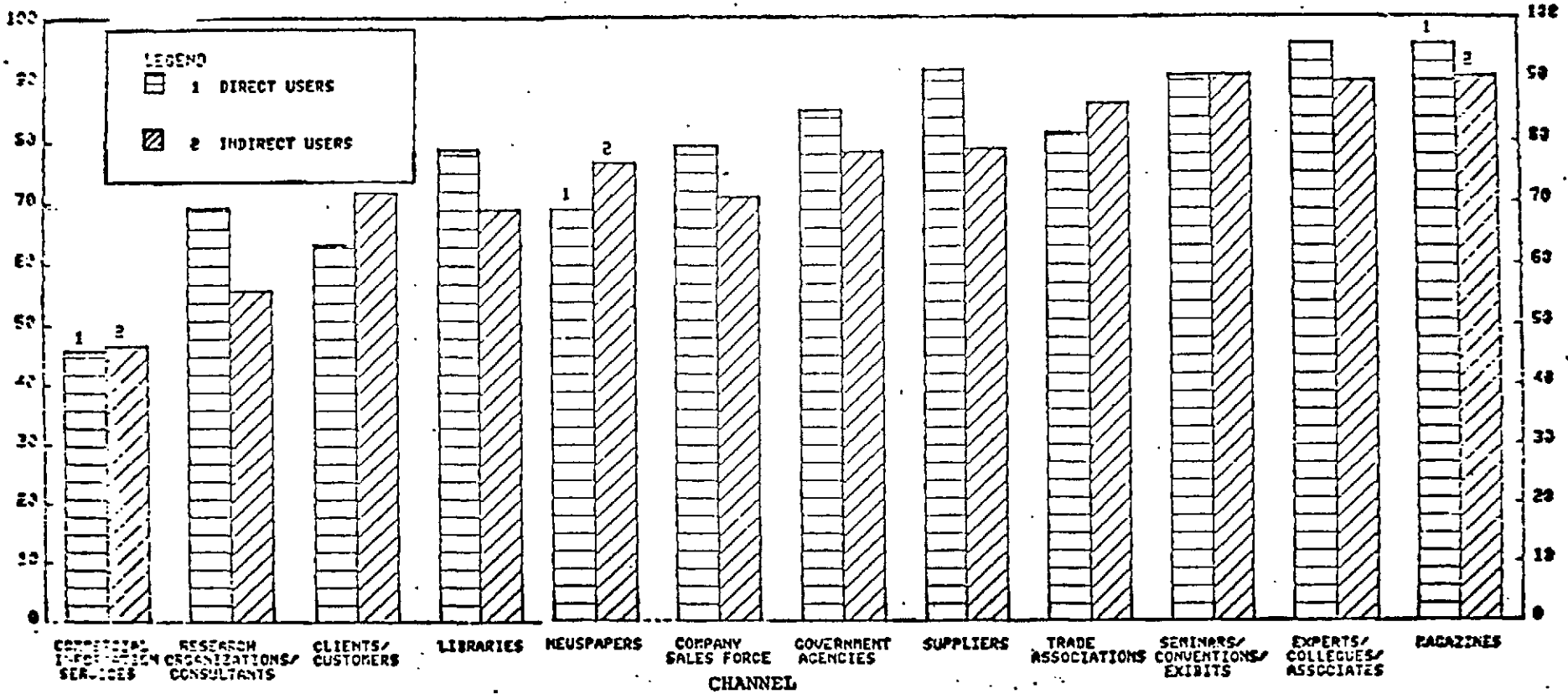
The first chart "Use of STI Sources by Direct/Indirect Users" on p. shows these patterns for both user groups. Both groups depend almost equally on experts, colleagues, associates and "magazines" for STI - direct users somewhat more heavily. Seminars, conventions and exhibits are a very important source of STI to both user groups. As one would expect, direct users lean more on suppliers than do indirect users. Indirect users, not surprisingly, place more value on trade associations, clients and customers and newspapers as STI sources. Research organizations and consultants are slightly more popular with direct users, but neither group seems to use very heavily the commercial information services that are available. The library and the sales force seem to be used at about the same levels. Government, as we have noted, doesn't come out very well at all, although it seems to have more attraction for indirect users. Perhaps they don't give up as easily.

The second chart, "User Satisfaction/Dissatisfaction

Index of STI Sources", p. is more interesting. It is far less objective in that it is the summation of the positive and negative statements (Satisfactions/Dissatisfactions) as expressed by all study respondents, for each source of STI. The calculation assumes that each factor - cost, coverage, objectivity, accessibility and so forth - has equal weight, while this is clearly not the case. The graphic display does illustrate how the user "sees" the STI sources available to him, and could represent an important perception for information specialists and organizations.

The resulting re-ranking of sources would seem to indicate that a priority for government and libraries is, at least, to position themselves above the zero base line if they wish to serve industry's needs for STI.

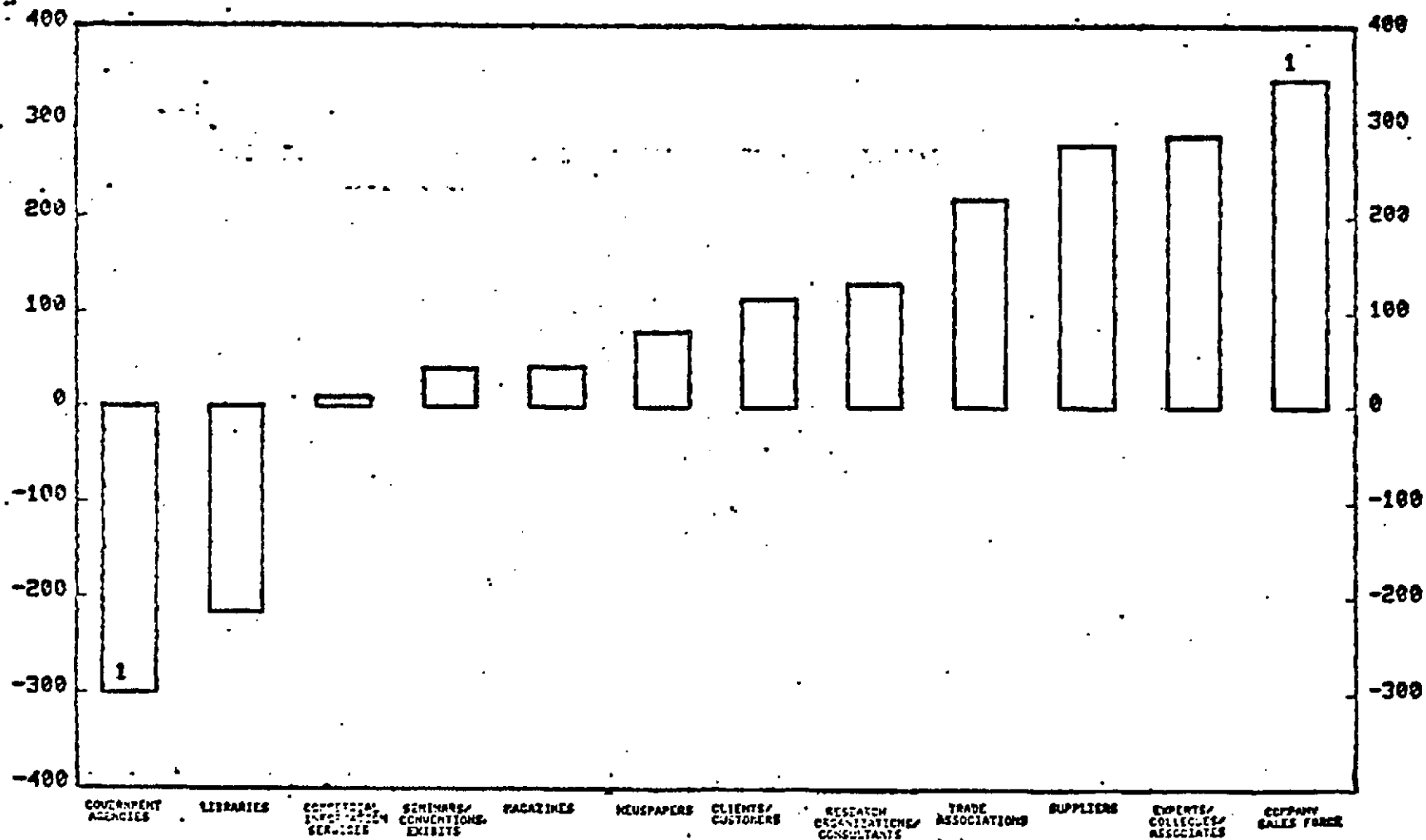
USE OF STI SOURCES BY DIRECT/INDIRECT USERS



SOURCE: NCST S.T.I. USER NEEDS SURVEY

FIGURE 4

USER : SATISFACTION/DISSATISFACTION INDEX.



ANALYSIS OF SATISFACTIONS/DISSATISFACTIONS
EXPRESSED IN FIRST QUESTIONNAIRE

An inspection of the open-ended comments under the headings Satisfactions/Dissatisfactions shows a wide range of response from "no comment" to several sentence answers. The comments were categorized into a list of 21 groups expressing positive or negative opinions on attributes such as coverage, objectivity and cost. The same list of 21 attributes was used to group comments on all 12 sources. For some sources it was necessary to add other attributes to the list to cover peculiar aspects of the source concerned. A count was made of the number of mentions under each attribute for each source.

The graphs on the following pages (graph pp. 47-51) show plots of the differences between the number of positive and negative comments for each source under each attribute. No attempt was made in these tables to measure degrees of satisfaction or dissatisfaction, but every comment was classed as either positive or negative and given equal weight. In an effort to place some quantitative meaning on this analysis, the classification was somewhat arbitrary, and each attribute must be interpreted in the context of the source to which it is applied, as is explained below. The results do, however, give some interesting support to the findings of other parts of the survey.

