DEVELOPMENT INFORMATION CHAIN:

INFORMATION SCIENCES DIVISION IN-DEPTH REVIEW - 1985

Prepared by the
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PREFACE

In preparing this in-depth review of the Information Sciences Division (ISD) program, two audiences have been identified. The first is the ultimate decision-makers, those responsible for approving the long-term program for the ISD and endorsing the priorities and possible new directions of the work program in order to realize the Centre's objectives. The second is the staff of the ISD.

The report is divided into four parts: program history; program priorities and direction; program background details and rationale; appendices. Together, these parts form an integrated, cohesive argument. Part I (Program History) and Part II (Program Priorities and Directions) can, however, be read independently. Parts III and IV, though, must be read in conjunction with Part II, for they amplify the case made in that section.

The crucial component of the report is Part II. This section contains a statement of the role and objectives of the ISD, a compact presentation of the issues that confront it in the present operational environment, a point by point identification of the key strategic elements of its program, and a brief analysis of the principal implications of resource allocations to achieve its long-term goals.

Going through the process to prepare this in-depth review has resulted in a clarification to both audiences of where the ISD will be heading in the next four years, which developing country information needs should have priority, and which operational modalities will best meet those needs.

PART I: PROGRAM HISTORY: CHANGE AS CONTINUITY - AN EVOLVING DIVISION

The current status and future prospects of the IDRC's Information Sciences Division (ISD) cannot be efficiently evaluated and effectively projected without some knowledge of the ISD's historical background, for what is past is always prologue to those who study history and learn from past experiences.

Since its inauguration, the ISD has developed and worked within one major environmental constant: the belief that information is central to the development process. Two quotations illustrate the soundness of this constant:

> The nineteenth century was largely defined by the struggle for control of the means of production; the twentieth century is being defined as a struggle over the means of communication and information.
>
> Irving Louis Horowitz

> The underdeveloped nations of the world today are those which came late to their industrial revolution; the underdeveloped nations of the future will be those which came late to the information revolution.
>
> G. Esoterica

Thus, the ISD plays an important role within the overall objectives of IDRC.

Yet, an arresting parallel exists between the circumstances of the ISD and that of the Centre itself. One commentator wrote that "Canada's IDRC is still largely unknown in its own country." Despite a vigorous, ongoing program of activity cumulating to over 15% of the Centre's total budget, the ISD often appears "largely unknown in its own Centre." The results are that the value of ISD activities has been difficult sometimes for others to discern.

The following discussion of ISD's history emphasizes major themes of significance. It does not provide fine-grained detail. Instead it highlights the capabilities and resources of the ISD by showing how it responded to past challenges, for the intent of the presentation in this section is to offer a perspective on how ISD's past experience has been valuable in determining the changes needed to meet current and future demands. The data used to examine ISD's structural evolution is based primarily on the Program of Work and Budget (PWB) and other internal documents of the ISD.

A. THE STRUCTURAL DEVELOPMENT OF THE INFORMATION SCIENCES DIVISION

1. Mandate Identification.

The ISD's legitimacy and raison d'être were drawn from its parent body, IDRC. The enabling legislation which created IDRC (IDRC Act, RSC 1969-70, C.36) has both legal and practical elements. The legal mandate calls for the Centre to initiate, encourage, support, and conduct research into the problems of the developing regions of the world and into the means for applying and adapting scientific, technical, and other knowledge to these problems. There are four corporate objectives for the IDRC:

a. enlisting talent of scientists and technologists;

b. assisting developing regions in building problem-solving resources;

c. encouraging international development research coordination;

d. fostering mutual cooperation between developed and developing nations in development problem research.

These objectives have been interpreted to mean support for useful research, capacity building, international coordination, and North-South cooperation. Over the years the success of the Centre has been measured by eight output indicators: projects completed; final

reports; research publications; people trained formally; people who obtained research experience; workshops held; networks established; and information systems established.

Because there is no legal provision for the organization of the IDRC into functional divisions, the ISD has no independent legislative standing. Information, however, is central to the needs of each IDRC corporate function. Since the Centre is empowered to "establish, maintain, and operate information and data centres and facilities for research and other activities," an Information Sciences Division was and remains both necessary and consonant with the spirit of the legal mandate.

The practical mandate of the IDRC is expressed in its latest annual report: "to stimulate and support scientific and technical research by developing countries for their own benefit." Research has been supported and enhanced through the creation and assistance of international research networks and promotion of "cooperation between developing-country researchers and their Canadian counterparts." The ISD gives considerable practical support to the IDRC mandate through "the creation and the development of international and regional information-sharing networks," including activities relating to assisting individual nations in establishing national information programs to link into regional networks.

The ISD's role in helping the Centre fulfill its legally mandated responsibilities is thus significant and real. Within the context of its mandate and to the extent that its resources allow, the ISD sees its principal role as both catalyst (generating progress) and enrichment agent (where some basis exists to permit it). By so operating, the ISD realizes the "multiplier" effect of information in that it creates a functional means which allows an open-ended series of outputs to result from information's infinite reusability.

2. Structural Development.

The framework for the history of the structural development of the ISD is provided through the evolution of the major budget categories into which its programs fall. To understand many of these developments, some clarifying definitions are necessary:

- program refers to the ISD's major operational components responsible for overseeing activities, such as the Science and Technology Information (STI) program.

- sub-program refers to a specific continuing subdivision of a program, such as the Human Settlements component of the Socio-Economic Information (SEI) program.

- project refers to a defined set of tasks within a program or sub-program intended to have a specific output and duration, such as the project with the Commonwealth Secretariat to develop computer software for debt recording and management, an activity supported by the Information Tools and Methods (IT&M) program.

Based as it is on budget (planning) summaries and PWB, the following structural history can only highlight what appears to be evident from the documentation available.

The ISD started operation in 1971. In the 1971-72 budget year, the Information for Development Program (which has had the longest life of any of the defined ISD programs), Within-Centre Projects, and DAPs were initiated. In 1972-73, the ISD programs remained the same, but the overall ISD budget was more than quintupled, marking the beginning of substantial operations.

In 1973-74, a family of divisional programs was developed that remained constant for most of the ISD's existence. These were Information about Development; Infrastructure Development; Information for Development; Within-Centre Projects; and DAPs. In 1984-85, the Information on Development and the Information Tools and Methods programs were established. And, finally, in 1985-86, the Science and Technology Information and the Socio-Economic Information programs were introduced. (In addition to these changes within the ISD, the Centre introduced its Cooperative Programs Division in 1981-82, which resulted in a new budget line for ISD and other Divisions.) The net result of all this has been an evolution in response to changing needs and priorities.

Information about Development intended to propagate information about development to the appropriate audience, with the goal of influencing opinions and research directions. For most of the program's existence, its components remained constant, although some changes occurred in later years. In 1981-82, the Information about Education sub-program of the Information about Development program became the Social Issue sub-program. In 1982-83, public administration projects were added to this sub-program, and in 1983-84, women's issues were included. The entire sub-program became a part of the SEI program when it was created in the 1985-86 PWB. Until the Information about Development program was absorbed by its successor, budgetary allocations tended to fluctuate narrowly around the $700,000 level and represented a declining trend on an annual percentage basis.

Infrastructure Development intended to aid the creation of the necessary systems, mechanisms, and trained personnel for effective application of information resources in developing nations. This activity, with a primary goal of effective bibliographic control of print, print-related, and appropriate non-print materials, was initially implemented through the Library Development Program. The goal was to be realized through personnel training, development of bibliographies, tools for bibliographic control, and mechanisms for resource sharing. This initial program was later supplemented by:

a. national and regional systems, with a primary goal of creating information systems in order to realize objectives relating to effective information use, promotion of beneficial information sharing, maximization of available resources, and identification, collection, and communication of information unique to developing countries; and

b. computer sciences, with a primary goal of applying information-related computer techniques to developing countries, a goal realized principally through the development of an Interactive Minicomputer System for Information Retrieval and Library Management (MINISIS) and continued support of MINISIS applications.

Budgetary allocations to the Infrastructure Development program, despite an occasional dip, tended to increase on both a percentage and total dollar basis from year to year up to the point the program was absorbed by its successor.

Information for Development intended to provide assistance for the actual creation of information appropriate to development from and by the developing countries themselves. The information to be created involved industrial, agricultural, population/health, communication science, social issues, cartographic, and environmental areas. The primary objective of the program has been to supply information to provide self-sustaining improvement in the specific areas of application. Permanent additions expanding on these objectives included the cartographic project and environmental subcategories, the former beginning actual expenditures in 1975-76, and the latter in 1978-79.

Support for specialized information analysis centres (SIAC) has been a major ISD component for over a decade. This activity had formed a major part of the Information for Development structure, with assistance being given for agriculture (the predominant grant category),

health, sanitation, geosciences, and industrial topics. Such centres represent a useful answer to the problem of getting the right information to the right persons. They have been located, staffed, and stocked with careful attention to the key elements for SIAC success.

Information for Development also involved several durable sub-programs, Development Sciences Information System (DEVSIS) and Information Service on Low-Cost Rural Health Care and Health Manpower Training (SALUS). The DEVSIS Canada project began in 1975 with an approved budget of $37,900 for two years and with the objective of collecting Canadian development socio-economic literature on the Third World. When MINISIS became operational at IDRC, the DEVSIS operation was computerized. In 1981-82, the scope of activities was increased as DEVSIS Canada began accepting experimental input from other countries/institutions that wished to test DEVSIS methods before incorporating them in their own national or regional programs. The staff of DEVSIS Canada also became involved in several activities abroad (e.g. professional advice for start-up phases of new DEVSIS projects and training).

The SALUS information service sub-program was designed by the ISD in the early 1970's and relates to the provision of health care in rural areas of developing countries. Materials were identified and collected, a data base was created, bibliographies were published, and information retrieval services and microfiche document copying were provided. The intention has always been to transfer SALUS to a permanent host once the program was firmly established.

Budgetary allocations to the Information for Development program have followed trend patterns similar to the global figures of the ISD until the final three years when dips and sharp rises in both dollar and percentage terms started to occur. Information for Development has always been the largest single ISD program component.

Subsequently, the in-house activities, Centre Library, and MINISIS Group were consolidated as Within-Centre Projects. Budgetary allocations to Within-Centre Projects have tended to follow the same trends as global totals for the ISD. They rank below only Information for Development in terms of budget share; however, since allocations grew when the global total was falling, their percentage has fluctuated more than the global totals.

The 1984-85 PWB introduced a sweeping change. The Information about Development and the Infrastructure Development categories were replaced by Information on Development and Information Tools and Methods. IT&M took over Computer Sciences, while the Information on Development program took over Library Development (which evolved into the Library Infrastructure sub-program) as well as the National and Regional Systems sub-program. Information on Development also absorbed the sub-program on international networks taken over from the old Information about Development program. The resulting arrangement attempted to cope with the distinction between structures and systems, while recognizing the degree to which computer sciences constituted a separate sub-program as well as being a discipline infused throughout the ISD.

A major change in the information environment in the past decade has been the extension of computerized methodologies for information handling ("informatics") throughout the world. Equally important, developments in telecommunications technology for information activities have combined with these methodologies to create the dominant synthesis in information applications.

Simultaneously, external developments among national needs and within the field of information demanded that significant additional emphasis be given to the increasing importance of non-bibliographic materials along with the traditional bibliogrpahic information types. The ISD response has been the introduction in the 1984-85 PWB of what appeared to be an entirely new program category, Information Tools and Methods. In fact, this category represents an upgrading of the Systems

and Methods group to a budget line item in recognition of their importance to Information Sciences as both discipline and division. This program, while containing new elements (e.g. telecommunications) also included technical sub-programs (e.g. informatics and cartography/remote sensing) with which the ISD had long been familiar. The main objective of the program is expressed in terms of supporting the use of tools and methods (hardware and software) to improve the access to and use of information by developing countries, with the emphasis shifting from advisory activities to projects. Budgetary allocations to the IT&M program have doubled in the two years of its existence.

In the 1985-86 PWB, yet another major realignment of divisional responsibilities effectively terminated the categories of Information on Development and Information for Development. In their place, two "mission-oriented" categories were created:

Science and Technology Information, representing an aggregation of programs relevant to agriculture, industry, energy, earth and marine sciences. The primary objective of the realignment was to ensure efficient application of information-handling methodologies for effective solutions to specific problems. The approach used remains pragmatic and eclectic because many of the issues involved in this program are interrelated to other ISD components, such as the linkage between remote sensing and earth sciences.

Socio-Economic Information representing a recognition of the diversity and interdisciplinary nature of social and economic information systems. This major reorganization in the 1985-86 PWB added one entire new sub-program, Development Economics, comprised of elements in labour, trade, fiscal issues, and state/private enterprises information, plus additional elements in the Human Environment sub-program (ecology), the Health sub-program (occupational health/safety and traditional medicine), and the Population sub-program (maternal-child health/family planning, human migration/transportation, and urbanization).

Table 1: Budget Distribution Among IED Programmes

Latest Revised Figures, Where Possible

Figures Have Been Rounded for Clarity and Emphasis

	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	
Information About Development																
Amount	-	-	$300,000	$600,000	$900,000	$800,000	$700,000	$700,000	$600,000	$680,000	$800,000	$700,000	$900,000	-	-	
Page	-	-	13.08	15.30	15.18	13.46	13.37	13.59	12.65	12.81	11.39	8.55	8.50	-	-	
Infrastructure Development																
Amount	-	-	$150,000	$250,000	$400,000	$550,000	$550,000	$450,000	$650,000	$700,000	$850,000	$1,000,000	$1,600,000	-	-	
Page	-	-	6.54	6.37	7.02	9.25	10.50	8.73	13.70	13.19	12.10	12.22	15.11	-	-	
Information On Development																*
Amount	-	-	-	-	-	-	-	-	-	-	-	-	-	$2,760,000	$1,160,000	
Page	-	-	-	-	-	-	-	-	-	-	-	-	-	20.60	10.40	
Information For Development																*
Amount	$125,000	$950,000	$900,000	$2,050,000	$3,370,000	$3,050,000	$2,750,000	$2,750,000	$2,250,000	$2,250,000	$3,000,000	$3,380,000	$5,000,000	$4,240,000	$5,440,000	
Page	55.56	77.67	41.66	51.34	58.38	51.34	52.53	53.39	47.63	47.51	42.72	46.45	47.23	38.56	48.78	
Information Tools And Methods																
Amount	-	-	-	-	-	-	-	-	-	-	-	-	-	$340,000	$900,000	
Page	-	-	-	-	-	-	-	-	-	-	-	-	-	3.08	8.07	
Cooperative Programmes																
Amount	-	-	-	-	-	-	-	-	-	-	$225,000	$300,000	$500,000	$1,350,000	$800,000	
Page	-	-	-	-	-	-	-	-	-	-	3.20	3.66	4.72	12.32	7.17	
Within-Centre Projects																
Amount	$36,000	$243,000	$610,000	$820,000	$820,000	$1,090,000	$835,000	$800,000	$1,010,000	$1,440,000	$1,750,000	$1,950,000	$2,080,000	$2,200,000	$2,200,000	
Page	16.20	19.86	28.24	20.91	14.39	18.35	15.95	15.53	21.46	27.23	25.01	14.39	19.69	19.98	19.73	
Divisional Activity Projects																
Amount	$60,000	$30,000	$200,000	$200,000	$250,000	$850,000	$400,000	$450,000	$275,000	$275,000	$390,000	$425,000	$500,000	$598,000	$650,000	
Page	27.14	2.45	9.25	5.10	4.38	7.57	7.64	8.73	4.74	4.20	5.55	5.19	4.7.	5.41	5.82	
TOTAL	$221,000	$1,220,000	$2,160,000	$3,920,000	$5,490,000	$5,940,000	$5,220,000	$5,150,000	$4,740,000	$5,300,000	$7,020,000	$8,180,000	$10,500,000	$11,000,000	$11,100,000	

* For purposes of comparison, SEI and STI have been presented within the former set of programs.