Coverage

Libraries, magazines and government were seen to have the best coverage. Those sources where the balance of the comments about coverage were negative are sales force and experts. Both experts and sales people were thought to be too narrow and restricted in subject scope as sources of STI. Opinion was roughly evenly split concerning the coverage of trade associations and suppliers.

Staff (quality, degree of helpfulness, etc.)

Libraries and trade associations were seen as having the "best" staff. Whilst government came out as having high-quality staff, a number of comments indicated that government personnel were seen as more knowledgeable than helpful. The quality of staff involved in giving seminars was a common dissatisfaction, and the image of newspaper reporters is also negative.

Objectivity

This is seen as a net negative feature of all sources except research organizations and libraries. The least objective sources are seen to be suppliers, company sales forces, clients and newspapers, in that order. Surprisingly, perhaps, experts and colleagues are also seen as subjective and biased. Overall there seems to be a healthy disrespect amongst our respondents for the objectivity of most sources of information.

Reliability (of the information)

Research organizations, experts, government and trade associations are seen as the most reliable. Newspapers, sales forces and clients are seen as unreliable sources. Opinion on the reliability of magazines and commercial information services was divided.

Precision/Specificity (relevance, pertinence, etc.)

Under this heading the most positive feelings were expressed about research organizations, company sales forces, trade associations, suppliers and experts. Clients, newspapers, magazines, seminars, libraries and government all received significant negative scores on this aspect.

Practicality (the concept of applicability to industrial needs)

Government and clients were the only significant negative scores. Experts, suppliers, sales force and trade associations received overall positive mentions. Research organizations received a split vote.

Cost (to the user of the source)

Not surprisingly, research organizations and commercial information suppliers were strongly negative. Seminars were also seen as very expensive. Libraries were seen as an expense mostly in terms of the time taken to get to and use them. On the positive side, none of the sources were really

seen as low-cost, although suppliers did receive a few mentions.

Ease of Access (to the source of information)

Experts and colleagues, sales force and newspapers were all found to be accessible. The only strongly negative focus was around the accessibility of government. Comments concerned the difficulty of finding the right agency or person, and complained of government "buck-passing" and "runaround."

Currency (of information)

Newspapers, sales force, magazines and seminars all scored heavily positive. Libraries and government sources were the only sources to receive a net negative score.

Response Time (for getting an answer to a question)

As with currency, government and libraries were the only sources to receive negative scores. Sales force, commercial information sources and experts all scored positively on this attribute. Opinion was split concerning magazines and research organizations.

Format

On the positive side, people like magazines as a portable personalized medium (but disliked the amount of extraneous reading). Trade associations and experts were also liked because of the two-way contact and the lack of formality. Seminars received a split vote. On balance the respondents

disliked the seminar-convention format as being too formal and rigid. Libraries also received a small negative vote, which mostly related to the lack of portability of the information (no borrowing privileges or no copying).

Confidentiality

Most comments were negative. Sales force, suppliers, clients, experts and research organizations were all seen as possible conduits for transmission of company secrets if used as an information source. The concern with government was more in relation to government's rigid adherence to rules regarding release of information that might prejudice another's confidentiality.

Continuity

This was a minor issue. Clients scored positive and trade associations negative.

Follow-Up

The only significant finding relates to the difficulty of following up on the proceedings of conferences.

Uniqueness (is source seen as the only source?)

Trade associations, government and seminars were thought to be unique sources. On the negative side, libraries were found by some to be a source which some felt they could do without.

Expresses Opinion (does source give advice as well as information?)

Seminars, experts and suppliers came out positively, whilst government came in for criticism concerning failure to express an opinion.

Intellectual Level (how the source relates to the user's level of knowledge in this field)

Libraries were seen negatively in this area, but mostly the criticism related to public libraries. Experts and colleagues were the only significant source with net positive comment. Opinion was divided on magazines and suppliers.

Organization (of information)

Libraries obtained a equal number pro and con on their organization. For each respondent who liked the system, there was another who did not know how to use it. Otherwise, seminars and government both scored negatively. With seminars the comments mostly related to their organization of time and subject, whilst comments concerning government organization refer to lack of communication between departments, etc.

Gatekeeper (ability to talk to a knowledgeable expert who could redirect to other relevant sources)

This was seen as a major positive aspect of seminars and experts (the same people?). To a lesser extent, government personnel and suppliers were also used as gatekeepers.

Other Comments

Some specific groups of comments are:

- Suppliers, clients and magazines were seen as positive sources of ideas for new product development.

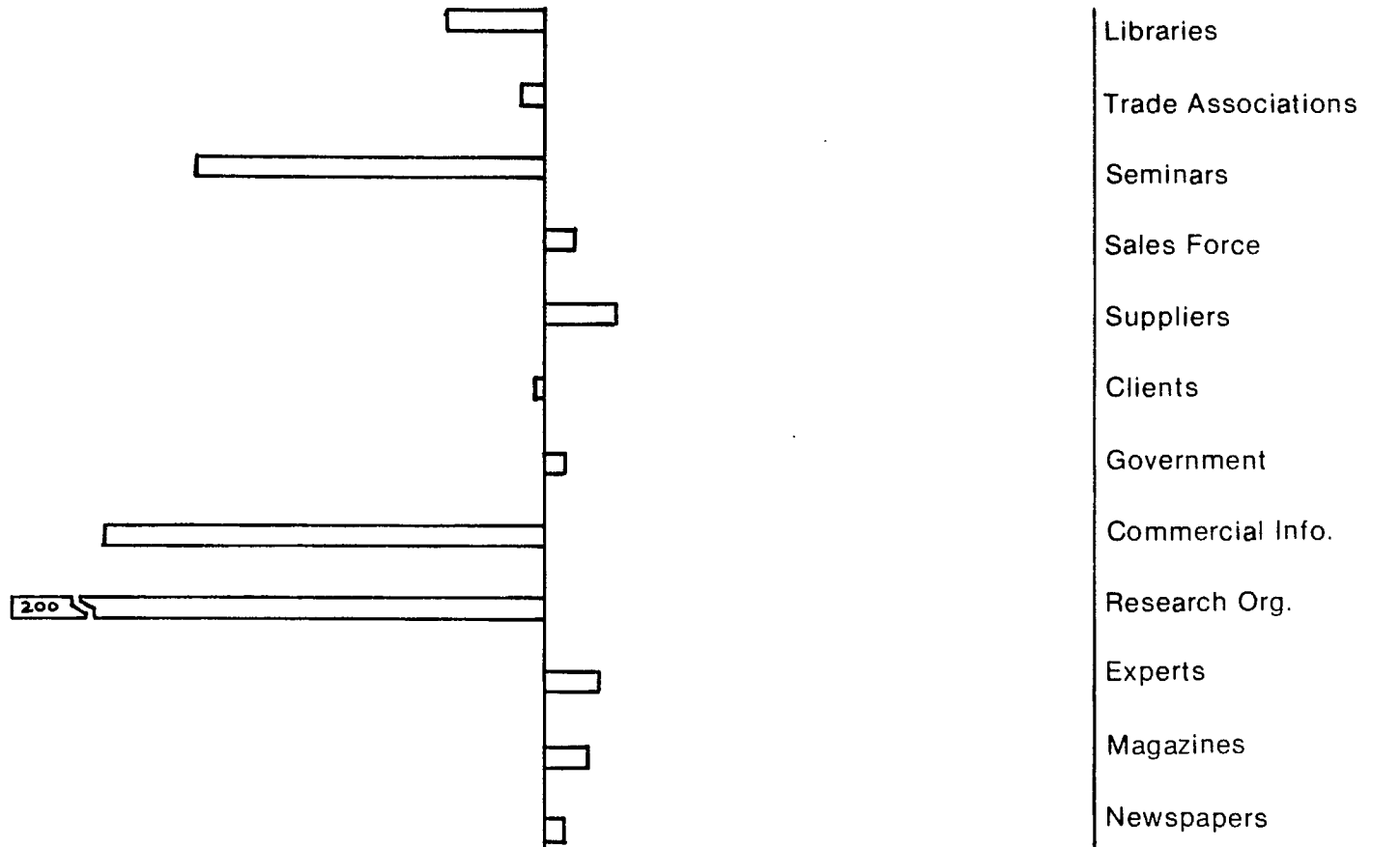
- Clients provided valuable input into quality control and planning.

- Experts and colleagues were seen as important sources because of the shared commitment to solving the problem and their willingness to give an honest opinion to a questioner's idea.

- Magazines were seen as poor on Canadian content, badly indexed, and offering too much to read. Opinion was split on the informational value of their advertising content.

- Newspapers were seen as providing leads (albeit often inaccurate) to further sources of new ideas.