The summary of the fundamental structural development of ISD is shown in Table 1 (p. 10) which breaks down the budgetary totals on an annual basis. Since the major set of programs which have characterized the ISD activity was implemented in 1973-74, the overall budget has expanded over five-fold. This expansion does not, however, take into account that over the same period the effect of inflation has cut the value of the 1973-74 dollar by about two-thirds. If growth factors are combined with inflationary allowances, then the overall financial resource growth has been approximately twofold. However, this overall magnitude has not been evenly distributed over the life of the ISD. From 1971-72 to 1975-76, growth was constant (amounting to a doubling from the 1973-74 base), but over the next five years the financial resource base of the ISD actually declined. From 1981-82 to 1983-84, the trend again has been a doubling but against a base that was smaller than the 1976-77 base. From 1983-84 to 1985-86, only a very slight budgetary increase has been granted. This allocation, moreover, does not take into consideration divisional management and support overhead; it represents only the "cutting edge" of program appropriations.

An additional perspective is provided by the summary budget information set out in Table 2 (p.13), which must be supplemented by figures for Technical Support and Division Management costs. Based on original rather than revised budget figures for the period from 1980-81 to 1985-86, Technical Support has varied from 12.8% to 10.5% of the total ISD budget and Divison Management from 3.9% to 4.6%. On that basis, a mean of 11.8% for Technical Support and 4.2% for Division Management seems reasonable, representing a total "surcharge" of 16% over and above the figures presented in Table 2.

Table 2 presents the data in two different ways: the cumulative totals are self-evident, but the means represent the cumulative total divided by the number of years the program category was funded. This presentation prevents distortion based on a small annual program category such as DAPs cumulating over a long period of time and, thus, appearing to consume a greater proportion of resources than larger programs such as IT&M, which have had their current forms for only a short period of time.

TABLE 2

INFORMATION SCIENCES DIVISION BUDGET TOTALS: 1971-72 to 1985-86

(in 000's)*

	Cumulative	%	Mean	%
Information About Development	7,680	8.8	698	8.1
Infrastructure Development	7,150	8.2	650	7.5
Information on Development	3,420	3.9	1,710	19.8
Information for Development	41,875	47.9	2,792	32.3
Information Tools and Methods	1,240	1.4	620	7.2
Cooperative Programs	3,175	3.6	635	7.4
Within-Centre Projects	17,884	20.4	1,192	13.8
Division Activity Projects	5,053	5.8	337	3.9
TOTAL	**87,477**	**100.0**	**8,634**	**100.0**

*Note that the mean figures have been rounded for clarity and emphasis.

Source: Information Sciences Budget Summary, computer output, for figures to 1983-84; revised budget sheets for remaining years.

The reorganization consequent on 1984-85 and 1985-86 budgets means some program items are no longer directly comparable, the major area of difficulty related to the Information for Development category. In effect, a synthetic replica of this program area was created for the 1985-86 budget figures by "mapping" the sub-programs in the STI and SEI programs back onto the Information for Development category.

What emerges most clearly from this overview is the singular importance of the Information for Development program and its successor mission-oriented programs. Combined with the Information on Development program category, this accounts for over half the total budget allocation (and this predominance approaches 60% when actual, rather than budgetary, figures are considered). Within the various sub-programs of the Information for Development program, agricultural information has been predominant, being budgeted for nearly 40% of the total (over twice the amount initially allocated for the next most important category, population and health).

From this vantage point, it can be seen that the resource requirements, the project load, and the emphasis of the various divisional programs are not simply a function of the total divisional budget since some vary from one year to the next in trends opposite to that of the whole. Where a program enjoys a prolonged upward trend in both dollars and percentage terms (as was the case for most of the period reviewed for Information for Development and Cooperative Programs, for example), it is reasonable to conclude that this circumstance represents additional emphasis for the program in question. The divisional totals over the past three years seem to indicate the beginning of a contraction cycle similar to that of 1976-77 to 1980-81, the impact of which is lessened only slightly by the fact that the current inflation rate is only about half that prevalent at the turn of the decade.

B. THEMATIC DEVELOPMENTS WITHIN THE INFORMATION SCIENCES DIVISION

Within the perspective provided by the overview of the ISD programs, it is possible to determine some shifts in emphases that help indicate which divisional operations represent continuing interests, and to what extent changes are resulting from new requirements.

1. Constants.

Table 3 (p.15) shows the trends in ISD programs in terms of selected major projects. One constant emerges clearly from inspecting this table; the major feature characterizing ISD program development would appear to be growth. This growth seems to involve project type as well as outright numbers. The range of particulars makes classification difficult, for, in addition to new types of information systems, emphasis is being given to a wider subject application. As a result, classes of sub-programs and projects tend to proliferate, whereas direct terminations at this level appear to be rare. There are five major constants that emerge from this level of analysis (plus one that does not) which appear to have permeated ISD operations from the beginning:

a. Agricultural Science and Technology Information

The ISD has constantly mounted a program to develop information systems relevant to agricultural research in Third World nations. The major focus here has been in international cooperative systems like International Information System for Agricultural Sciences and Technology (AGRIS) and the SIACs. Strengthening the work of regional and national centres is the most effective mechanism for disseminating agricultural information.

b. Industrial and Scientific Information

The ISD has been active in promoting useful, practical information transfer through its program for industrial advisory services in developing nations, TECHNONET, the only such project supported by the ISD from 1971 to 1982. Some support has been offered to SIACs in engineering and technical disciplines and to the development of projects involving high-technology remote sensing operations.

Table 3: Selected Major Elements From Programmes of Work - Detailed Display

Element	Year							
	78/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86
AGRIS assistance	+	-	-	-	-	-	-	-
Regional Info Centres	+	C	-	C	+	-	C	C
DEVSIS	+	C	+	C	+	C	-	<
POPINS	+	-	C	-	-	-	-	C
IERS education aid	+	\	!					
Natn'l Infrastructure	+	-	C	-	C	-	-	-
Joint missions with UN	+	-	-	-	-	+	-	+
Sahel sub-regional act	+	-	-	-	-	C	-	-
SIAC's-Agriculture	+	-	\	-	-	-	/	-
SIAC's-Engineering	+	\	\	-	C	C	/	-
SIAC's-Technical	+	\	\	-	-	C	/	-
Union lists	+	-	-	+	-	C	-	-
Microfiche promotion	+	-	+	-	-	-	/	-
TECHNONET	+	C	-	-	-	/	-	-
Famille & Developement	+	-	!			C		
Cartographic projects	+	\	\	C	C	-	-	+
Library svc CanDevSys	+	+	+	-	C	-	\	-
MINISIS	+	C	+	/	/	-	-	-
SALUS	+	-	-	-	-	-	-	>
Special bibliography	+	-	-	-	-	C	+	C
Regional Fisheries Dv		+	-	-	-	-	-	!
Water/sanitation		+	+	+	+	-	-	<
Future Sys micros			+	-	-	-	+	+
+ CARIS emphasis				+	C	-	C	<
Health Sci inf emphs				+	-	-	+	-
Latin Amer educ IC s				+	-	+	!	
Human Settle't Asia				+	-	-	-	+
SIC's-Diseases					+	-	-	-
Admin Inf exchange					+	-	-	-
LATINAH hum set IS					+	-	-	<
Systems & Methods G					+	-	<	-
Occp'l Hlth Safety						+	C	-
Latin Amer Env mcp						+	C	<
IDRIS database mgmt							+	-

KEY

+ = ongoing/established

C = major change of emphasis

- = support continued

\ = support diminished

/ = support increased

+ = major additional activity

> = programme merged with another

< = major expansion/ diversification of programme

! = programme support terminated

Drawn from annual programmes of work and budget, 1978/79 through 1985/86. Highlights major programmes with continuing impact only. During this period there were many additional "one-shot" programmes of necessarily limited duration, even though many of these were significant and some of considerable magnitude.

c. Population/Health Information

The ISD has been active in promoting information programs which actually deliver population and health information. More recently, public health information has received increased emphasis.

d. Development of Computerized Information Systems

The ISD has maintained a constant emphasis on the development of information systems, particularly computer systems, like MINISIS, for application in libraries and information centres.

e. Development Information Systems

The ISD has always been active in promoting the collection of socio-economic information relating to development, to assist both Canadian literature (DEVSIS Canada) and other institutions to apply DEVSIS methods in their own regional and national systems.

f. Training and Education

The fact that the ISD has of necessity always placed great emphasis on and provided extensive support for training/educational activities is the one constant which does not emerge from the program analysis above because the nature of the program and sub-program structure acts to focus attention on their subject matter rather than the process whereby their ends are realized.

Two other more general constants must also be noted in any historical review of the ISD's activities:

a. The ISD, like the rest of the Centre, places great emphasis on the quality of the projects to be supported. Furthermore, ISD projects tend to have concrete outputs, and be self-sustaining at the conclusion of IDRC support.

b. The nature of divisional activities and programs involves the ISD in a continuing dialogue with the scientific and technological leadership of the developing world, IDRC is perhaps the only development research donor to possess such a mechanism for applying the information sciences to development.

2. Shifts in Direction and Emphasis

There is little doubt that many minor shifts in direction and emphasis have occurred in ISD programs over the 15 years since its inauguration. However, the recent reorganizations represent shifts of disproportionate weight when compared to former changes. Moreover, the nature of these shifts makes it more difficult to trace project continuities even where these undoubtedly exist. Nevertheless, four significant categories of change emerge from a review of the history of divisional operations. Interestingly, these shifts have been in both program type (as in the introduction of new programs or sub-programs) and in implementation strategies (taking into account new developments and considerations). These shifts indicate how the introduction of regional profiles and the development of new standards for evaluating project effectiveness have had a practical effect on ISD operations and have also demonstrated that the capacity for effective interaction with the divisional service environment is being upgraded.

a. Perhaps the most significant change in program type has been the apparent shift away from the agricultural/scientific information emphasis which has dominated the history of the ISD (although agricultural information remains a sub-program of great importance) towards the economic and human environment emphasis which was introduced in the latest PWB. Two issues which must be distentangled carefully are really involved here:

- the extent to which the agriculture and scientific/technical information category has previously been dominant;

- the extent to which economic and social emphasis has increased to the point where it is now dominant.

Given the percentage distributions of the budget mentioned earlier, the extent of the ISD's emphasis on agriculture remains undeniable. However, the 1985-86 PWB shows the current SEI program with a larger appropriation than the STI program. To some extent this fact reflects the grouping in one location of previously disaggregated figures, but this approach is not the entire story. The 1985-86 PWB also stresses how many new sub-programs are represented under the SEI program heading. By placing the sub-programs in this new aggregation, the ISD seems to be trying to provide a balanced approach to the variety of information types (and the systems whereby these information types become useful) which have a role to play in Third World development.

b. A second change in emphasis is renewed appreciation for the value of the resources which the developing nations possess. For example, the recent activities on culture and traditional medicine demonstrate that effective use of information in developing nations is as much a matter of organization and consolidation as it is one of transfer.

c. A third change in emphasis has been a sharper focus on the importance of national developments in information management. This emphasis has been added to ISD's long-standing commitment relating to national, regional, and international networks. This action, in part, represents the realization that networks must evolve and that without effective operating members they will be little more than a charade, but it also represents the implicit realization that however difficult national problems may be, they are an order of magnitude less difficult than those attending international networks.

d. The final shift in emphasis has resulted in increased attention to new and developing information forms and systems. Such systems are expected to supplement the traditional standard bibliographic-library services and are emerging as a result of both technological innovations and the need for new system structures. This move means that information forms like machine-readable data join data from remote sensors like satellites (a division interest since 1975), and information services/systems like identification services, directories/inventories, decision-making tools, on-going research networks, extension information institutions, data banking, and grass-roots management information systems as important subjects of investigation and support. The traditional information tools represented by books and periodicals remain important, but their effective integration into the total information picture will require more attention than given in the past. (This shift in emphasis has been paralleled within the ISD by an attempt to improve support of IDRC regional offices through a greater service emphasis for the ISD's library/information resources.)

The additional emphasis being given non-bibliographic information matters represents a refined appreciation of current information developments in the industrialized world. The commercial importance of databases, data banks, statistical and time series aggregations, the marriage of telecommunciations and computation, the developments in video-recording and mass information storage/indexing, the growing importance of sophisticated graphics systems, and all the information implications inherent in computer aided design/computer assisted manufacturing amount to what has commonly been called an "information revolution". Although the exact implication of these developments remains unclear, their potential impact for information work is unquestionable. The ISD has taken the direct relevance of these developments seriously and has formulated new and changed programs as a result.

C. CONCLUSION

The diverse threads of development and the real achievements of the ISD which emerge from this brief overview of its history are based on two characteristics which have dominated the discussion: flexibility and consistency. In more than a decade of operations, the ISD has had to cope with a vast increase in its subject material, rapid alterations in budgetary support levels, and increased diversity in the demands made upon its resources. It has met such challenges through an extensive evolution of its program structure, an evolution which has blended change with continuity. It is precisely this blend which has provided the ISD's consistency in pursuit of its goals and which has led to a mature operational philosophy that infuses all of its activities.