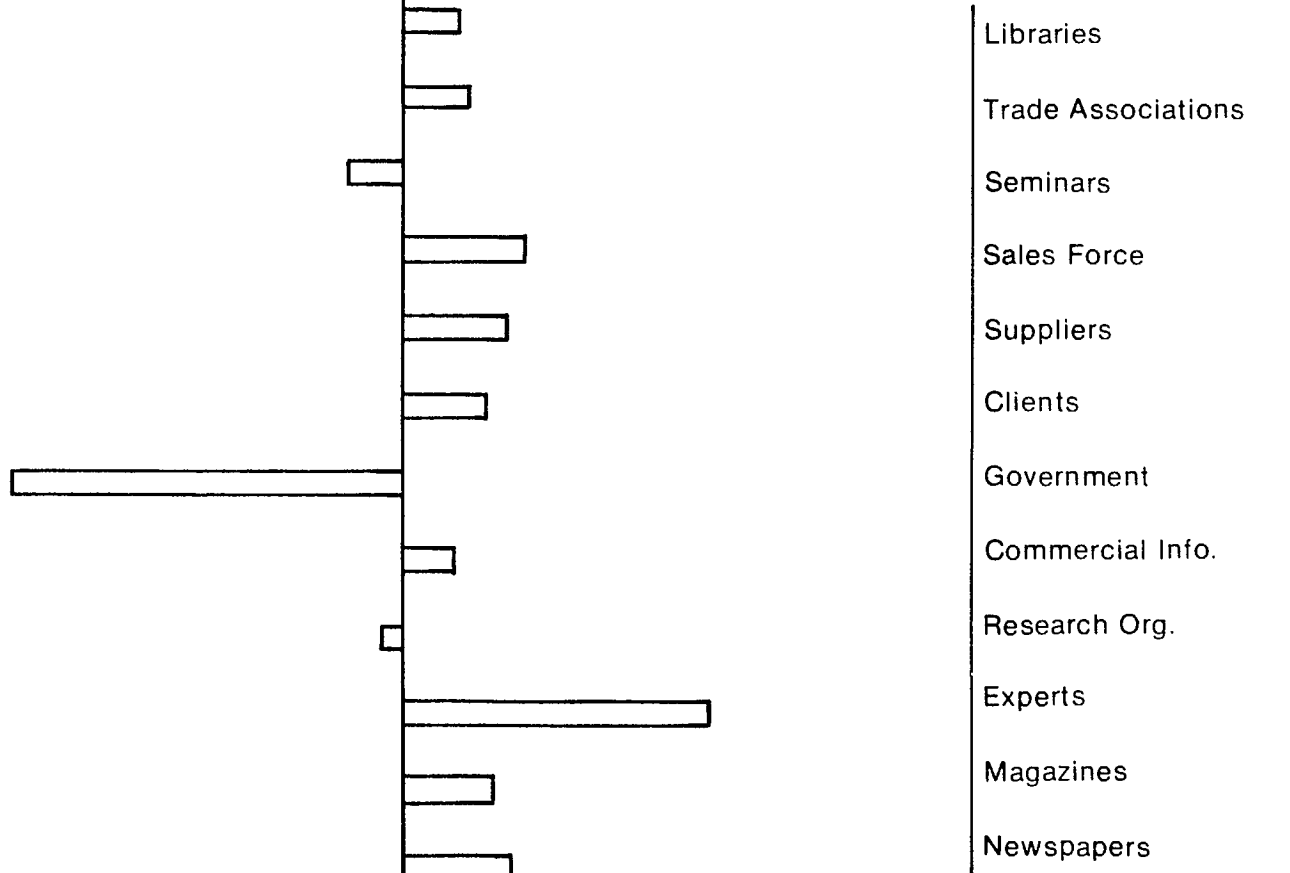


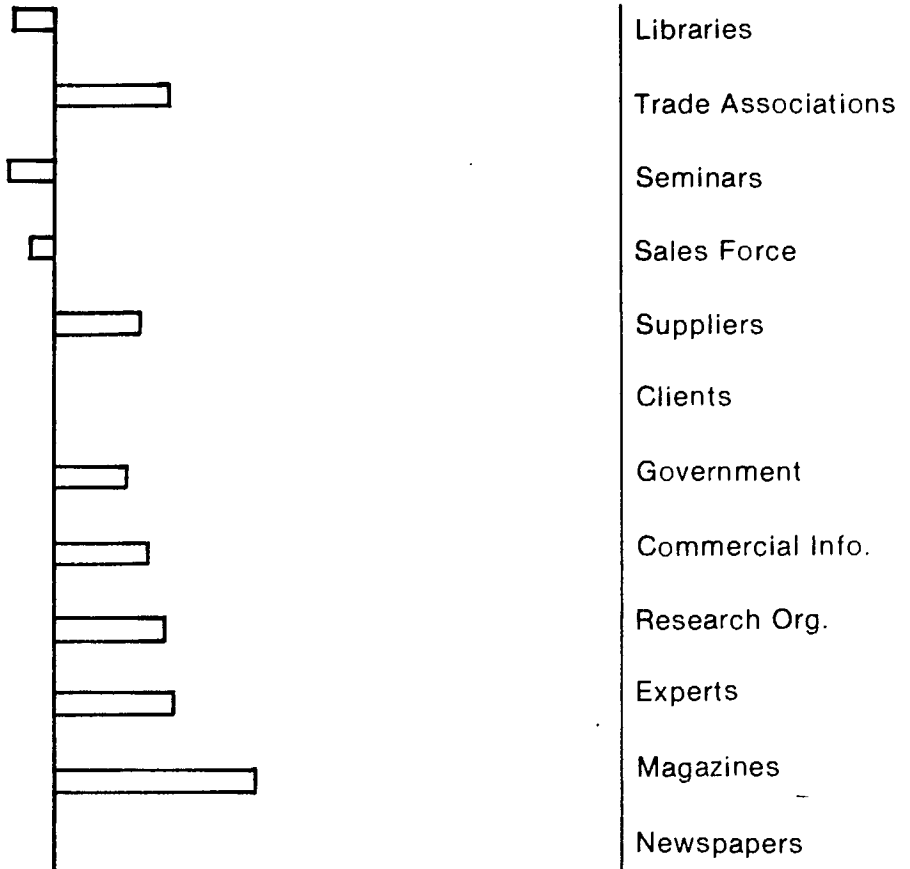


COST



ACCESSIBILITY

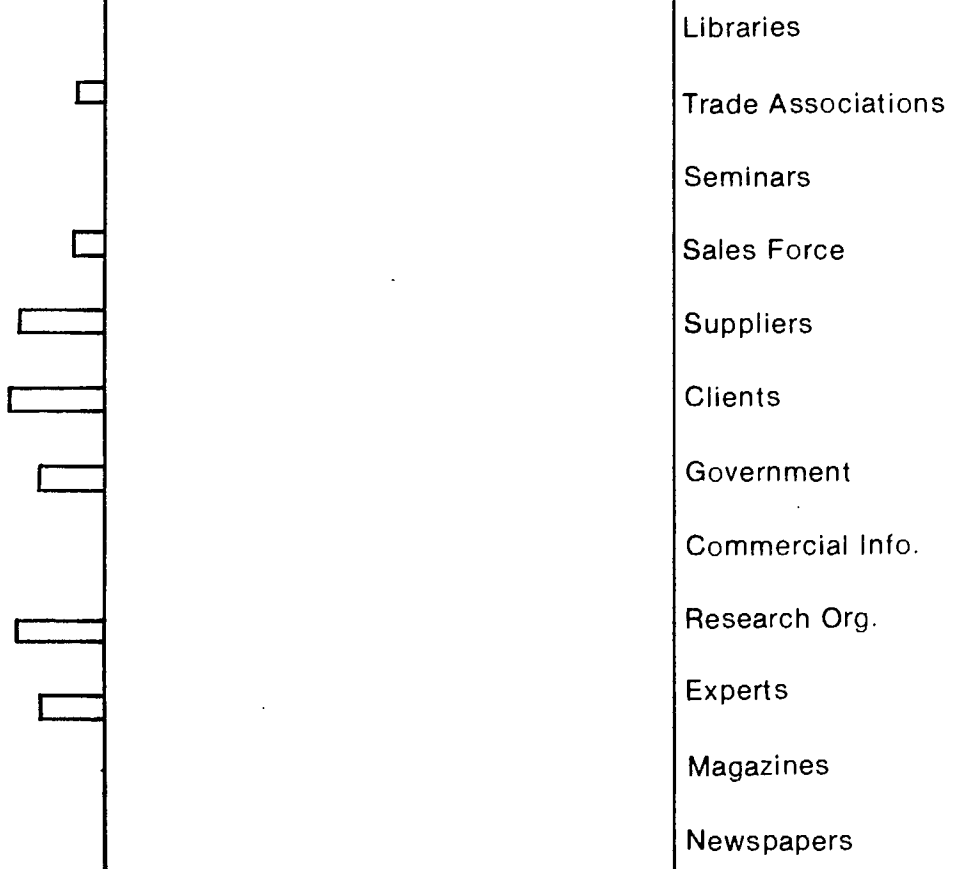




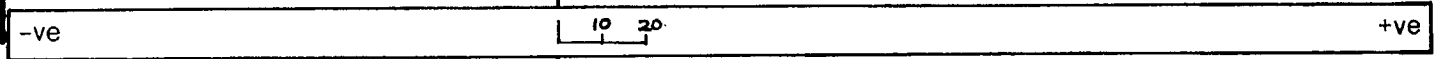
FORMAT



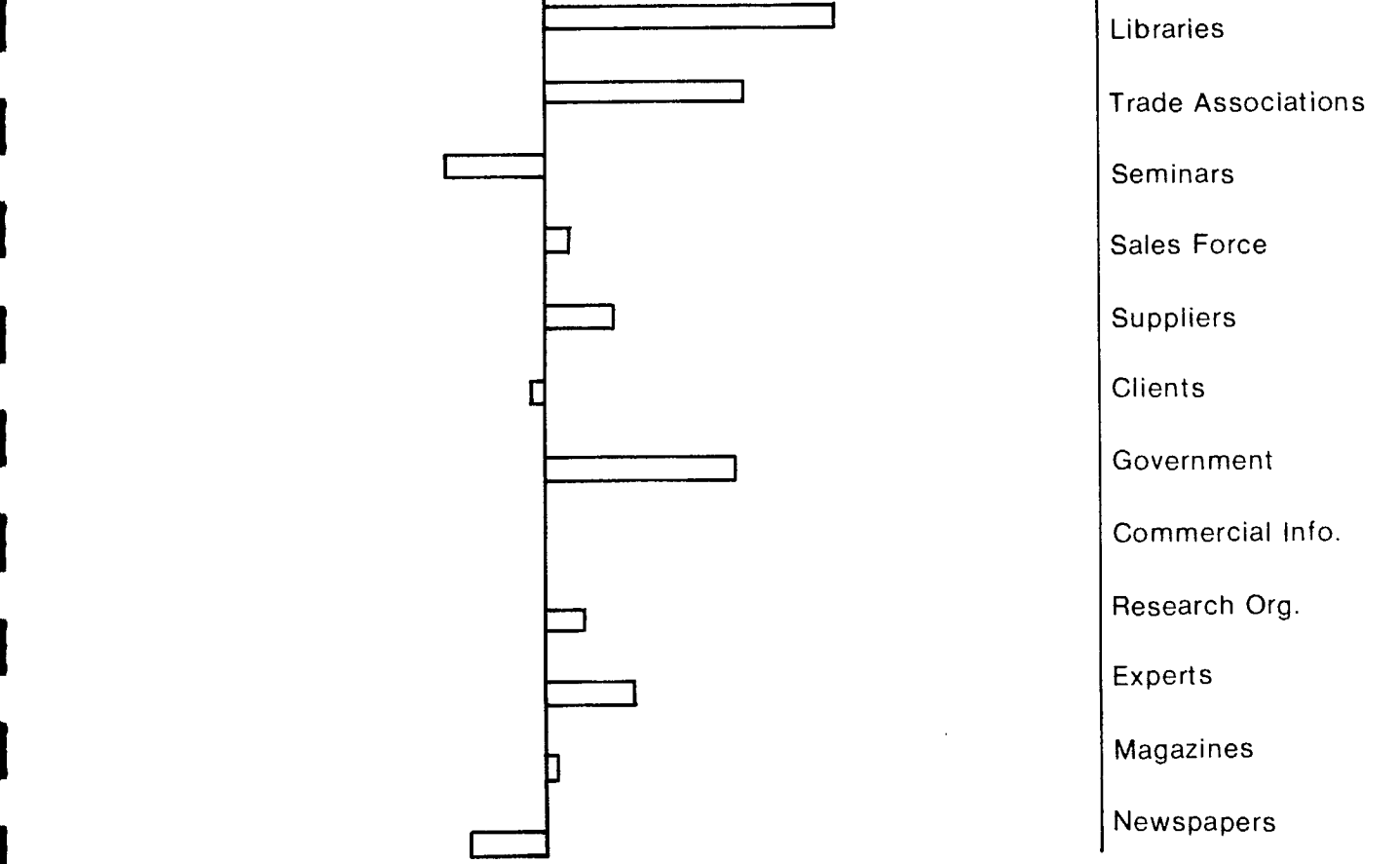
CONFIDENTIALITY PRESERVED

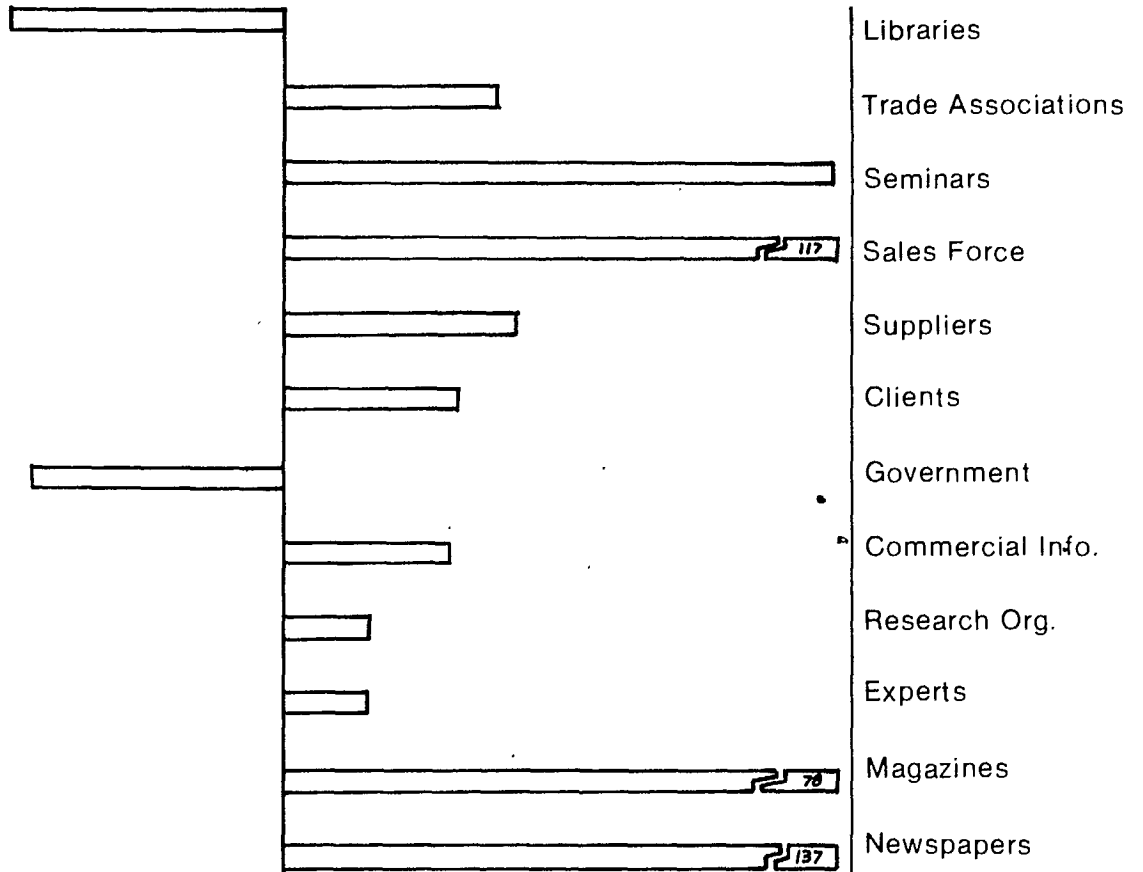


COVERAGE



STAFF