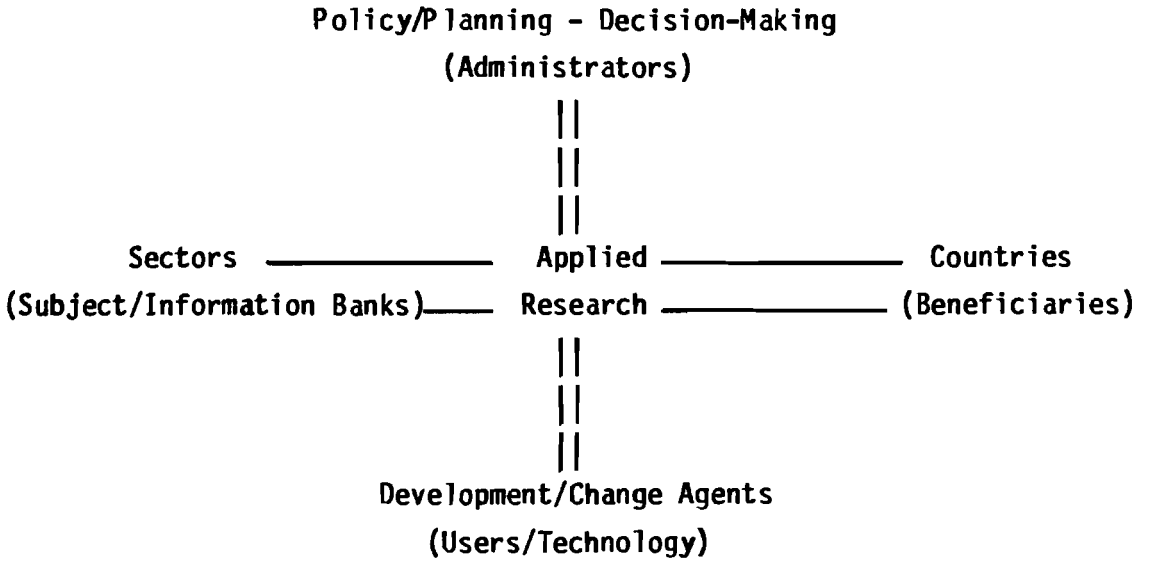
PART II: PROGRAM PRIORITIES AND DIRECTIONS

The crucial component of the report, Part II, is made up of four sections. These are devoted to a statement of the role and objectives of the Information Sciences Division (ISD), a compact presentation of the issues that confront it in the present operational environment, a point by point identification of the key strategic elements of its program, and a brief analysis of the principal implications of resource allocations to achieve its long-term goals. Essential, detailed background information relating to the ISD's position today and a rationale for strategic actions to meet the objectives of the long-term program are included in Part III. Part IV offers added documentation to support the case put forward.

A. ROLE AND OBJECTIVES

The role and objectives of the ISD support both the legal and operational mandate of the Centre. The former calls for the Centre to initiate, encourage, support, and conduct research into the problems of the developing regions of the world and into the means to apply and adapt scientific, technical, and other knowledge to these problems. The latter more specifically calls for the Centre to stimulate and support scientific and technical research by developing countries themselves for their own benefit.

Each program of the ISD supports one or more links in the information chain on which the research communities of developing regions depend. Just as IDRC's research support is directed to building indigenous research capacity in developing countries, so are the activities of the ISD directed to building indigenous information capacities. The information chain as applied to the ISD's Information Sciences programs, though quite complex, can be envisioned through the following chart.



The information in the chain may flow both vertically and horizontally to form a complex network. The vast majority of development aid is devoted to grass roots activities at the development/change agent level. Objectives and scope of those activities are normally local and isolated. IDRC, whose resources are small (4%) in relation to Canada's total Overseas Development Aid (and miniscule in relation to world-wide aid) and the ISD focus most programs on the higher, key level of applied research. This is the level representing a long-term investment by a society to tackle its problems and build for the future.

While the indigenous research capacity must direct its energies to solving problems of local priority, it is also important that the results, experiences, and methodologies are shared with research communities in their own and in other countries for constructive feedback and for avoidance of duplication of effort and waste of resources; that they lead to recommendations to decision-makers for more effective development action nationally, regionally, and globally; and that they are applied for more effective development action at the grass roots level for the farmer, small entrepreneur, civil servant, and other economic groups.

Thus, the ISD views its role as both catalyst (generating progress) and enrichment agent (when some existing basis permits). By so functioning, the ISD realizes the "multiplier" effect of information. Information when applied is not "used up" but rather can be re-used in an unlimited succession of contexts.

The broad objective of the ISD is, therefore, to encourage and support research on problems in the developing regions by studying and building the information chain in those regions as an essential means for applying and adapting scientific, technical, and other knowledge to these problems.

Looking at the simplified concept of the information chain, three principal choices emerge for sub-division of the ISD's programs: by levels in the information chain (decision-making, research, extension); by sector; or by countries.

Although most donor agencies are organized geographically, IDRC is organized sectorally. The ISD's programs are, therefore, most effectively sub-divided by sector. The sub-programs in each sector thus become responsible for any vertical integration of the information chain. In the ISD organization, the responsibility of the sectoral sub-division is supplemented by the sub-programs which involve, for information handling and transfer, the appropriate tools and methods or technologies which are not sector-specific. and by assuming geographic responsibility, the regional program officers add this perspective to the programs. In addition, the IS programs are sub-divided by projects orientation (STI, SEI, IT&M) and services orientation (Centre Library, IS Computer Systems). With service programs and project programs working together, ISD can achieve an effective division of responsibility on the one hand and a synergistic linkage on the other.

The broad sub-divisions of the program are outlined. Each program includes a sub-set of specific objectives which together form the basis of the ISD's work in fulfilling its broad objective. These programs are examined briefly here but are covered in detail in Part III.

SCIENCE AND TECHNOLOGY INFORMATION

The objectives of this program are primarily:

1. to assist in the establishment in developing regions of science and technology information services which:

   a. meet the specialized information needs of specific research communities working on subjects of importance to developing regions;
   b. are in fields related to the Centre's research programs, mainly in agriculture, industry and technology information (including energy), and marine/earth sciences from a natural resources perspective;
   c. repackage and disseminate research information for the ISD by decision-makers, other researchers, and extension agents; and
   d. have generally a multiplier effect, through a regional or international mandate, through being a model or example for other information centres, or through participation in cooperative networks.

   Examples: The SIACs, such as those on grain legumes and pulses in Nigeria, cassava in Colombia, rattan in Malaysia, tropical vegetables in Taiwan, coconut in Sri Lanka, and numerous others which are located in research centres of excellence and which have a worldwide mandate in their area of specialization; national agricultural information centres in many countries; TECHNONET, the technology extensions network in Southeast Asia; the Caribbean Technology Consultancy Services located at the Caribbean Development Bank; Indonesian fisheries network; and many others.

OUTLINE OF INFORMATION SCIENCES PROGRAMS AND SUB-PROGRAMS

A. Science and Technology Information

1. Agriculture
2. Industry and Technology (including Energy)
3. Earth/Marine Sciences

B. Socio-Economic Information

1. Social and Economic Systems
2. Human Environment, Health and Population Information
3. Information Infrastructure Development
4. DEVSIS/SALUS

C. Centre Library

1. Services to IDRC Staff
2. Services to IDRC Projects
3. Services to Canadian Development Community
4. Microform and Other Technologies

D. Information Tools and Methods

1. Computer Technologies
2. Telecommunications Technologies
3. Cartographic and Remote Sensing Technologies
4. Applications Development and Support

E. IS Computer Systems Group

1. MINISIS and other Software Development and Maintenance
2. MINISIS Training, Installation, Distribution for Developing Countries
3. Computer Advisory Services to Program and Projects
4. Applications Development and Support

2. to support user needs, planning, implementation, and evaluation studies which may help developing countries to use their own and other donor funds for STI services most effectively.

   Examples: DAPs for marine control surveillance missions, energy information networks, training courses with the Institute of Scientific and Technical Information of China (ISTIC).

3. to support applied research in special cases in some fields of ISD's program where the results are expected to have short-term impact and where ISD has special expertise.

   Examples: MULBUD project to develop a software package for agricultural extension to use in the field for advising small farmers on multi-storied cropping strategies and options; mangrove research using remote sensing in Thailand and other Southeast Asian countries.

SOCIO-ECONOMIC INFORMATION

Within the overall Centre and ISD objectives, the purpose of the SEI Section is to develop the capacity of developing country institutions to provide information services in the substantive areas covered by the Social Sciences and Health Sciences Divisions. The information vital to the development process must be made available as expeditiously as possible to the primary target user groups: the policy-makers, planners, administrators, practitioners, and researchers at all levels.

Project activities supported include:

- initiating and strengthening information systems and services implemented at regional, sub-regional, and national levels in developing countries and encouraging their increasing self-reliance;
- coordinating existing services and encouraging information networking and sharing of information nationally, regionally, and internationally, in both South-South and North-South contexts;
- repackaging and consolidating information;
- introducing appropriate information technologies to support systems and services; and
- training and educating for educational activities in library and information science.

SEI program lines, as reflected in the Program of Work and Budget for 1985-86, comprise:

1. Social and Economic Systems: Development Planning; Development Economics; Social, Legal, and Cultural Issues;

2. Human Environment, Health, and Population; and

3. Infrastructure Development, including Library, Archives, and Records Management, National and Regional Systems, and Curriculum Development.

CENTRE LIBRARY

The Centre Library's objective is to stimulate and facilitate access to development information with particular emphasis on research in adapting scientific and technical knowledge to the economic and social advancement of developing countries. To meet this objective, the Library has three program thrusts:

- the provision of information and library services;
- the provision of advice and training; and
- the testing of new technological, methodological, and bibliographic developments and standards.

The end users of the Library's program, in order of priority, are the IDRC staff in Canada and its Regional Offices, IDRC projects, the Canadian community concerned with Third World development, and other communities or organizations concerned with Third World development.

Because of the expertise developed in the implementation of its program, the Library has created important two-way linkages with all the different program areas of the ISD.

INFORMATION TOOLS AND METHODS

The primary objective of the IT&M program is to increase the capacity of developing countries to acquire and use appropriate information technologies to deliver the information needed by researchers and planners to meet the development goals of their countries. As information systems become more complex and interdependent, the need in developing countries for modern, usually electronics-based, tools and methods to deal with their information requirements grows. The IT&M program assists developing countries by supporting, through DAPs and projects, a variety of activities to help information workers - those who select, build, adapt, and use the tools, methods, techniques, and technologies - make informed choices regarding the technologies they will use to provide information services in their countries. Activities include:

- information systems, networks, and services on specific subjects;

- technology assessment, selection, and evaluation;

- feasibility studies and technology demonstrations;
- pilot projects and experiments;
- technology introduction and transfer;
- technology adaptation and development;
- education and training; and
- documentation and exchange of experience.

The IT&M program shares the sub-objectives of other IS programs in that it tries to strengthen the capacity of developing countries to execute such activities themselves whenever possible.

The program is currently involved with three sets of inter-related information technologies: computer, telecommunications, and cartographic and remote sensing. The tools involved are generally those which can be applied in the subject areas supported within the Centre and the other program sections of the ISD.

IS COMPUTER SYSTEMS GROUP

The three sections of the IS Computer Systems Group, the Future Systems Group, the MINISIS Outreach Group, and the Computer Operations and Applications Group, share the common objective of assisting developing country organizations to use effectively software tools developed by the group. In accordance with the corporate objectives of the Centre and the ISD, the specific objectives of the IS Computer Systems Group are:

1. to maintain, enhance, and support MINISIS and related software as tools to assist organizations in operating and maintaining information and data centres and facilities for research;

2. to provide advice and support to the ISD programs and projects which are using MINISIS and other related software tools;

3. to teach and transfer practical technical computer skills to developing country institutions in order to assist them in solving their information problems;

4. to facilitate cooperation between institutions by providing a method of exchanging information in machine-readable and printed form;

5. to provide practical technical advice and assistance for developing or adapting MINISIS-like software tools that will permit developing country organizations to solve their information problems;

6. to strengthen the technical knowledge of developing country MINISIS installations to promote self-sufficiency for their MINISIS activities; and

7. to operate effectively the IS HP 3000 computer for the benefit of various components of the IS program and other Centre activities in order to develop, maintain, and promote tools and techniques that will assist developing country data centre managers with the operation of their computers in a MINISIS environment.

These objectives are pursued in the information environment of the developing regions and in the international community in which the development information chain exists.

B. INFORMATION ENVIRONMENT

The ISD within its present operational environment faces a set of issues which will determine much of its future development and effectiveness. Resolving these issues successfully is important, for the determinations will have a major impact on helping developing nations overcome a number of problems. The salient points are:

1. The explosive growth in the latter part of the 20th century in the amount and importance of scientific and technical information exacerbating problems in acquisition, organization, and effective employment of information resources to the degree that available information institutions are stretched nearly to the breaking point.

2. The rapid expansion of hardware and software means for handling this information load in scientific and technological areas.

   Characterized by extreme diversity, considerable capital investment requirements, and dependence on an extensively evolved control and communications infrastructure, efficient selection and employment of such systems for information development aid become a critical and finely-balanced act of judgement.

3. A growing realization on the part of developed countries that their investments in infrastructure creation amount to the value-added equivalent of a commodity, insofar as information is concerned, paralleled by a growing appreciation on the part of the developing world of the importance of information as a basic precondition to effective industrial/social development.

   The results place information services/systems development in the forefront of the political controversies inherent in international cooperation and competition.

4. The recognition that effective and durable technology transfer demands careful cultivation of a supporting information environment in the recipient nations, one which takes into account the needs and aspirations of the people involved as well as their capabilities and characteristics.

5. An increase in requirements within developing nations at all levels of production and technology for meeting basic needs which completely outstrip the resources available.

   These information requirements, however, can be met because of the distributive properties of information. But, to accomplish this end, the human/system resources needed demand the most cost-effective means of system creation and operation. Therefore, wherever possible, emphasis must be given to capabilities for resource sharing and the creation of networks.

6. The ineradicable persistence of a host of barriers restricting and frustrating information transfer, including but not limited to shortages of foreign exchange currencies, to political and economic instability in the developing world, to shortages of trained personnel, and to inadequate development of basic infrastructures.

   Such barriers can only be surmounted through relentless application of both informed research directions and mobilization of political initiatives.

7. The growth in importance of information indigenous to developing nations themselves, information which, because of its limited global value, is difficult to capture for processing in the kinds of information structures that can best benefit the developing nations.

   This situation requires the effective identification of materials and the effective provision for their transfer to those needing the materials.

8. The existence of differing structures for information aid delivery and of major differences in professional opinion as to the most effective patterns of evolution for developing nations' information systems.

   These differences increase the difficulties of effective planning and resource allocation immeasurably.