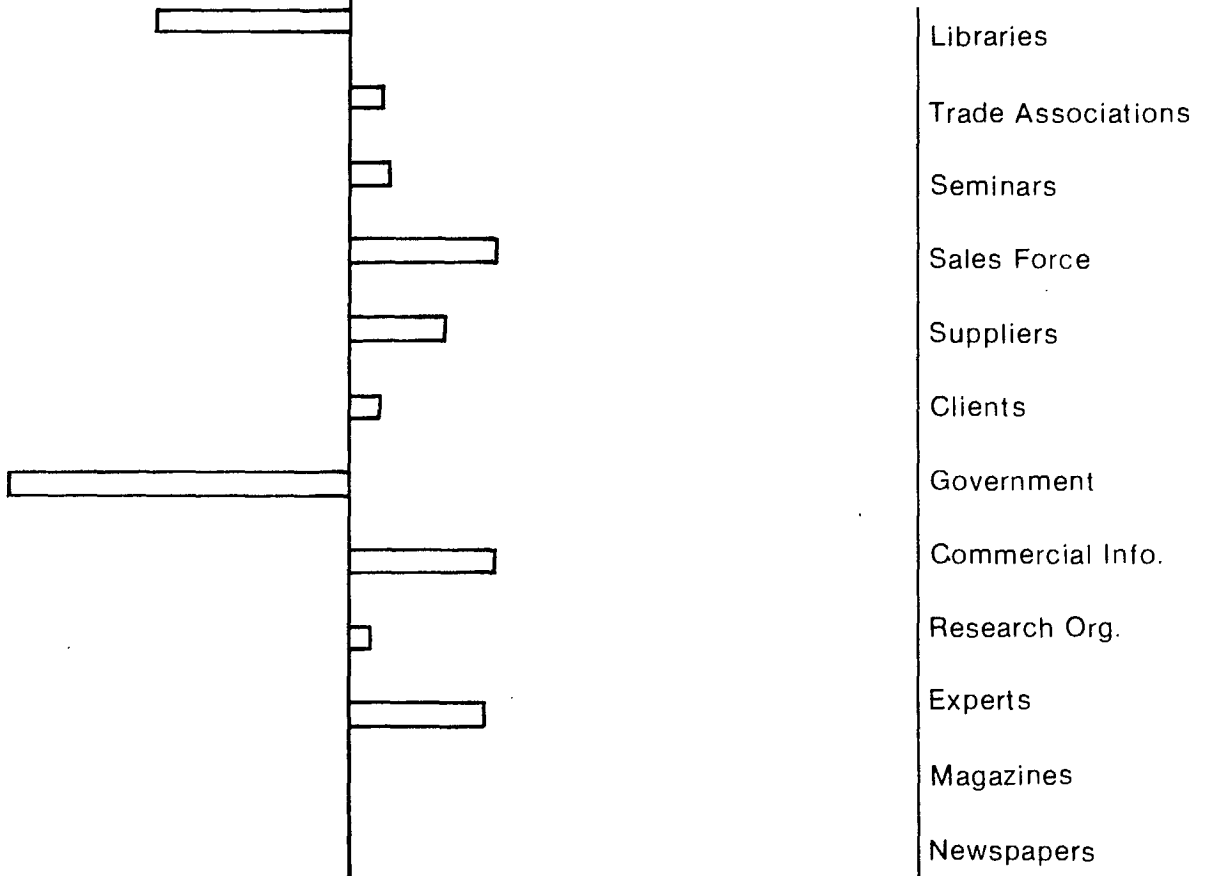


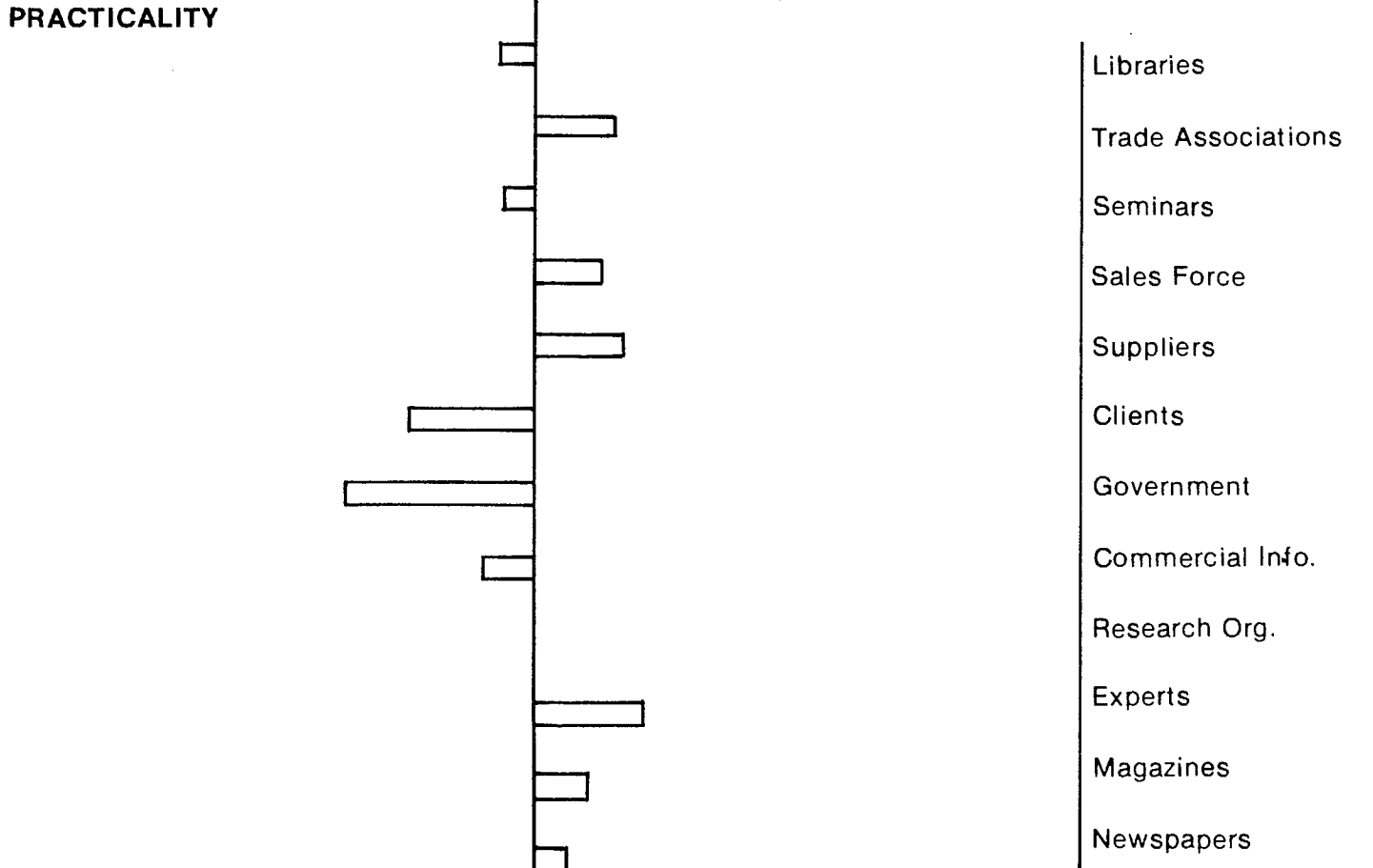
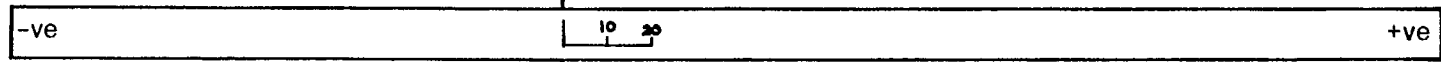
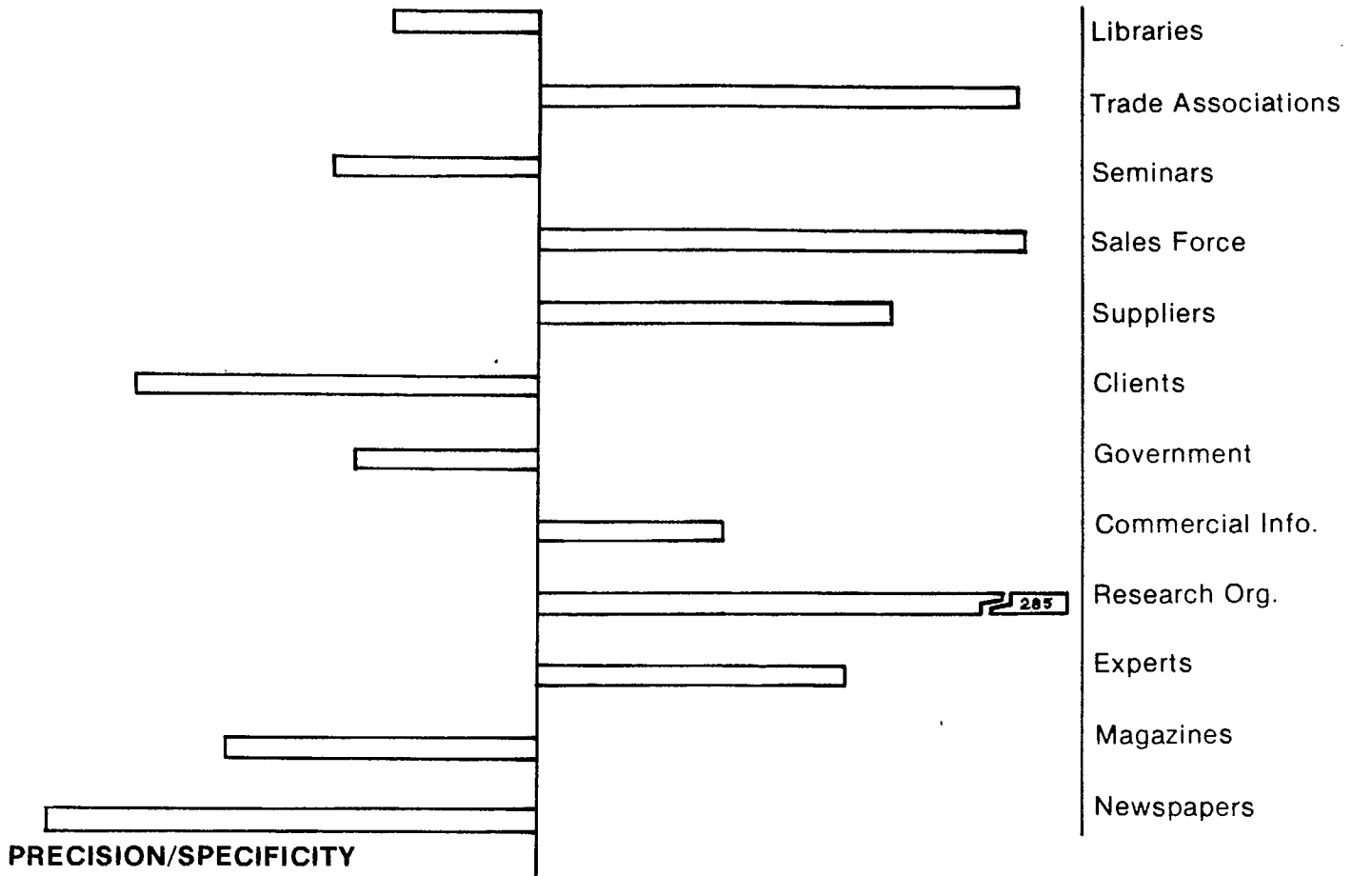


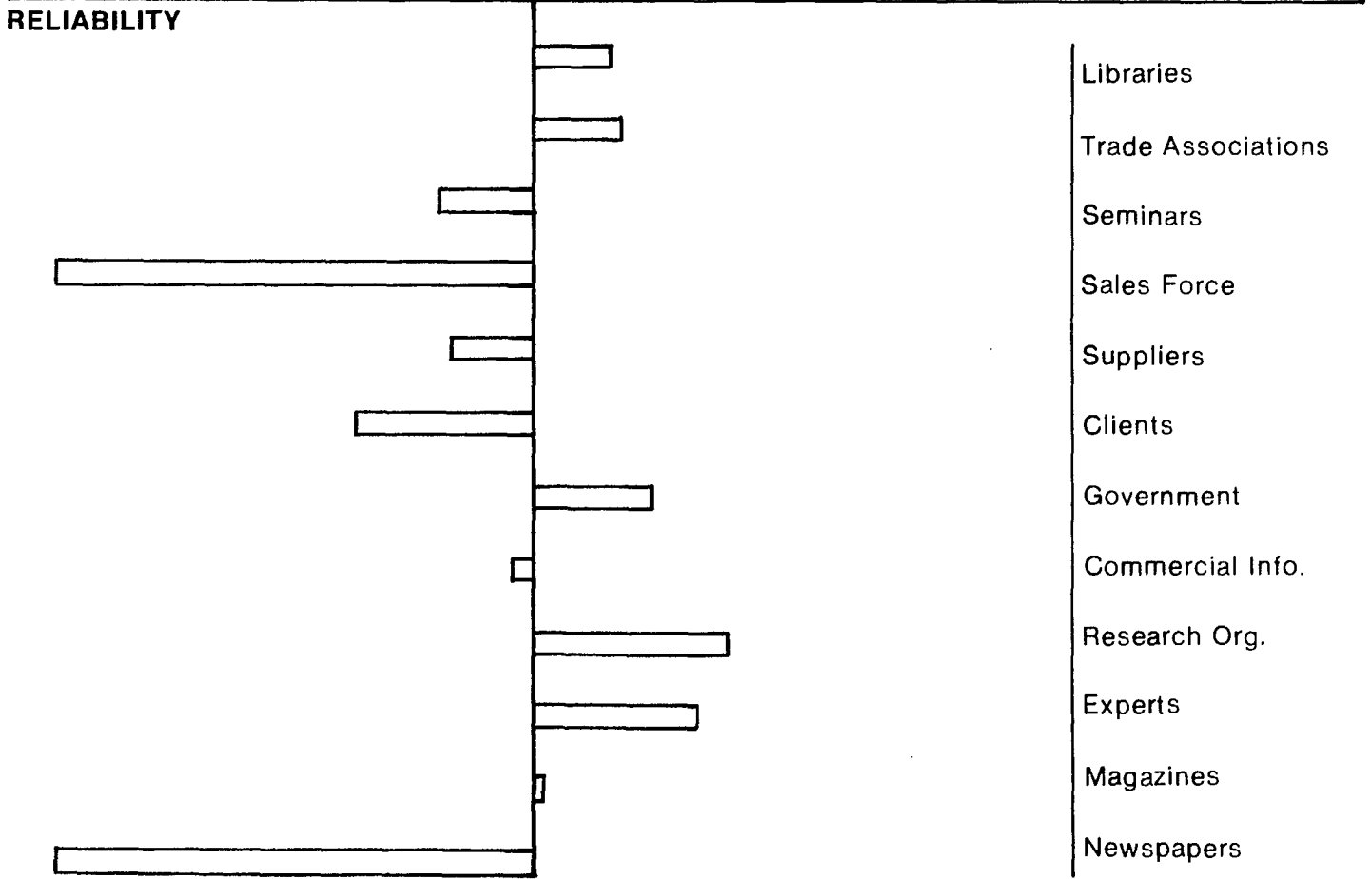
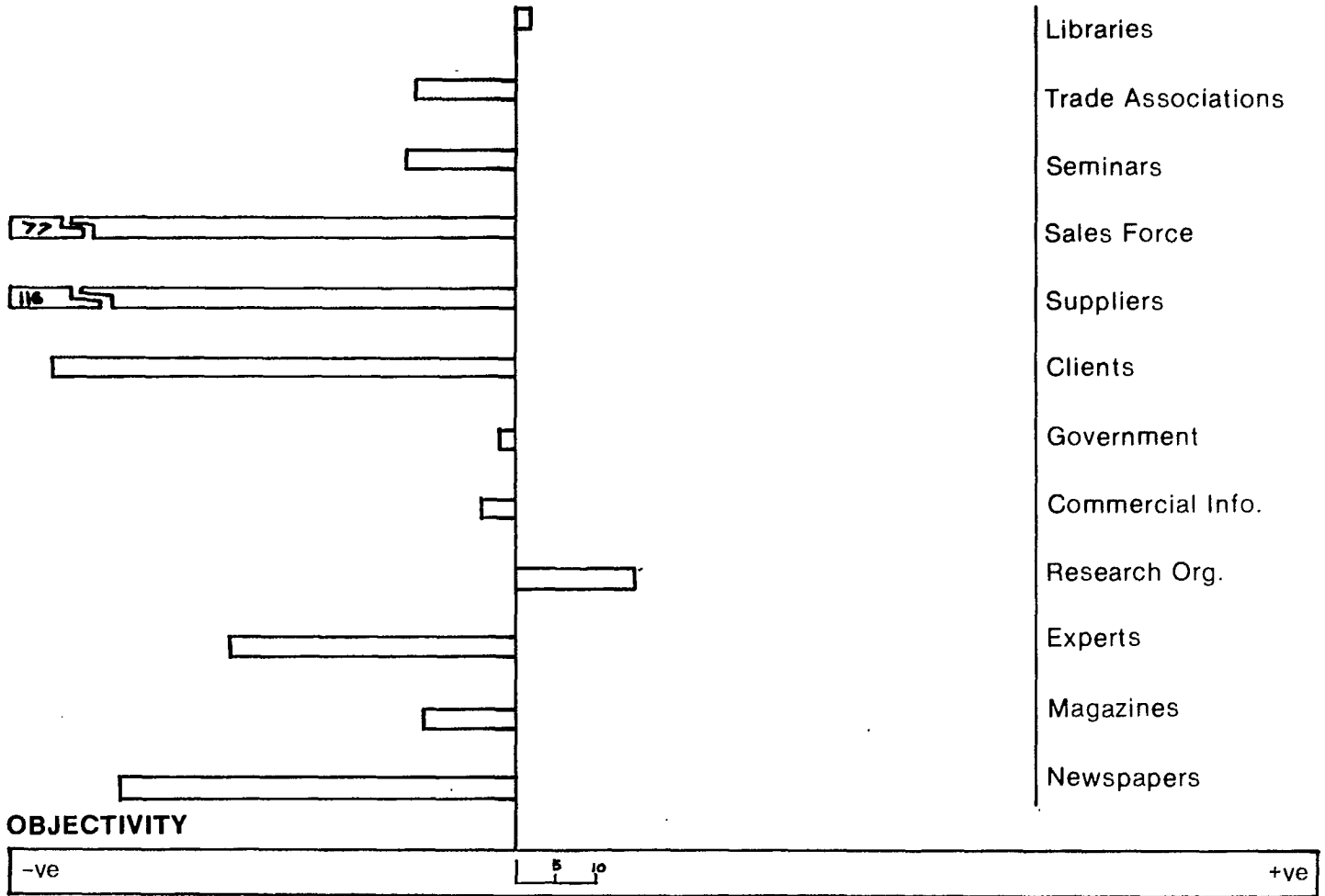
CURRENCY