9. The ISD's facing budget resource restriction at the same time as it re-evaluates its organization and operations to determine the optimum structure for future development.

   This factor adds an additional set of specific burdens to the challenges posed by the general issues.

These major issues represent a constant for information systems creation in the developing world and a formidable intellectual challenge requiring ISD's best efforts. The situation is complicated by the fact that the issues vary in aspect and intensity both by the nature of the specific subject involved as well as the nation or region in which the information system/service is to be implemented. A flavour of the range of subject diversity can be ascertained by contrasting physics with agricultural technology. In the former discipline, constants will not vary among nations, although emphases may; in the latter, specific details of climate, soil, vegetation, and livestock may be so different that procedures and routines which work in one country are completely inapplicable elsewhere. The fact that disciplinary details are paramount concerns for effective information systems development further intricates the process of moving from theoretical generalities to practical specifics for implementation. Therefore, for the ISD, practically every new disciplinary project involves extensive innovation as well as application of established procedures, e.g. in the production of thesauri or the implementation of a MINISIS system.

Differences among information practices by discipline are paralleled by the diversity of national situations in the developing world. The common classification of these nations into categories of advanced, standard, and lesser-developing countries only scratches the surface of these differences. In addition, the kinds of political, economic, and technical problems faced by nations at the same development level, e.g. India and China, differ as much from each other as the two together do from nations in different development categories, e.g. Ghana or Colombia. Some appreciation for the sorts of differences involved can be obtained through consideration of the distinct variety of general regional information needs with which the ISD has experience:

Southeast Asia

- information on development and international networks
- industrial, environmental, science and technology information
- choice and transfer of technologies
- assistance in analyzing information already collected

Africa

- basic agricultural information transmission
- public health information and education
- information for engineering projects
- assistance in analyzing information needs and procedures development

Latin America

- technical information
- education information
- economic information
- legal information

Even within these regions, specific requirements and information use capabilities not only differ from country to country but often also differ between urban and rural areas in the same country. The unique capability that the ISD brings to bear on these circumstances is grounded in the Centre's six regional offices. The interaction between the reservoirs of particular expertise relating to specific national/regional circumstances represented by ISD staff in these regional offices and the mission-oriented interdisciplinary/application resources of the ISD's Ottawa bureau contributes essentially to the success of the ISD's operations.

The ISD's efforts are even further complicated by the structure of the international information aid community - a multiplicity of competing institutions in a loosely coordinated operational environment. This organizational environment results in the additional burden of careful navigation to avoid duplication of effort or counter-productive organizational conflict to the rest of the problems with which the ISD must cope. A partial enumeration of the elements in this organizational environment provides some notion of the complexities involved.

At one level are the major international information agencies, those of the United Nations (UN) being predominant: the UN Development Programme (UNDP); the International Labour Office (ILO); the UN Centre on Transactional Corporations (UNCTC); the UN World Intellectual Property Organization (WIPO) - Patent Information Service; the UN Conference on Trade and Development (UNCTAD) - Technology Division; the UN International Atomic Energy Agency (IAEA); the UN Food and Agriculture Organization (FAO) - (AGRIS, CARIS); the UN Environment Programme (UNEP) (INFOTERRA); the UN Industrial Development Organization (UNIDO) (INTIB); UNESCO; and the UN World Health Organization (WHO).

Operating on a similar worldwide scope are the major commercial information services based mainly in the U.S.A.: Lockheed (DIALOG); Compuserve (The Source); Systems Development Corporation (ORBIT); the Institute for Scientific Information; and major proprietary worldwide nets in banking and airline services.

At another level, but by necessity connected to the UN and other agencies by a variety of links, are the national organizations, one of which is IDRC, that offer information assistance as an outgrowth of national policy decisions for foreign aid. The U.S.A.'s National Technical Information Service (NTIS) of the Department of Commerce and the Board on Science and Technology for International Development (BOSTID), the Canadian International Development Agency (CIDA), the U.S.S.R.'s VINITI, the Swedish Agency for Research Cooperation with Developing Countries (SAREC), the Swedish International Development Agency (SIDA), the German Foundation for International Development (GTZ), and the German Appropriate Technology Exchange (GATE) are all involved with information aid activities of one kind or another. Yet, not one of these agencies has an information program with IDRC's scope and dedication.

Operating in the global arena, though on a considerably reduced scale corresponding to their subject specialization, are national scientific and technical societies like the U.S.A.'s American Association for the Advancement of Science (AAAS), the U.K.'s Inter-University Council for Higher Education Overseas (IUC), the Netherlands Universities Foundation for International Cooperation (NUFFIC), the Association of Special Libraries and Information Bureaus (ASLIB), and the International Association of Technical University Libraries (IATUL), institutes like the Intergovernmental Bureau of Informatics (IBI), private bodies like the Rockefeller and Ford Foundations, and corporations like Information Management Incorporated (IMI).

Another organizational layer in the information environment is formed by regional networks/authorities and cooperative groups/service bodies, such as TECHNONET ASIA; Asia-Pacific Centre for Technology Transfer, Bangalore; Pan-African Documentation/Information System (PADIS); Organization of American States (OAS), Project on S/T Policy; Arab League Educational, Cultural and Scientific Organization (ALECSO); African Regional Centre for Technology (ARCT); and Organization for Economic Cooperation and Development (OECD); all of which span a wide range of information strengths and weaknesses and all of which have been supported or assisted by the ISD. Proliferation of such a variety of applications agencies, each with its own "turf" and each frequently incorporating protocols incompatible with other networks, paradoxically presents another barrier to the objective of these regions, wider cooperative systems.

A final layer of complexity results from the activities of national and local information agencies, some governmental, some non-governmental and nonprofit, and some neither. What is common to this environment is an absence of explicit knowledge about what is going on, a considerable competitiveness among different organizations, and a high probability of waste or ineffectiveness.

Lack of any directional authority over the institutions within the complex information environment coupled with the resources and capabilities of the ISD gives IDRC a major role to play, one which probably few other organizations can perform nearly as well.

C. STRATEGIC PLANS

The previous two sections have revealed the environment in which the ISD works and the objectives and organization of its program. Each section described the program of work which links the ISD in the information chain by which information is transferred and shared. Primarily using the project modality, the ISD supports within developing

countries activities that are concerned with advancing their indigenous capacity to identify and prioritize information needs, to identify and select information sources, to manipulate and process acquired information, and to retrieve, repackage, and disseminate information to a clearly identified target audience. The information chain, or the information transfer process, in each sector and at each level within the society, is deemed crucial for decision-makers and researchers who must take timely, well-founded, and accurate actions in order to improve the "quality of life" and to contribute to the socio-economic development of their country.

At the writing of this in-depth review, a new history, using the lessons of the past and visions for the future, is being created for the ISD. On the one hand, the various programs of the ISD represent many years of experience in analyzing and responding to the information needs in developing countries around the world, particularly, though by no means exclusively, the needs of researchers and policy-makers. On the other hand, the size and scope of the total program are limited not by the enormous, broad information needs of the Third World but rather by the limited availability of resources and by the specific mandate and policies of IDRC.

With both the needs and constraints in mind, this section identifies in point form the principal elements of the strategic program plans for the ISD over the next four years. These action-directed elements are placed in the broader context of each program in Part III. Some plans are section specific, but many apply to all components of the IS program.

The net cast by these plans is very wide; however, so are the needs and issues as illustrated by the recommendations of workshops and comments of the plenary speakers at the Conference on Research for Third World Development held at the University of Waterloo, May, 1985. Four

of the five research workshops expressed the need for improved information exchange and access to information for Third World researchers. Dr. Koesnadi Hardjasomantri of Indonesia encouraged greater support for abstract journals covering the work of Third World researchers. Dr. Jorge Hardoy, IDRC Governor from Argentina, requested support for several parts of the information chain: for media newsletters to highlight development projects and issues for special interest groups in research, for training journalists to popularize research results through the mass media, and for improved methodologies and technologies for collection and census data. Dr. Ralph Campbell, Director of the International Development Office (IDO) of Canada, emphasized that information is an important means and not an end; the objective of information systems must be to get quality information into the hands of the user for action.

Under the current prospects of little growth in budget or person-year allocation for the Centre in the next few years, the following directions will be pursued in each of the ISD programs.

SCIENCE AND TECHNOLOGY INFORMATION

1. Reduce gradually the size of the agricultural information program in order to use the resources released for other sectors of STI.

2. Control and reduce the level of support to later phases of existing projects, especially those which involve operational information services, either in international, regional, or national information centres.

3. Develop and expand the industrial and technology information program to address the scale of needs ranging from cottage and small industries to heavier industries relevant to the Third World.

4. Continue the development of regional energy information networks and SIACs in close association with the Centre's Energy program.

5. Develop and expand the marine/earth sciences information program with emphasis on support to Third World countries to collect and analyze information for planning and decision-making.

SOCIO-ECONOMIC INFORMATION SYSTEMS

1. Use the existing level of resources primarily to maintain the momentum in the major SEI sub-programs; i.e. social and economic information systems; environment, health, and population information; and infrastructure development.

2. Reduce the level of support provided to international organizations with high operating costs.

3. Place priority on short-term, innovative or pilot projects rather than on long-term infrastructure building.

4. Develop as a high priority the recently established information sub-programs in development economics and curriculum development; the remaining new sub-programs to be developed as circumstances allow.

5. Wind down gradually and terminate the SALUS indexing, abstracting, and information services as these are increasingly provided by national and regional health centres in the Third World.

6. Complete evaluation and review of the DEVSIS-Canada activities with a principal objective being integration into the most appropriate ISD program section or external agency.

CENTRE LIBRARY

1. Reorganize the Library and its staff to meet the challenges of its program under the present constraints on person-years and budget.

2. Shift the focus of library services from "information about the social and economic aspects of Third World development" to "information about Third World development with particular emphasis on information about research which adapts scientific and technical knowledge to the economic and social advancement of developing countries".

3. Fulfill the information needs of the following communities in order of decreasing priority: IDRC staff in Canada and abroad; IDRC projects; Canadian community concerned with Third World development; and other communities concerned with Third World development.

4. Absorb the planned growth in services to Regional Offices, Ottawa staff, and projects by reducing selected services to the external community.

5. Reduce significantly the role of the Centre Library in testing methodologies and technologies which are more appropriately tested in Third World libraries.

6. Expand the training and advisory role of the Centre Library which particularly serves the ISD programs (especially the sub-programs of SEI), other programs of the Centre, and the Regional Offices.

INFORMATION TOOLS AND METHODS

1. Support the adaptation and development of computer software by the Third World to meet specific developing country needs.

2. Facilitate computer-based and satellite-based communications, the access to and exchange of scientific data, to support developing country researchers.

3. Assist with the general transfer of cartographic and remote sensing technologies, primarily for application to resource management, to selected Third World institutions.

4. Develop the program-related and project-related roles of microforms as a media for information exchange, storage, and retrieval in the Third World.

IS COMPUTER SYSTEMS GROUP

1. Develop and support, in association with IT&M, an increasing number of projects which build the capacity of developing countries to apply and manage MINISIS-related software tools to meet their information needs and to operate in their own language.

2. Help initiate projects to identify, develop, and support national and regional MINISIS resource centres in developing countries to disseminate and support MINISIS as well as implement and maintain local language software tools for MINISIS.

3. Provide a continuing quality of support to new and existing developing country users of MINISIS without expanding the existing level of personnel within the section. The implication, given the anticipated growth in the number of MINISIS users, is that the budget available for increased travel as well as professional and special services must be made available directly through the section's budget or indirectly through the DAP or project budgets.

4. Devise methods, possibly related to MINISIS fee structures or generated revenue, that would enable developing country MINISIS

resource centres to become at least partially self-sufficient in the long-term provision of MINISIS support services.

5. Make efforts to strengthen the technical MINISIS knowledge of the commercial distributors in order to reduce their demands on Centre staff.

GENERAL

1. Develop further ISD's liaison with other Centre programs and other donors to maximize the use of resources and the impact of the information component and projects and to minimize the risks of duplication.

2. Negotiate and build an evaluation component into all projects over $350,000.

3. Change the status of the Computer Systems Group and the Centre Library to full program sections.

4. Incorporate the Micrographics and DEVSIS/SALUS Within-Centre activities into the program sections.

5. Seek the resources needed to develop and implement projects in the sub-programs identified by each of the sections.

Although achieving all these ends for all of the user communities in the Third World is impossible for any development aid program, the information programs of the ISD do address a wide range of user communities, information channels, and types of information relevant to research and decision-making for development.

D. RESOURCE IMPLICATIONS

Strategic planning of development aid programs is based primarily on a long-term vision of which activities are appropriate to the IDRC mandate and the needs of the Third World, a perspective

introduced in the previous sections. A secondary but, nevertheless, very important concern is that of resource allocation to achieve the long-term goals of the ISD and the Centre. To identify future options for resource allocation, past and current trends are analyzed.

Human Resources

The ISD experienced its most rapid staff growth in the first five years, 1972 to 1977, (Figure 1, p. 47) when it reached 70 positions. In the eight years to 1985, another ten positions were added, most of this growth occurring during the past four years.

Growth has been selective. The ISD has reduced the number of Within-Centre activities and has controlled the size of the Centre Library and IS Computer Systems programs, which are integral components of its long-term strategic plans. Thus, the number of positions allocated to Within-Centre activities has decreased since 1980 (Figure 2, p. 47). Staffing growth has been directed into Division Management and Technical Support for program and project development and work.

The principal Within-Centre activities which have evolved into program sections are the Centre Library and IS Computer Systems (Figure 3, p. 49). As indicated by the graph, the number of authorized Library positions has not changed significantly (has actually decreased) since 1974, when 23 positions were allocated. The actual number of people on staff during the early years was generally higher than budgeted. While Library staffing has not increased, the size of the Centre and the diversity, volume, and quality of Library services have increased several fold.