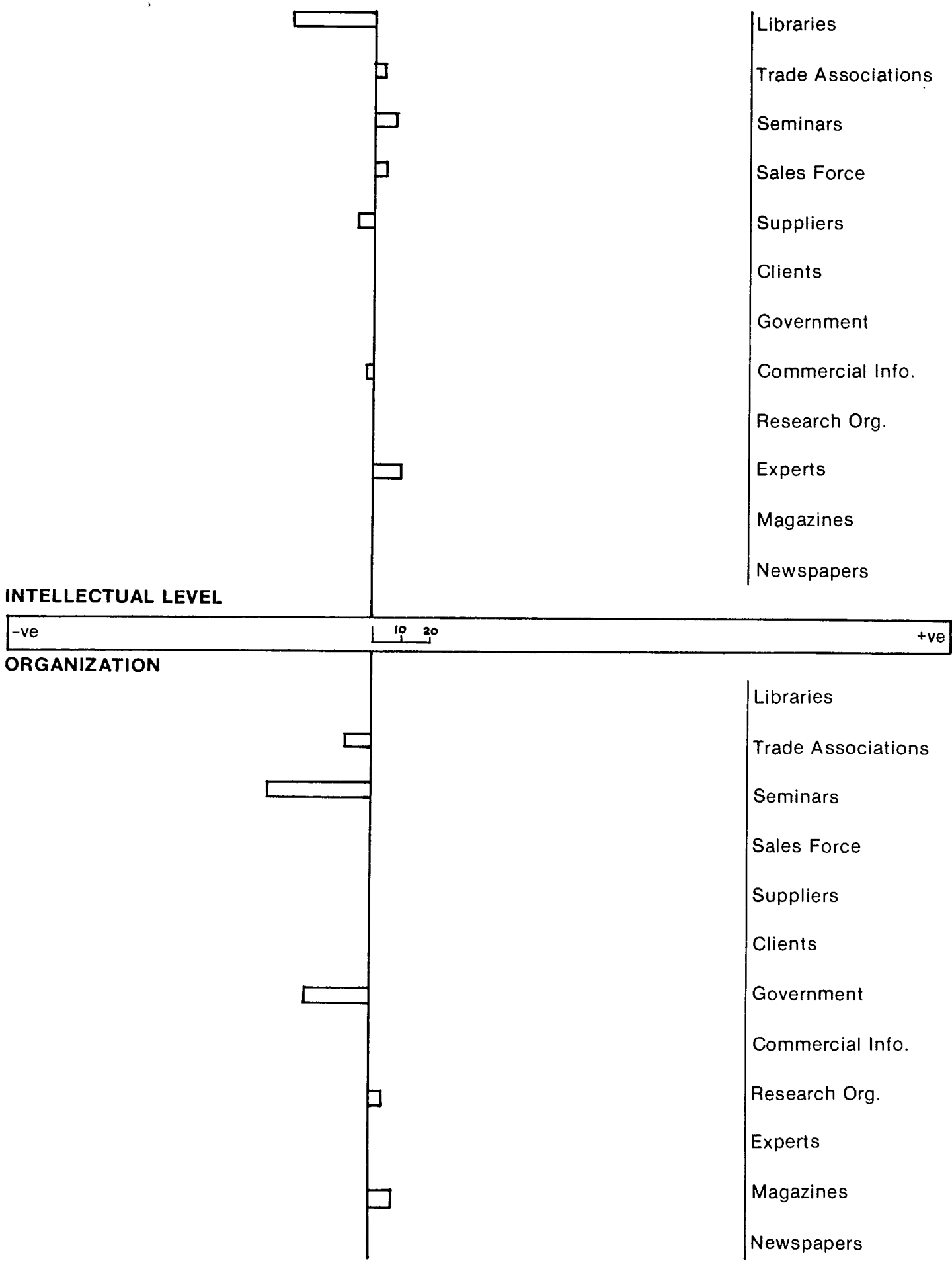


FAST RESPONSE





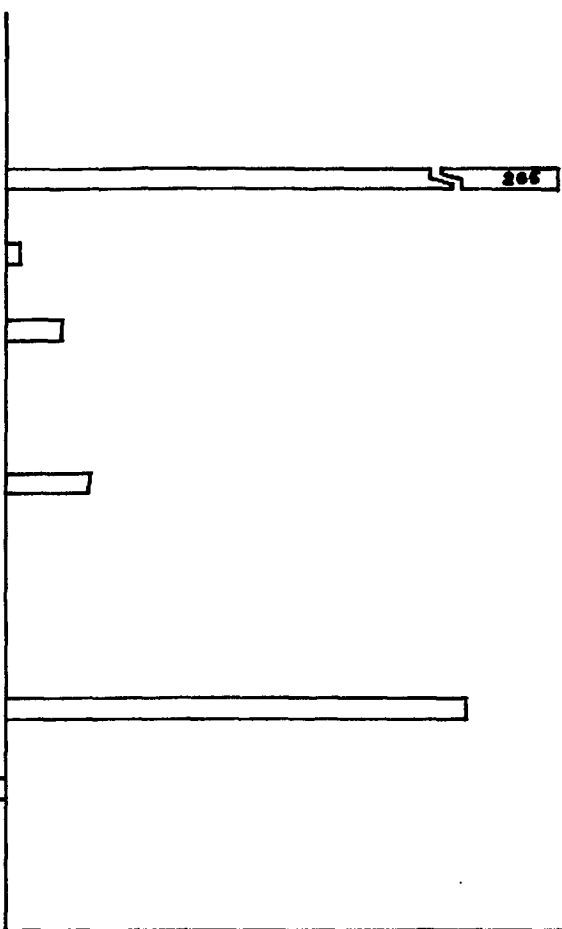


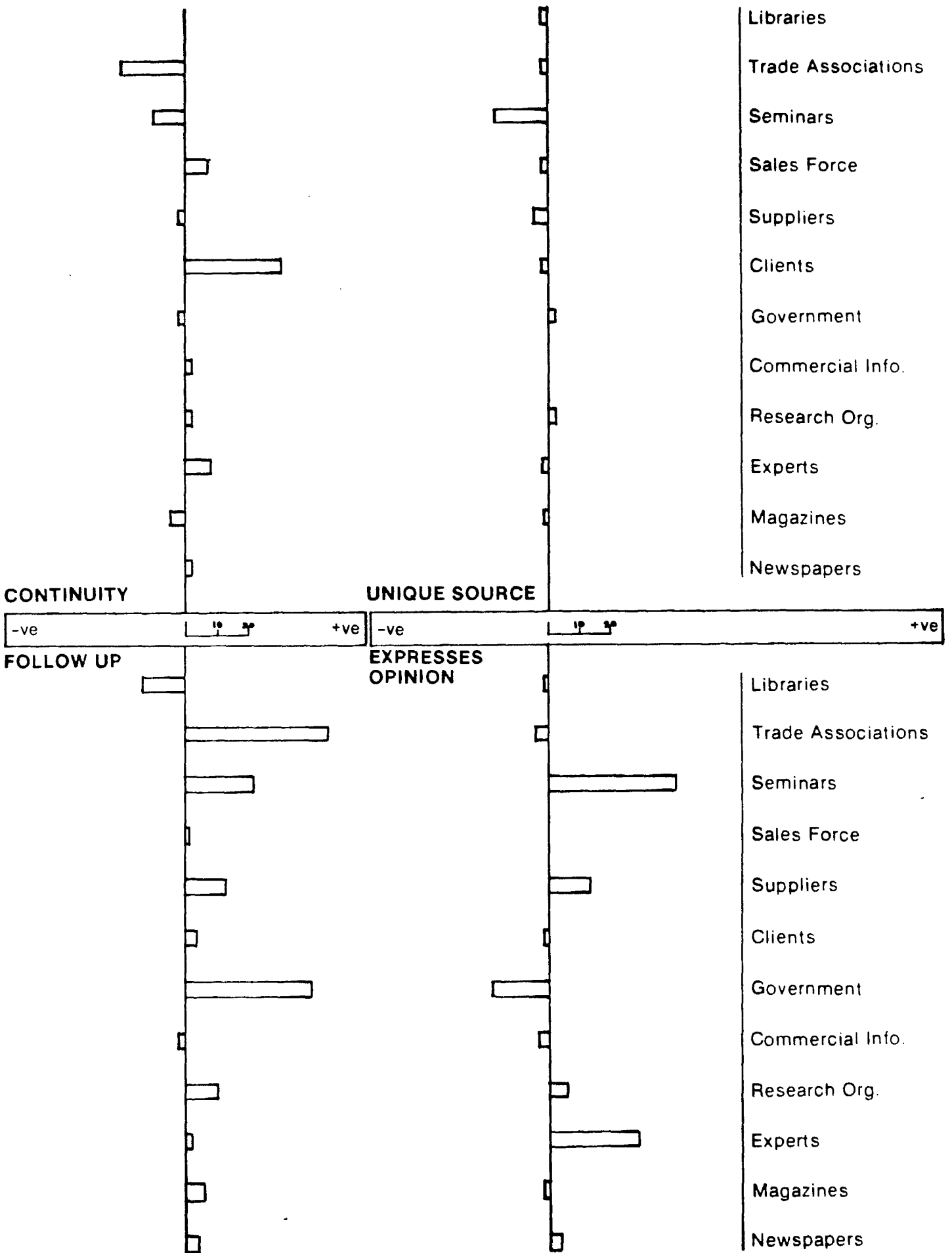


GATEKEEPER



- Libraries
- Trade Associations
- Seminars
- Sales Force
- Suppliers
- Clients
- Government
- Commercial Info.
- Research Org.
- Experts
- Magazines
- Newspapers





THE AGENDA

All workshop participants were mailed a pre-work package (Volume II) which included an abbreviated agenda.

Once at the workshop, participants were handed a topic outline sheet for each discussion module as the discussion got underway.

Chairmen received the pre-work package and the detailed topic outline sheets prior to the meetings.

STI POLICY WORK GROUPS FROM BUSINESS & INDUSTRY

DISCUSSION MODULE I

Topic: The Federal Government's STI Activities: - How Can They Become More Aligned To Industry's Needs.

Summary: The survey has shown that respondents agree:

- "All latest STI should be available for business use from government sources," and;
- "STI is not always available in a form business can use."

The following federal government agencies were mentioned most frequently in the survey as primary sources of STI:

- Statistics Canada
- Industry, Trade & Commerce
- National Research Council
- Energy, Mines and Resources

Specific problems with government agencies as sources of STI were, difficulty of access, currency of information, long turn around time, staffing attitudes, practicality and precision of the information obtained.

Discussion: In the context of the agencies mentioned, discuss better ways by which these or other government bodies can serve business needs for STI.

STI POLICY WORK GROUPS FROM BUSINESS & INDUSTRY

DISCUSSION MODULE II

Topic: The Federal Government's Management of International STI Exchange: How Can It Better Serve Industry's Needs.

Summary: The survey has shown that respondents agree:

- "STI is a valuable national resource."
- "Canada needs improved management of STI resources."
- "STI is under-utilized by business in Canada."
- "Government should seek out the needs of business in order to provide better STI systems."

The federal government recognizes its responsibilities for managing an effective STI policy for Canada in an international context.

Discussion: The introduction to this module summarized emerging STI activities/policies in Japan, the U.S.A., and the E.E.C.

Discuss the effects of these policy thrusts by our major trading partners with regard to their effect(s) on our competitive industrial position.

- Do these developments pose problems for Canada?
- What forms should the Canadian response take, in terms of government policies?
- What are the information priorities such policies should address?

STI POLICY WORK GROUPS FROM BUSINESS & INDUSTRY

DISCUSSION MODULE III

Topic: Government and the Private Sector: How Can They Work Together to Meet Present and Future STI Needs.

Summary: The survey has shown that respondents agree:

- "Canada needs improved STI resources to meet the needs of business."
- "STI is as important as capital investment in plant and equipment."
- "Canada has a high priority to develop its own STI systems despite easy access to those from other countries."

The survey did not attempt to measure the willingness of the private-sector to participate in the development of an improved Canadian information capability.

Discussion: - What forms could such involvement take?
- What fiscal measures could be taken by government?
- What kind(s) of organization should emerge?

THE WORKSHOP DISCUSSIONS

THE WORKSHOP DISCUSSIONS

Sometimes I get the impression when dealing with Ottawa, that industry is serving government rather than the other way around. (Indirect User)

Civil servants should go out to industry more often, it helps break down the ivory tower arrogance we see. (Direct User)

Someone recently prepared a list of the three least credible sentences in the English language:

"Your cheque is in the mail."

"Of course I'll respect you just as much in the morning."

"I'm from the government, and I'm here to help you."

The last sentence describes a subtle form of tyranny which many participants felt they had experienced in the past, that of the government expert who has all the answers.

Since one major purpose of the project was to ask industry in Canada how government STI resources can assist a firm when it contemplates an R&D investment, a new venture, product or process, the project team listened carefully. Members of the team were described to workshop participants as resource people, not there to defend, debate or persuade, but to listen. This deliberate behaviour paid off in full and frank discussions among participants.

THE OBJECTIVES OF THE WORKSHOP DISCUSSIONS

1. To clarify the federal government's role in providing, financing and encouraging the development of effective STI system(s) in Canada, that is the availability and delivery of federally funded R&D through STI - and the tools (contracting-out, tax concessions and grants to the private-sector; TIS and CISTI in the public sector).
2. To examine if and how private-sector might become involved in the creation and cost-sharing involved in building a national mechanism to supplement, focus and develop STI activities in Canada.

SUMMARY OF DISCUSSIONS

1. By including statistical and economic data in the broad definition of scientific and technical information, discussions were sometimes less focussed. This caused more problems for direct users than indirect users.
2. Amongst indirect users in particular, there

was not an urgent awareness of information as an issue. This meant that participants were discussing the issues as abstract notions. (There was always, however, a high degree of willingness to consider the issues raised.)

3. Almost all the meetings were permeated by a sometimes unspoken feeling on the part of industry that government did not greatly care about business problems.
4. It was frequently stated that an STI policy is only one part of an industrial policy.
5. Participants had some problems separating proprietary and non-proprietary STI in discussing the issues raised. They were unwilling to see any further government involvement in proprietary areas.
6. There was a feeling that the U.S. and Japan managed their STI resources more effectively and that we could usefully learn from their mistakes and successes.

The information systems of government have been characterized by fractionalization and subdivision. Individuals and institutions outside government, faced with this,

become selective about the information sources to which they can pay attention. This feeds differences and starves effective decision-making around complex and difficult problems.

Much of the current problem in making government-funded STI available to industry is that a user firm or individual has to move to different agencies and different people for information that relates to a single problem. Such is the effect of this shunting, that the process cools out user demands for STI and forces him to other systems, (NTIS for example), or makes him abandon the search. There is a real resentment among users over having to accommodate the bureaucratic timetable rather than their own sometimes urgent schedule.

For Module I, the following summary is divided into negative comments, positive comments and constructive comments. This parallels the development of the discussion.

NEGATIVE COMMENTS

General

- Lack of interdepartmental communication in government.

*(Re: R&D and STI) in government
the right hand does not know
what the left hand is doing -
or they don't give a damn. (Direct User)*

- Irrelevance of much government R&D to industrial needs.
- Too much R&D performed in-house by government.