Since the completion of the initial MINISIS development and the establishment of separate Electronic Data Processing (EDP) Services in Office of the Comptroller General and Treasurer (CGT) in 1982, the size of the Computer Systems Group has been stabilized as well. Both in the case of the Library and the Computer Systems Group, increased

Information Sciences

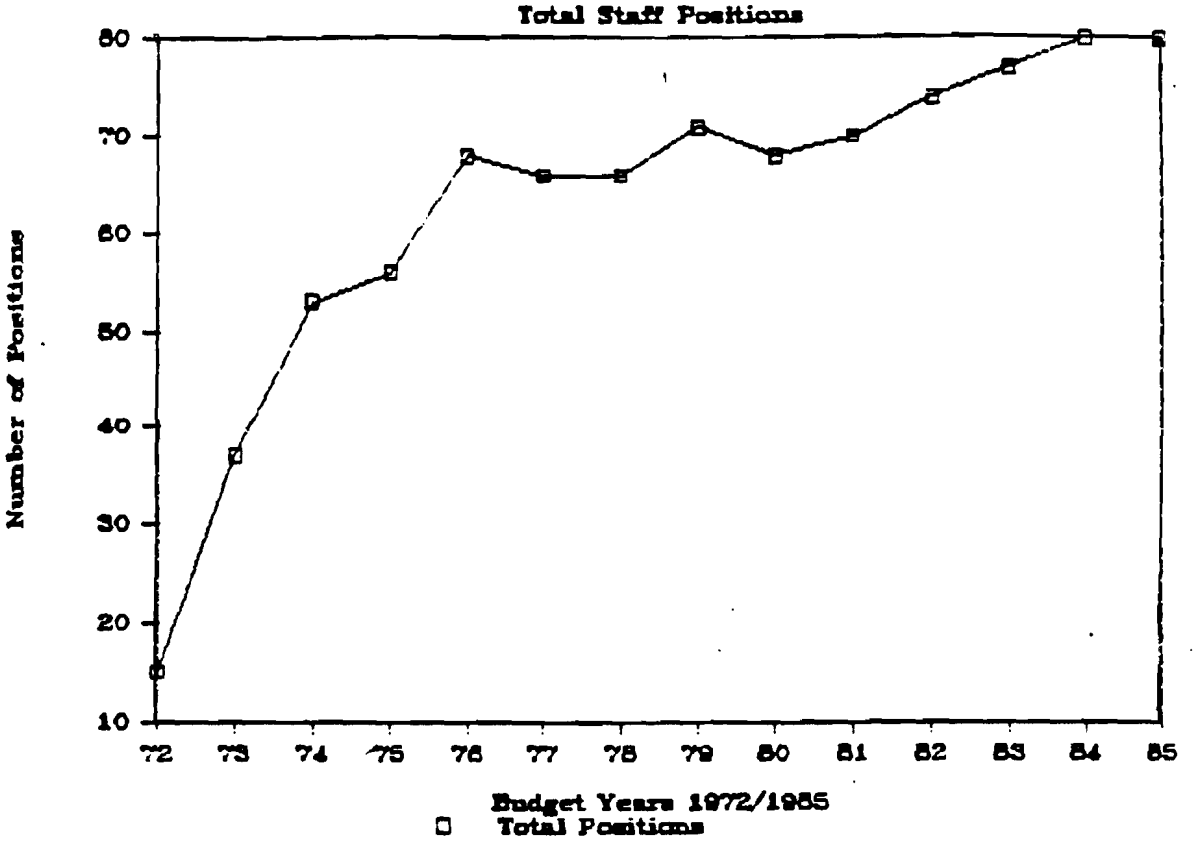


FIGURE 1

Within-Centre Activities & Program

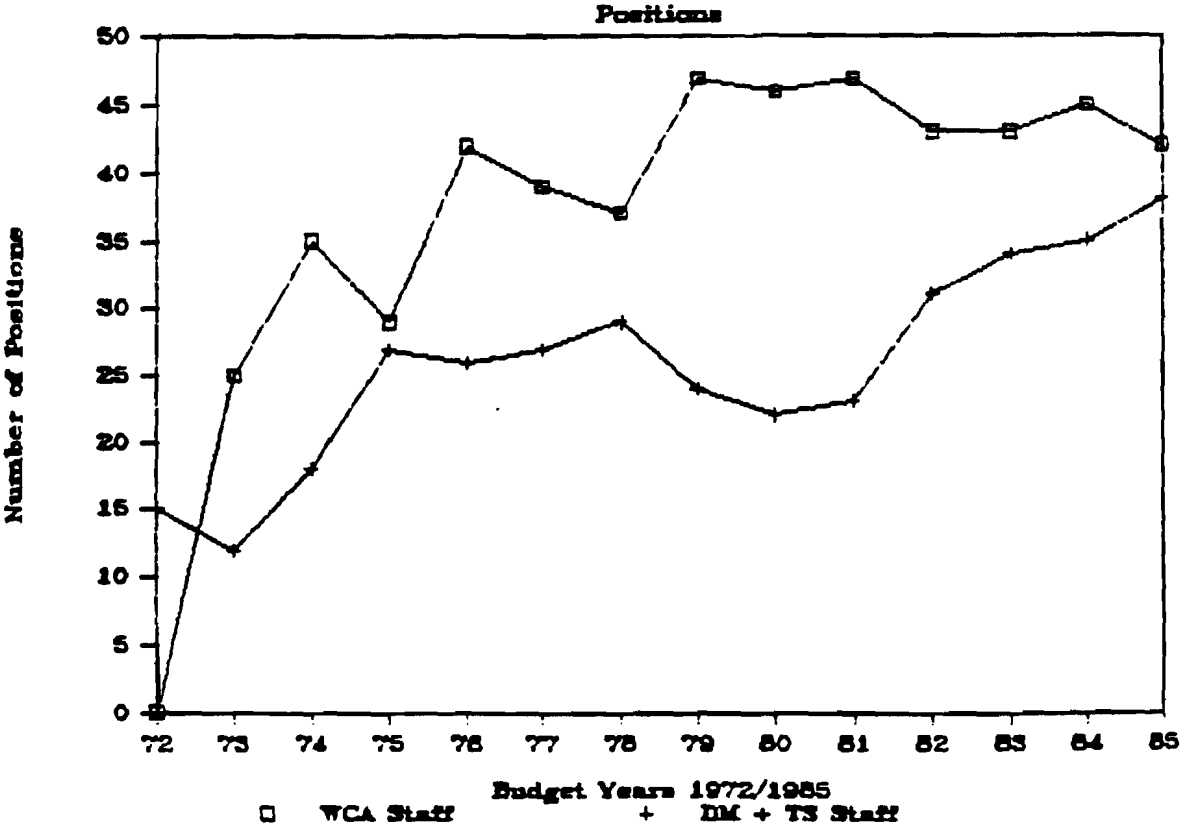


FIGURE 2

demands for services are being met via other mechanisms, including adjusting of priorities, dropping of low priority activities, and purchasing from or developing services in other organizations, usually in the Third World.

The new positions created over the past five years in Division Management and Technical Support have mainly been professional positions (above Level 8). The ratio of professional to support staff has consequently increased to 1.8 from 1.4 four years ago (Figure 4, p. 49). Staffing MERO and SARO with Regional Program Officers who receive support locally on the Regional Office budgets accounts for the increase only to a small degree. Therefore, a high priority will be given to reducing the ratio to about 1.5 in order to relieve excessive pressure on support staff and to increase the efficiency of more expensive professional staff.

Changes in staffing levels must be interpreted in terms of productivity. To measure and appreciate fully the productivity of the ISD requires the analysis of numerous complex activities and services. For example, the impact on productivity of the audits and reviews, which the ISD has undertaken the past two years during its period of reorganization and program growth, is not immediately apparent; yet, audits and reviews have demanded considerable staff time. However, a reasonable approximation of productivity can be determined through the most basic measure of the Centre, number of new projects.

Number of projects more accurately measures productivity than dollars appropriated because many of the overheads of project development and monitoring are independent of size of project budget. The pressure of Centre programs is not to spend dollars but rather to help as many recipients as possible to carry out research and research support activities which are measured in projects and recipients. Between 1978 and 1984, the ISD has quadrupled the number of new projects appropriated annually (figure 5, p. 51). More than 40% of all

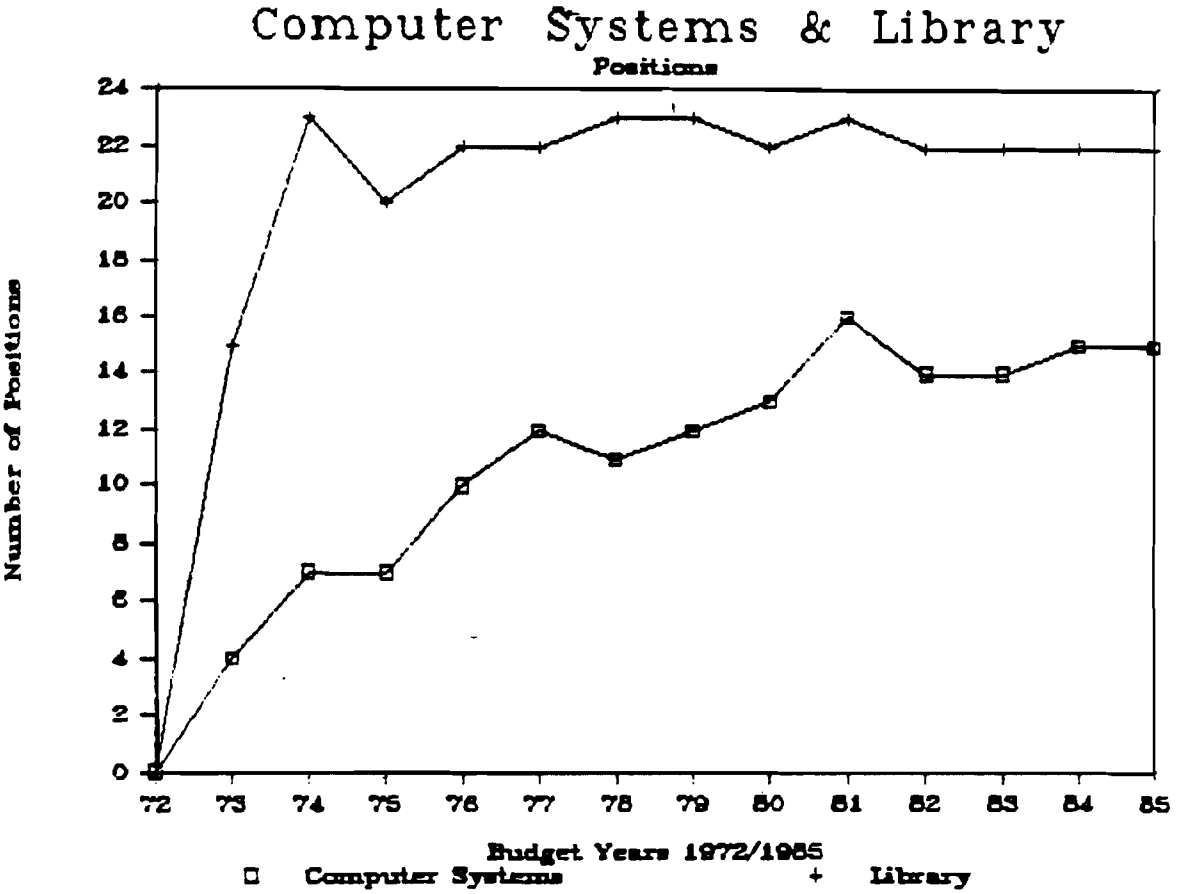


FIGURE 3

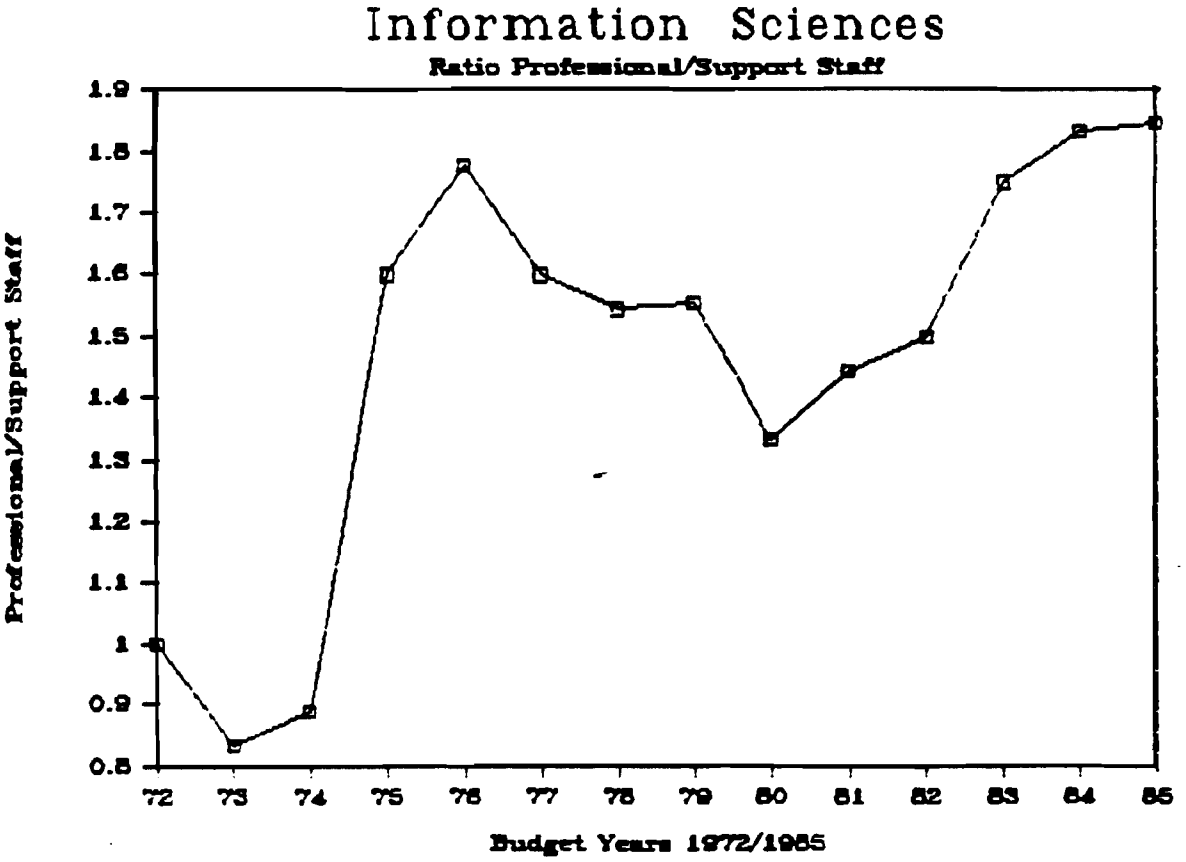


FIGURE 4

projects appropriated were approved in the past three years. This rapid growth rate will stop for two reasons: the recent budget restraint and the fact that monitoring of a growing number of active projects will reduce time available for developing new projects.

Growth in the number of new projects designates a real increase in the number of new projects per staff member (figure 6, p. 51). When averaged across Division Management and Technical Support staff, the figure is currently 1.3 new projects per position. When averaged across all the ISD staff (including the Centre Library and Computer Systems Group who do not normally develop projects), the figure is nearly 0.6. It is very difficult to interpret this figure in relation to the level for research divisions. However, the figure does represent a large increase in the ISD's project productivity and can be used as a benchmark in future years.

The primary staffing considerations for the next four years can be summarized as follows:

1. no or low growth in number of positions;

2. maintaining staffing levels of Library and Computer Systems;

3. converting positions that become redundant to support positions in Division Management and Technical Support;

4. maintaining productivity level of 0.5 to 0.6 new projects annually per ISD staff member.

Financial Resources

The ISD's budget has traditionally consisted of four major components:

- project appropriations (regular and Coop);
- Within-Centre projects;

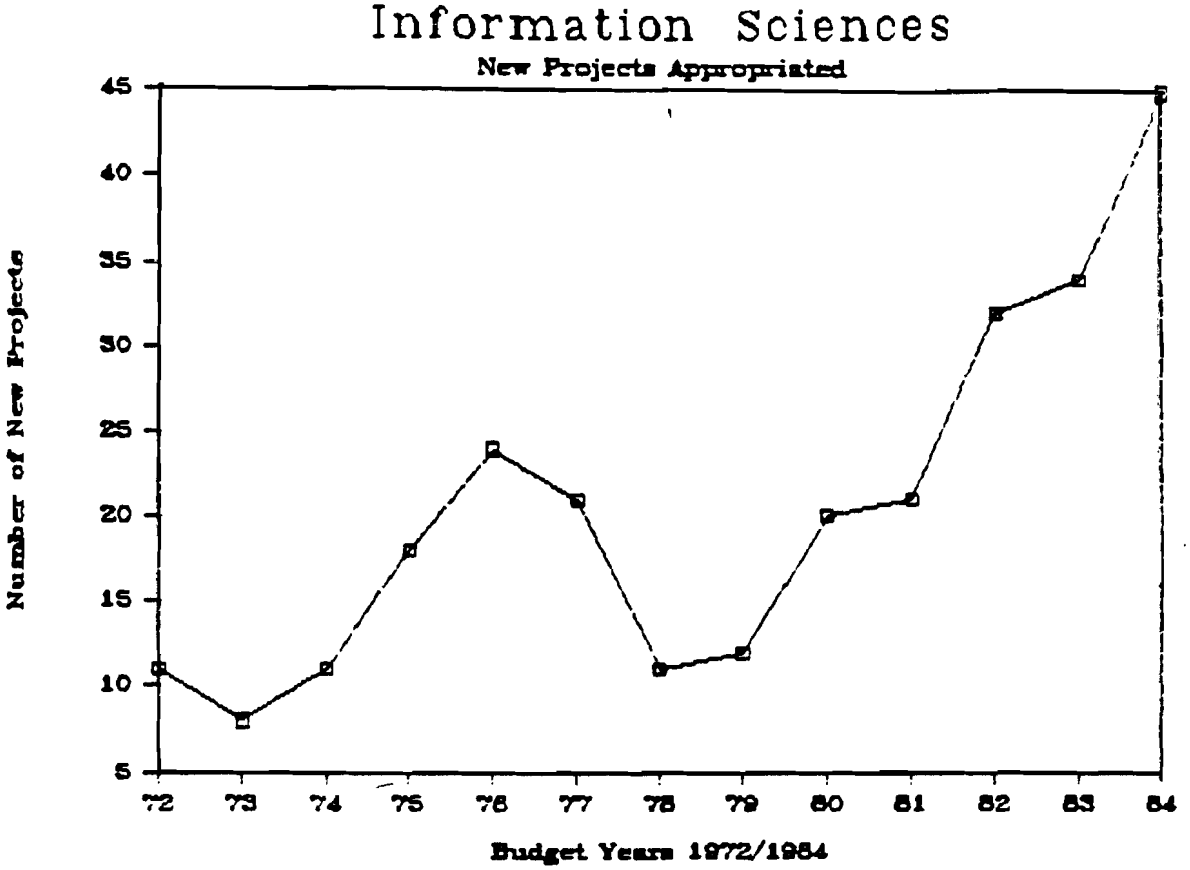


FIGURE 5

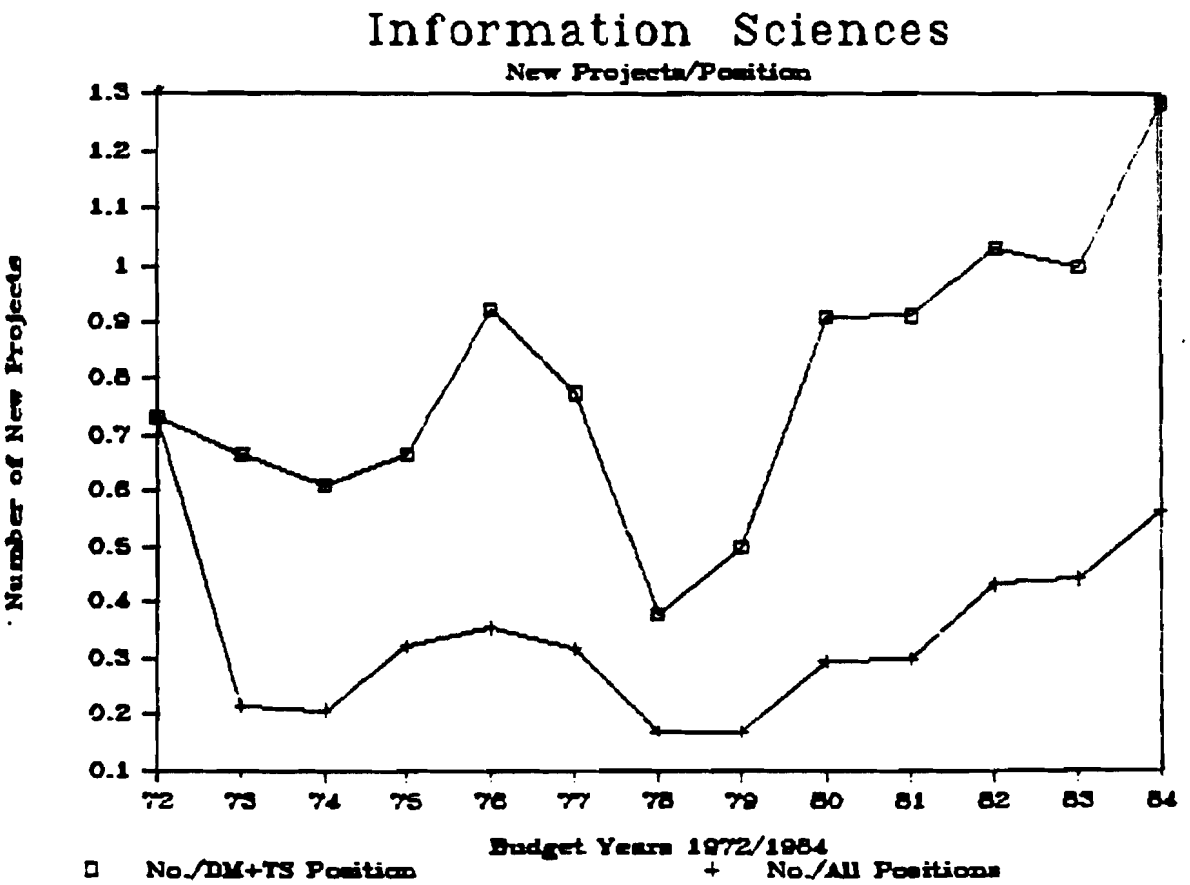


FIGURE 6

- DAPs (regular and Coop);
- Division Management and Technical Support.

Three of the four components are common to the research divisions. However, both the Communications and Information Sciences Divisions support programs (publications, library, computer) which are directed to Third World needs but which are managed and carried out by permanent staff working mainly in Ottawa, a power explicitly assigned by the mandate of the Centre. Activities have been handled administratively like projects with the exception that staff were placed on the person-year rolls of the Centre. These projects have existed for many years, have amply demonstrated their impact and thrust, and have become an integral part of the Centre programs. The ISD is, therefore, assigning program rather than project status to the Centre Library and IS Computer Systems, and these activities will, henceforth, be treated similarly to the other programs in its budget.

A key element in the ISD's strategic plans remains the expansion of the budget lines for regular project appropriations while controlling the expansion of the Library and Computer Systems budgets. Although Within-Centre expenditures grew more rapidly than project appropriations (Figure 7, p. 53) from 1976 to 1980, in recent years efforts to reverse the trend have succeeded.

Following the steep climb from 1981-1982 through 1983-1984, expenditures will remain constant or even decrease marginally through 1985-1986. Thereafter, limited budget increases representing inflation correction rather than growth (Figure 8, p. 53) are projected by the Centre in Program and Policy Review (PPR) VII. Under these circumstances, the launching of the new sub-programs, planned and prepared during 1984-1985 and described in detail in Part III, may be possible.

The preferred option shown in Figure 8 was determined by adding 20% in 1986-1987 to the budgets of the SEI and STI programs. Although the outlook for injection of new funds into the Centre is

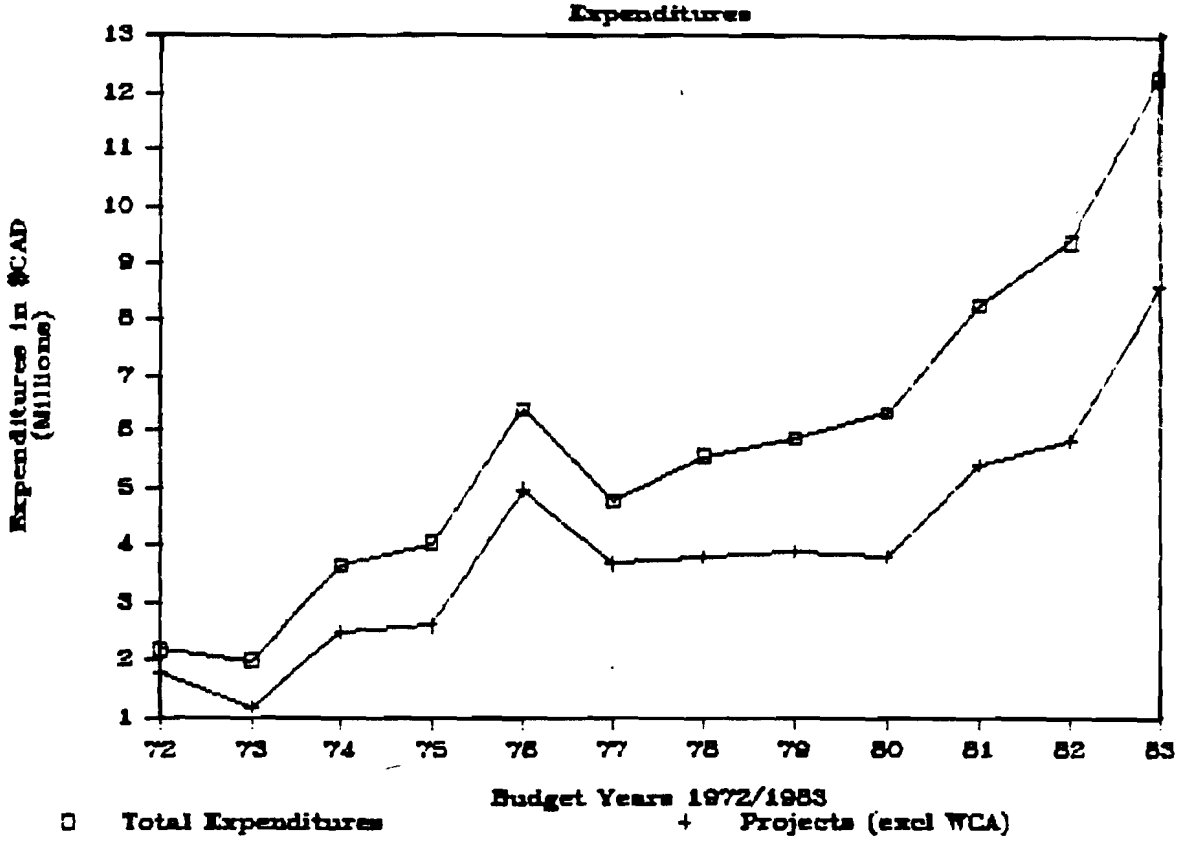


FIGURE 7

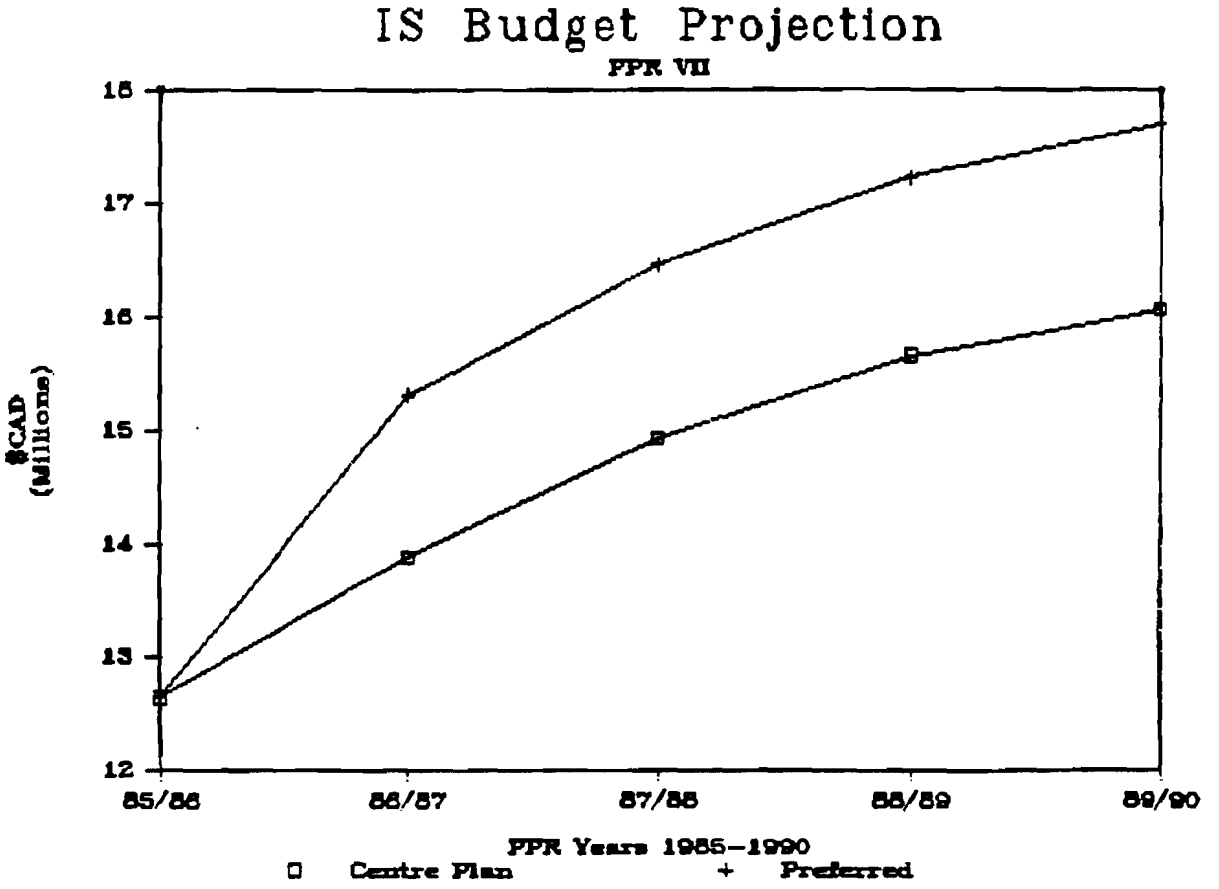


FIGURE 8

presently uncertain, the ISD can utilize effectively such an increase (roughly $2 million or 10 projects) for its new sub-programs, specifically to develop the larger capacity-building projects. In the meantime, projects in these sub-programs will be largely confined to low-cost exploratory activities which, in turn, place additional pressure on the DAP budget that wasreduced 20% by the Centre between 1984-1985 and 1985-1986.