Most of the research results from NRC to date are too esoteric. (Indirect User)

- Lack of long-range planning resulting in constant change of research programs, funding support, and other services.

To me the key word in government STI systems is inconsistency. (Direct User)

- Publicly funded R&D contracts should result in more openly accessible information.

The top priority is making tax-funded STI available to the taxpayers who have paid for it. But business should pay costs of retrieval. (Direct User)

- There was a feeling that the system of contracted-out government bookstore operations to replace Information Canada is not working.
- Hostility to any attempts to change the patents system in Canada.

There is a real need for better information around patents. (Direct User)

Statistics Canada (This agency came in for the most frequent and negative remarks.)

- Overload on industry to provide input.
- Irrelevance of much of information demanded.

If we put Statistics Canada into a Crown corporation, on a pay-as-needed basis, we would soon know how much of its activities are needed. (Direct User)

- Little relationship between input and output.

We rely heavily on Statistics Canada for economic data and that's pretty scary - because some of our people believe those numbers. (Direct User)

- Time delay.

Statistics Canada data is readily available. Unfortunately it is 2-3, more likely 4-5 years behind the current situation. (Direct User)

- No central access point.
- Much of information not published in useful form.
- Poor marketing, resulting in lack of awareness in services available.

Industry, Trade & Commerce

- Lack of awareness in industry of full extent of programs, resulting in a feeling that there is something there that they are missing.

National Research Council

- Lack of relevance of R&D programs.
- Difficulty in locating appropriate expert.
- Too much of the "old boy network" approach.

- Poor marketing of information services (particularly TIS).
- Publications poor and poorly distributed.
- Insufficient interaction between NRC staff and industry.

Energy, Mines & Resources

- Lack of relevance of R&D programs.
- Low general industry awareness of purpose, function and programs.

POSITIVE COMMENTS

General

- When the appropriate government expert is finally located, the results are generally positive.

Statistics Canada

- Demographic information good, but need better aggregation.
- Unique sources.

Industry, Trade & Commerce

- Trade attachés helpful as source of STI. Should be better used.
- Trade Analysis Branch does good work.

National Research Council

- Perceived source of value.
- Awareness of separate status (Crown corporation) seen as a good thing.

- TIS, building research excellent programs.

CONSTRUCTIVE COMMENTS

- Need for central "gatekeeper." Either a central agency or at least a point of contact in each department. Failing the above, a published directory should be prepared to help industry approach government. This should include a description of programs and the names and numbers of contact points. It should be frequently updated and widely circulated.
- There should be free access to services provided, either by Zenith or INWATS, although this does not preclude payment for use of the services. This was felt most strongly by smaller companies located far from Ottawa.
- Statistics Canada should be streamlined. The best way to do this would be to set up the agency on a cost-recovery basis, and market the products to all customers, including governments.
- It was also felt that all government information services should aim for cost-recovery.
- Emphasize visibility of government experts by making budgets available for travel, conferences, visits, etc.
- Provide better publicity for information programs.

- Review priorities for government-funded R&D in light of industry needs.

MODULE II (See Agenda)

Participants had difficulty in dealing with this section. Part of the problem was undoubtedly due to their lack of awareness of the state-of-the-art in other countries.

In reacting to the suggestion that foreign initiatives posed a threat to Canada, there were two schools of thought:

(a) There is no problem.

- multi-national company view

We don't have any of these STI problems, because we find the information is readily available from the U.S. But I know that Canadian companies do have problems. I've worked for some. (Direct User)

- direct users seeing science as international

(b) Recognition of problem, or potential ^{problem}.

The problem was seen in different ways by groups, for example:

- Control of access as information increasingly electronic, therefore, controllable.

- Information as a "commodity" emerging.
- Cogent example of Japanese success.

The Japanese understand that some information is "free," but where it is not it must be purchased. We have a larger number of Japanese information seekers touring our installations than any other group, including Canadians. The Japanese private-sector budgets for and around information. (Direct User)

- Lack of Canadian controlled input to emerging systems.

In talking about Canadian reactions, the discussions nearly always got involved with our apparent lack of an industrial strategy to underpin all government initiatives in this area. It was repeatedly stated that the government should, in consultation with industry, set sectoral priorities around the Science Council notions and then adapt the informational and R&D effort to support these priorities.

At a more detailed level, there was a perceived need for better access to translations and foreign patents. There was a feeling that as long as Canada has free access to U.S. technology, then we shouldn't be concerned with other countries. It was not thought realistic that we should ever be cut-off from U.S. technology, given the nature of our economy.

MODULE III (See Agenda)

Organization

The following types of organization were suggested:

- (a) Maintain the status quo, but improve management and marketing of services.
- (b) Build upon CISTI as the central agency for contact between industry and government STI. Give it more power and money, but maintain links with NRC (mainly advanced by direct users).
- (c) Create a new Crown corporation which should be small, market-oriented, and operate on cost-recovery. It should be responsible to a board of directors representing government and industry, with the later input coming primarily from trade associations. (Consensus came mainly from indirect users.)

More and more because of necessity, because of complexity and cost, we are going to have to go to joint arrangements between public and private-sectors. (Indirect User)
- (d) Government as a neutral collector and supplier of information with the private-sector information industry taking over repackaging and dissemination.

We do not want the government to stay out and not contribute, but we do not want it to run the information system. (Indirect User)

Fiscal Measures

Whatever the structure, it was almost universally felt that business should pay for services provided for their use.

Canadian industry in general is not looking for handouts from government. Cost-recovery is an important concept. (Indirect User)

Reasons given were:

- It provides management feedback.
- Discourages frivolous use.
- Gives information a value.
- Limits bureaucratic empire-building.

If there is a choice between tax relief/cost-sharing or grants to support information activities, then industry generally favours tax-cuts/cost-sharing. A minority, however, felt that grants were fairer.

The incentive must be a tax holiday for STI and R&D costs and investment before the board of directors will sit up and take notice. (Direct User)

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Other individuals in Canada and in other countries were generous with their time: Leon Katz, Joe Becker, Georges Anderla, Bill Knox and Paul Zurkowski, to name a few.

One name prominently stands out: Anton Disch, author of the Norwegian Scientific and Technical information study "The Voice of the User." Anton was exceedingly generous with his time and experience; we held long and intensive discussions in Oslo early this year. He had only recently undergone surgery, and it was a great effort for him. His knowledge, willingness to help and his enthusiasm for the project provided valuable insights. Anton Disch died in September this year.

My wife and family put up with quite a year as I became a weekend commuter between Ottawa and Toronto; their patience, good humour and support contributed in no small way. I thank them.

Writing acknowledgements is a new experience for me, and I can be forgiven for breaking some of the rules. The traditional approach to solving many policy problems, and this seems particularly true in information matters, is to bring the specialists together. Expert opinion is important. It was freely given for this study, and I appreciate it. But most important was the voice of the user. I owe particular thanks to the business community who spoke clearly and with concern about things that are not, for many of them, day-to-day preoccupations, but which they recognize as important.

In the final analysis that is what information is all about. It has value and meaning only when it serves user needs. "Information is too important to be left to the information specialists."

J.E. McLaughlin
December 1977

STI STUDIES IN CANADA

STI STUDIES IN CANADA

BONN REPORT (1966)	TYAS (1969)	KATZ (1969)	1969 CABINET-DIRECTIVE TO NRC	OECD REVIEW (1971)	LAM REPORT
Survey of Canadian library resources in science and technology, make recommendations respecting a national science library system.	Revise mechanisms to increase technology transfer and use of information.	Propose a national policy for dissemination of STI and development of services relevant to need.	The response of the government to the preceding Science Council Study and Report.	Define mechanisms enabling a national STI policy to be formulated, implemented, and administered, its principles and its coordination with other policies.	Cons...
Consider library and science information needs of all scientists, engineers, research workers and graduate students <ul style="list-style-type: none"> provide access for the entire scientific, technological, research and industrial consumers in Canada develop regional centres and sources of reference material coordinate services at all levels 	<ul style="list-style-type: none"> STI to be accessible to those needing it independently of location or language timely evolution of present services into a coherent nationwide network include optimum means to acquire, store, analyse, evaluate, interpret, repackage, and communicate STI, using new techniques where economically possible. 	<ul style="list-style-type: none"> services to be based on existing expertise services to be linked into a network of systems decentralized control 	<ul style="list-style-type: none"> NRC to develop a national STI system in concert with existing information organizations, under general direction of the National Librarian: <ul style="list-style-type: none"> user oriented rapid response to specific requests responsive in either official languages built on existing resources and systems. Resources necessary to support the NRC's STI activities to be provided through a separate vote of Parliament. 	<ul style="list-style-type: none"> a general information policy needed to which all participating organizations can subscribe government should work towards a general plan, indicating the major options determined. 	
National Science Library of NRC to direct a voluntary science library network and provide grants-in-aid to develop information resources.	A Scientific and Technical Information Agency (STIA) of Canada recommended to plan, operate coordinate, study, and advise on matters identified below	Scientific and Technical Information Board recommended with NRC's framework to implement the federal role and to provide a coordinating focus for national developments.	NRC to appoint an Advisory Board, responsible for formulating general policies for STI services.	N/A	Various operative STI systems and to the Research
A "Science-Service" library retrieval project.	STIA to develop and coordinate a plan for the network To be operated by STIA		NRC to develop such a network in natural science and engineering.	A basic option already adopted Government should facilitate or support	Need id overall S
NRC/TIS identified as an element to be considered.	STIA to coordinate			A national policy should provide for planned development, coordination, and encouragement of such services	Role of C tiled in distributed informat A technical servi
NRC's library should be the National Science Library.	STIA to coordinate				Need for acknowl
	STIA to coordinate facilities for the national network				
	STIA to coordinate			An element for consideration in a national policy	Need is of comm activities
	STIA to support through grants and contracts			Action should be planned to support and coordinate	
	STIA to study				
	STIA to study				

STI TRENDS & DEVELOPMENTS
IN CANADA

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