Under the current no-growth plan of the Centre, the first priority will be to control overheads (19%) from taking an increasing proportion of the budget at the expense of the program appropriations (77%). The budget breakdown for 1985-1986 serves as a benchmark (Figure 9, p. 55). However, the ISD does hope to increase the DAP budget back to 5 to 5.5% of the total as soon as the Centre will allow.

Until supplementary funds become available, no significant changes are foreseen in the distribution of program funds between the six program budget lines (Figure 10, p. 55). Any new funds, however, will be channelled to the STI, SEI, and IT&M to increase the level of regular program appropriations.

The key financial planning elements of the strategic plans for 1986-1990 are, therefore, as follows:

1. Acquire program status in the ISD's budget for the Centre Library and IS Computer Systems Group.

2. Hold overhead costs below 20% of total in order to maintain program appropriations at 75% or higher.

3. Increase the DAP budget line to at least 5% of total.

4. Seek supplementary funds (approximately $2 million) to develop sub-programs within the STI, SEI, and IT&M programs.

IS Budget Breakdown

1985/86

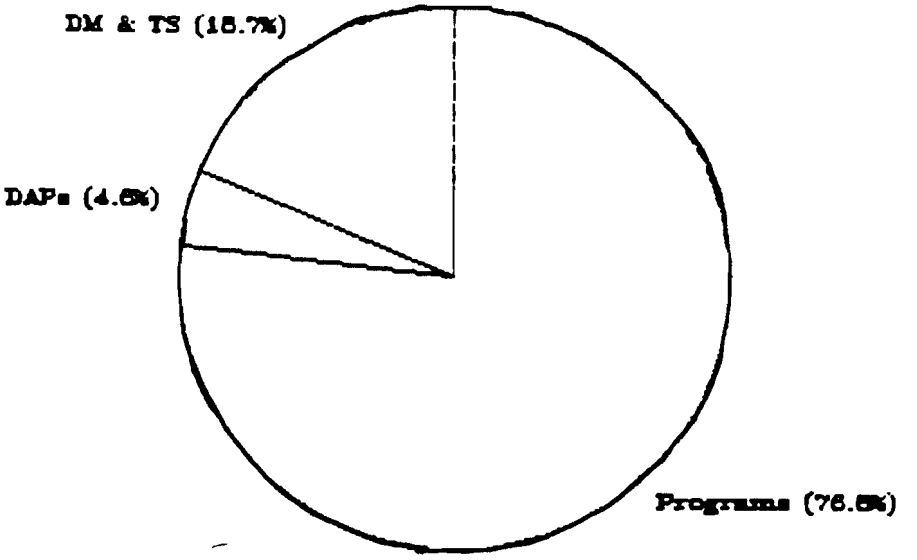


FIGURE 9

IS Budget Breakdown

1985/86

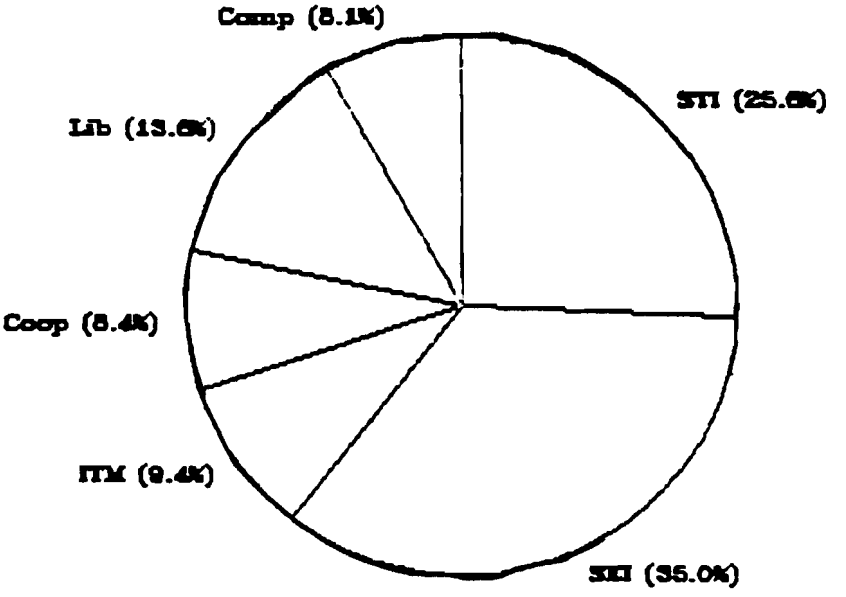


FIGURE 10

PART III: PROGRAM BACKGROUND DETAILS AND RATIONALE

Part III of the report provides brief background information and presents in detail, by section, the long-term program of the Information Sciences Division (ISD). It also contains much of the rationale for the strategic actions presented in Part II.

BACKGROUND

Until 1984-85, the structure of the ISD's program has been constant* and can be summarized as follows:

- Information about Development intended to propagate information about development, with a potential related goal of influencing opinions and research directions concerning development, to a carefully delineated target audience.

- Information for Development intended to provide assistance for the actual creation of information appropriate to development, from and by the developing countries themselves, in industrial, agricultural, population/health, communications science, social issues, cartographic, and environmental areas, with the primary objective of providing information to help foster a self-sustaining improvement in the specific area of application.

- Infrastructure Development intended to aid the creation of the necessary systems, mechanisms, and cadre of trained personnel for effective application of information resources in developing countries. This activity was implemented through:

* See Part I, Program History: Change as Continuity - An Evolving Division, if more historical detail is desired.

- national and regional systems with a primary goal of effective systems creation to realize objectives relating to effective information use, promotion of beneficial sharing, maximizing of available resources and identification, collection, and communication of information unique to developing countries;

- libraries, with a primary goal of effective bibliographic control of print, print-related, and appropriate non-print materials, its goal realized through personnel training, development of bibliographies, tools for bibliographic control, and mechanisms for resource-sharing; and

- computer systems, with a primary goal of effective application of information-related computer techniques to developing countries, its goal realized by and large through a series of MINISIS developments and continued support of MINISIS applications.

- Within Centre Projects intended to provide practical assistance on information problems in developing countries, with related objectives which have varied from project to project, and to provide information support to IDRC staff. Included in this category are the Centre Library, Computer Systems Group, and several mission-oriented databases.

In the fiscal year 1984-1985, the Infrastructure Development program was restructured. With the expansion of computerized methodologies for information handling and the importance of developments in telecommunications technology for information activities, computerized methodologies have become a major element in information systems applications. At the same time, external developments relating to national information needs within the field of information demanded that greater emphasis be given to non-bibliographic materials along with the traditional bibliographic information types.

As a result, a new program, Information Tools and Methods (IT&M), was created. Its main objective is to support, via projects in developing countries, the use of tools and methods (hardware and software) to improve access to and application of information, usually in support of research, by developing countries. Except for its activities which provide information about the technologies and techniques themselves, the program concentrates on projects concerning technologies and techniques used to describe, store, manipulate, or transmit information rather than on the information content itself. Thus, IT&M attempts to generalize and package experience with information-handling tools and methods.

In fiscal year 1985-1986, a major realignment of divisional program responsibilities eliminated the categories of Information about and for Development. In their place, the mission-oriented categories, Science and Technology Information (STI) and Socio-Economic Information, (SEI) were created.

In the past, the ISD has had two major components within its organizational structure. (Appendix A: Organizational Charts) One component consisted of three sections, currently STI, SEI, and IT&M, which use primarily the project modality for executing the ISD's mandate. The other component consisted of two sections, the Centre Library, which provides information support to IDRC staff and Centre projects and serves as a major information resource to the development community within and outside Canada, and the Computer Systems Group, which is responsible for ensuring that computer software developed within the ISD is maintained and consistently responds to the needs of projects within developing countries.

These two sections were identified as Within-Centre Projects, the Centre Library so designated since 1971, and the Computer Systems Group since 1975. Effective 1986-1987, these two sections should become "regular" budget line items within the ISD. Although this change may not have a significant impact on the ISD's operational budget, the change will facilitate a more efficient utilization of the resources available for achieving all its objectives. In addition, and perhaps equally important, anomalies within the ISD's organizational structure will be removed. The justification for this change becomes more evident in the detailed review of the Centre Library's (Section D) and the Computer Systems Group's (Section E) respective programs and future directions.

Since SEI has witnessed the greatest change and restructuring within the last two years, Section B, dealing with the sub-program, is the longest presentation. The focus and fine-tuning of the parameters of its subject scope are made evident by the detailed definition of each of its sectors. As a result of this review process, a "benchmark" will have been created for the SEI section for the next four years.

A. SCIENCE AND TECHNOLOGY INFORMATION PROGRAM

The STI program encompasses the broad area of the natural and physical sciences that pertain to development. As has been alluded to in Part II, developing countries are particularly disadvantaged by restricted access to scientific and technological information and quality information systems. A dependency relationship on the vast databases of industrialized countries is often the sole means of obtaining scientific and technical information, even about the work done in one's own country or region. Coupled with the fact that the information picture in many of the disciplines involved requires sources beyond standard bibliographic information tools, the need for packaging information appropriately for the user remains crucial. The ISD's response has traditionally been to try to reduce, wherever appropriate, this dependency relationship and to support indigenous self-reliant services in response to user needs in three broad areas of science and technology information: agriculture, industry, and earth/marine sciences or natural resources. In addition, a small sub-program called national/regional infrastructures for multi-sectoral activities is supported.

Agriculture: Agricultural information covers a very broad subject scope. In general the STI program adheres to the outline and concept of the Agriculture, Food and Nutrition Sciences Division (AFNS) programs which place improved food production as their main objective:

- crops and cropping systems;
- animal production;
- forestry;
- fisheries; and
- rural development issues pertaining to land and farming.

The user community (and needs) to which the STI program must respond is very complex and involves the operators (farmers), the advisors, the managers, the planners, the scientists and research workers, and policy-makers at the ministerial level. Similarly, the agricultural information required by the hierarchy of users is varied and consists of the physical/biological components (soils, nutrients, meteorology, germplasm, pathogens, etc.); the production mode (land, labour, capital, etc.); the management methods (farming/cropping systems, costs, constraints, etc.); the policy medium (laws, regulations, standards, taxation, etc.); and the value system (rural/social context, marketing, trade, etc.).

More than a third of all IS projects have been concerned with agricultural information; thus the ISD has acquired considerable experience in and knowledge of agricultural information systems and services in the Third World. Most of the support has been given to four types of institutions: the International Agricultural Research Centres (IARCs), international or regional information centres, national agricultural centres, or sub-national information centres usually within a regional information network. This program, which has supported projects in countries comprising 85% of the Third World population, has been instrumental in establishing many of the agricultural information networks and services available in the Third World today.

Over the next four years, agricultural information will remain the largest sub-program in STI and the ISD. However, the budget will be gradually reduced from the earlier 35-40% level, to 20-25% of the total IS appropriations budget in order to release resources for the other two STI sub-programs. Savings will be made in some areas of agricultural information, and some new areas will be developed.

Most centres of the Consultative Group on International Agricultural Research (CGIAR) network have developed their information programs with IDRC funding and are currently receiving IDRC funding. Support to existing CGIAR programs will be reduced in future phases,

and selected new initiatives will be funded, such as projects with the Centro Internacional de la Papa (CIP), the International Irrigation Management Institute (IIMI), and the International Network for the Improvement of Bananas and Plantains (INIBAP). These projects often involve close liaison with colleagues in the AFNS Division.

The Fisheries sub-program is evolving from an in-house fisheries information service, which was retired last year, to regional networks. The first network has been developed in Southeast Asia in the areas of aquaculture, mariculture, and artisanal fisheries as well as the more technology oriented Monitoring, Control and Surveillance Systems (MCS) for Economic Exclusive Zones (EEZ). This sub-program is a young information field for most countries and considerable demand is being placed on consultancies, advice from ISD staff, and training opportunities. Therefore, many activities will be supported jointly with the Fellowships and Awards and Cooperative Programs Divisions. Africa and Latin America, using the models of Southeast Asia, are targets for projects linked to global fisheries information networks.

The ISD's program has assisted many developing countries in establishing national agricultural information centres to become active AGRIS centres. The centres were given the capacity to capture the national agricultural information as a basis for effective information services as well as for input into the global AGRIS database coordinated by FAO. This sub-program is already becoming smaller as many developing countries with ISD support have already implemented their centres. Continued support to new initiatives and existing projects will be given when merited.

The ISD will continue to fund the establishment of both bibliographic and non-bibliographic information services. The latter may include marketing boards, cooperatives and "grass roots" information activities, statistical or raw data banks, analysis of data (food accounting matrices), and extension services. These may include the development of documents and/or software (audio-visual, computer programs, etc.) for publication and distribution.

The broad base of the existing program will be continued over the next four years. However, there will be greater emphasis on the packaging of information services than that which is already available and on the wider application of agricultural data banks and inventories of projects, institutions, and people (putting people in touch with those who have the knowledge).

At least 65% of the budget of this sub-program will be needed to fund subsequent phases of current projects. The current budget restraint will place greater pressure on recipients to establish priorities carefully, to contribute a larger part of the project budget, and to take on the full cost burden of the operational information service at an earlier stage.

Industry and Technology Information

The ISD's involvement in this field has been dominated by a single activity: TECHNONET Asia. This series of projects has had a major impact in the Asian region and has given the ISD an experience upon which to measure the needs of users of industrial technical information. However, until recently, when a program officer was recruited specifically for this work, this field was dormant.

The sub-program is currently under gradual and careful development, caused partly by the recent and unexpected budget reductions and partly by the need for the program officer first to review the options before embarking on a specific path. Many needs for which priorities must be set have been identified in developing countries.

Numerous subject areas are included under the umbrella of industrial and technology information: mining and quarrying; processing of coal, ferrous, and non-ferrous metals, non-metallic minerals; geotechnical surveys; food technology; biotechnology; post-production systems for food products; textile manufacturing; forest and wood

industries; chemical production; pharmaceuticals; petrochemicals and fertilizers; rubber and plastics processing; agricultural engineering; roads and transportation information; electric and electronic industries; waste processing; building and construction; patents and standards information; work study and productivity; industrial extension; and intermediate technology; however, the sub-program will not be structured along subject lines.

Like TECHNONET and the Caribbean Technology Consultation Service, ISD is looking for a regional framework in which to concentrate its suppport. An important example is the UNIDO/OAU/ECA decade of Industrialization in Africa and role of the Southern African Development Coordination Committee (SADCC). Tanzania has assumed responsibility in SADCC for industrial development and Zambia the responsibility for mining technology.

Contacts with international bodies and associations such as the United Nations Industrial Development Organization (UNIDO), the World Industrial Patents Office (WIPO), and the World Federation of Engineering Organizations (WFEO) are also being strengthened. Use of DAP funds is essential for these sub-program and project identification activities.

A need to clarify some of the concepts of cottage, small, small-to-medium, medium, and heavy industry and to develop a rough typology of management/operator needs also exists. Once this framework is developed, a significant increase in funding of the sub-program will be required, about $1.5 million annually.

Energy information forms a sub-activity of the industry and technology information program. A special fund for energy projects was created in the Centre following the United Nations Conference on New and Renewable Sources of Energy in Nairobi in 1981, and a commitment to specific support by the former Prime Minister Trudeau. However, there have been several kinds of difficulties in defining and implementing information projects specific to this field.

Firstly, the community of users in developing countries needing information about energy is very diffuse and spans many of the information communities that are already supported by other information services. Thus, because the risk of duplication of effort is very high, project development requires thorough investigation of existing services.

Secondly, because the community is so diffuse, little is known about its priority information needs. Therefore, before embarking on a program, the ISD sponsored two end-user research studies. Based on the results, a decision has been made to focus on information relating to small-scale energy systems and on dissemination of research results with practical applications. Information concerning energy conservation, energy audits, and the conversion and adaption of appropriate technologies (with most emphasis placed on wood/biomass) is of primary concern.

Regional information networks are being explored in Southeast Asia and the Caribbean. Specialized information analysis centres are being considered on the topics of biomass/fuelwood utilization, gasifiers, wood stoves, geothermal power, solar energy for rural use, and mini-hydro energy sources.

The capacity to fund these activities will be reduced significantly when the special energy funds lapse in 1987-88. Nevertheless, the projected energy shortages and escalating costs of many sources of energy underscore the long-term need to assist developing countries to adopt alternative sources. There is no doubt that improved energy information services are needed to reduce the gap between research and application of results.

Earth/Marine Sciences

One of the basic requirements for a nation to achieve development for its peoples is to know its natural resources and to be

able to manage and exploit these wisely for current and future generations. To accomplish this they require information on the geography, the geology, the flora and fauna, the hydrology, and, in some cases, the oceanography of the country. This information, once acquired, must be analysed and synthesized to result ultimately in decision-making.

New technologies, some of them supranational like satellite imagery for remote sensing, have increased by many orders of magnitude the amount of data available and the rate of data collection. However, little of this data is held by Third World countries themselves or is used by them for decision-making. Some of these technologies are very costly and beyond the means of IDRC to fund on a large scale. However, IDRC can act in unison with other donors that do provide massive infrastructure funding.

The STI Section will, consequently, participate in cooperative programs sponsored, for example, by UNESCO and Intergovernmental Oceanographic Commission (IOC) who work with UNDP funds. The approach will be multidisciplinary and based on international cooperation. Mainly, the role of the STI program will be to initiate feasibility studies, to assist the developing countries to prepare for decision-making in the arena of the large donors, to stimulate regional coordination, to carry out surveys, and, on a limited scale, to establish SIACs in selected fields.

It is anticipated that many of the ISD's projects will complement research programs being supported by other divisions of the Centre. Oceanographic information activities will relate to the fisheries networks, desertification information to semi-arid agriculture, and crop/weather mapping to cropping systems. Because of the special expertise and interests of the Canadian research community in resource management, there is every expectation that the proportion of cooperative projects will be high in this sub-program.

B. SOCIO-ECONOMIC INFORMATION PROGRAM

The Socio-Economic Information (SEI) program has the responsibility for social and economic systems, human environment, health and population issues, and information infrastructure development.

At a meeting of various international agencies which sponsored the establishment of the Development Sciences Information System (DEVSIS), development was identified as "one of the most important missions facing the world in the third quarter of the 20th century". DEVSIS is a major component of the SEI program; and the ISD strongly believes that the provision of support for socio-economic information systems and system infrastructures must be considered a task of vital importance for the development process.

The 1984 reports of the Centre's Regional Offices highlighted research priority areas which must be addressed by the program divisions if they are going to be responsive to regional needs (see Table on page 68). These areas have in a major way influenced SEI's program statements in the Centre's 1985-86 PWB. The key areas identified were drought, famine, food imports, food production, and nutrition; population growth, migration and the plight of refugees; poverty, unemployment and urban growth; and law and development. However, as stated in the 1985-86 PWB (pages 137-138): "A 7% increase in our (SEI) budget would have allowed us to continue our existing initiatives and to prepare for new program areas. To also launch new program initiatives based on the findings of our reviews and studies would have required an overall increase of 20% in the budget." Given that (i) the anticipated budget increases did not materialize in 1985-86, and (ii) the constraints of the present four-year no-growth budgetary forecast, the new priority areas (items with an asterisk overleaf) can be introduced only gradually into the SEI program.

SEI PROGRAMS IDENTIFIED AS PRIORITIES IN 1984 IDRC REGIONAL OFFICE REPORTS

SEI PROGRAM LINES	SARO	ASRO	MERO	LARO	WARO	EA
1 Social & Economic Systems						
1.1 Development Planning		X				
- Devsis-like	X	X	X	X		
- Public Administration *			X	X		
& Management	X	X	X	X		
1.2 Development Economics *						
- Labour & Employment			X			
- Trade & Marketing		X			X	
- Fiscal Issues & Foreign Debt		X	X		X	
- State & Public Enterprises	X					
1.3 Social, Legal & Cultural Issues						
- Education	X	X	X	X	X	
- Legal Affairs (Law & Development)	X	X	X	X	X	
- Women in Development						
- Language & Communication			X	X		
- Humanitarian Affairs	X	X	X	X	X	
2 Human Environment, Health & Population						
2.1 Human Environment						
- Ecology *						
- Human Settlements		X	X			
- Waste Management & Utilization *				X	X	
- Water & Sanitation	X			X		
2.2 Health		X	X			
- Biomedicine (Tropical Diseases)				X		
- Occupational Health and Safety *	X			X		
- Public Health (SALUS)			X			
- Traditional Medicine *						
- Nutrition			X	X		
2.3 Population						
- Demography			X			
- MCH & Family Planning *	X	X		X	X	
- Migration & Transportation *			X			
- Urbanization *	X		X	X		
3 Infrastructure Development						
3.1 Library & Archives & Records Management	X					
3.2 National & Regional Systems			X	X		
3.3 Curriculum Development*		X				

*New Program thrusts identified in the 1985/86 Program of Work and Budget

Needs assessment studies and evaluative reviews through consultancies, workshops and seminars, and consultations with regional office staff will continue to provide information to aid in strategic planning and the management of the limited financial and human resources available to the program. For instance, the Information Sciences Regional Profile for EARO, prepared by our Regional Program Officer for the Eastern and Southern Africa Region last year, identified some basic areas that should be considered to ensure a better understanding of the information environment in Africa. These included research into the process of information transfer in development decision-making in Africa, provision of information management support to key development activities, and the development of local human resource capacity in the planning of library and information services. This year a similar profile for SARO highlighted the need to work with NGO's in South Asia. Regional IS profiles and the Centre's Regional Office reports both enable us to develop a program that is geared towards reacting to regionally- rather than globally-identified priorities. Thus, not all topics are pursued in all regions. Indeed, attention will be directed to those areas within a region (e.g. drought and famine in Africa, curriculum development in Anglophone Africa, migration in the Middle East) identified locally as important. This helps to further narrow the focus within sub-program areas by region-related priority activities.

Although a number of new priority areas have already been identified, aside from some issues, such as trade and fiscal issues and curriculum development, requiring urgent attention, the introduction of new program/project initiatives will have to be delayed because of budgetary constraints. However, program definitions and priorities will continue to be set and implemented when possible.

The refugee problem is pertinent to both social, legal, and cultural issues and human environment, health and population program areas. The statistics related to refugees are staggering. In 1983, the United Nations High Commission for Refugees (UNHCR) estimated that

there were 10-11 million refugees around the world. The SEI section intends to collaborate with the Social Sciences Division to determine the priority needs for information programs and activities on refugees.

A balance must be sought between consolidation and persistence and the pursuit of new initiatives, such as ISD's newly identified thrust in trade and fiscal issues. The process should be evolutionary rather than revolutionary, should build on past experience, and should maintain the momentum of existing programs without sacrificing ISD's capacity to be responsive to the real needs of recipient organizations. One immediate constraint concerns the need for continuing support in some projects; for example, it is likely that 20-30% of the SEI budget will be needed for Phase II/Phase III activity.

There is a strong recommendation from the regions that, as is the case for the Social Sciences Division, program or institutional support should complement project support, especially for NGOs. Core support for an organization's basic needs, to sustain an institution or a program, could provide a useful maintenance function and reinforce IDRC's interest in maintaining the coordination of information resources. Longer first-time grants or small institutional grants administered by third parties also should be promoted when the Centre's grant level is substantially increased.

There are obviously insufficient funds to support all the demands likely to be placed on the program. The criteria for selecting projects, therefore, become critical, for urgent needs must be matched with the available support capability. Thus, the impact of reduced funding should be maximized by giving priority to those projects that can have a multiplier effect. The funding of experimental pilot projects to test innovative techniques and new technologies or to demonstrate, on a limited scale in national environments, the feasibility of systems such as DEVSIS (for developing planning), Population Information Network (POPIN) (for population), Red Panamaericana de Informacion y Documentacion Técnica en Ingenieria

Sanitaria y Ciencias del Ambiente (REPIDISCA) (for water supply and sanitation) should provide models that could then be used directly by interested countries/organizations. Also, support for activities based at the UN and other international organizations, which have high operating costs, should be reduced drastically.

While the three SEI budget lines - Socio-Economic Systems; Human Environment, Health and Population Issues; and Infrastructure Development - reflect adequately the areas of concentration, broad working definitions of all active and potential SEI sub-programs together with an indication of proposed activities for the next four years follows. These definitions also serve as guidelines for communication within the Division and will be refined in concert with the Board's Review of ISD.

The first sub-program is **Social and Economic Systems.** This sub-program includes three broad categories: Development Planning; Development Economics; and Social, Legal and Cultural Issues. A further breakdown of these categories is given on page 68. Unless there is a substantial change in the Centre's appropriation levels during the coming four years, approximately CAD 1.3 million will be appropriated each year for projects in this sub-program. The categories of the sub-program are described here.

Development Planning involves support to two main activities, DEVSIS-like systems and public administration and management information activities. A number of evaluation studies of the DEVSIS activities supported by IDRC since 1975 have been undertaken (Oswitch, Keren, and Bramwell) and others are planned. These studies will help to determine the impact of the program to date on a defined target audience; how to improve information services for development researchers, planners, and policy-makers and where the emphasis should be placed in future initiatives.

In particular, experience gained so far would seem to indicate that having already invested heavily in such regional systems as Information System for Planning in Latin America and the Caribbean (INFOPLAN) and Pan-African Documentation and Information System (PADIS) and in some participating national systems (Brazil, Botswana, Togo, Guinea), it would be useful to shift the program emphasis to strengthening the national systems - to evaluation, dissemination, user education, and training-related support at all levels. Greater emphasis could also be placed on non-bibliographic DEVSIS services: referral; information on on-going research; numerical or factual databases and data banks; and special information analysis systems.

It was suggested last year that the scope of Public Administration might be broadened to include administration and management information activities outside the government sector. This theme is strong throughout the Regional Office reports of 1984. The management of research institutes, programs and projects are topics of particular interest. These complement the concern of the Social Sciences Division in assisting institutions to develop appropriate and effective human resources management capabilities and also relate to the need to build a monitoring and evaluation capability into projects and institutional support programs.

The program will likely emphasize support for national and international training institutions (e.g. Instituto Latinoamericano de Planificacion Economica y Social [ILPES], UN Institute for Training and Research [UNITAR]) to promote awareness of information and its part in long-term development planning and the management of research through seminars for civil servants, planners, and policy-makers.

Development Economics was identified as a major new program thrust for 1985-86, and will continue to be important to program planning during the next four years. Significant issues include labour and employment, trade and marketing, fiscal policy and foreign debt, and state and public enterprises.

In the next two to four years, the emphasis will be in the area of debt management and export promotion and trade. Once the debt recording management information system being implemented in Sri Lanka has been fully tested and found to be viable, the ISD plans to hold a technical workshop in Colombo to share the Sri Lankan experience with other interested countries. This workshop will probably take place in the spring of 1986. Eventually, the ISD plans to support activities relating to the modification and adaptation of this system for implementation in at least one test site in several developing sub-regions (i.e. Eastern and Southern Africa, the South Pacific, South America, and the Caribbean).

In the area of trade, possibilities exist for the ISD's working together with the Caribbean Community (CARICOM), the Centre Islamique pour le Développement du Commerce, and the International Trade Centre (ITC) to establish sub-regional trade information programs and services.

Social, Legal, and Cultural Issues reflect social science topics and possible areas of shared interest and opportunities for cooperation with the Social Sciences Division and the Secretary's Office. In particular, they include:

1. Education. Support in the past has been on two main fronts, both dealing with bibliographic information: establishment of the IERS at the International Bureau of Education (IBE) in Geneva; and continued strengthening of the network for information on education research in Latin America (Red Latinoamericana de Documentacion en Educacion [REDUC]) at Centro de Investigacion y Desarollo de la Educacion (CIDE) in Santiago.

The major recommendation of the international team reviewing IDRC's Education Program within the Social Sciences Division was "that the focus of the Education Program should be to help build up and strengthen the education research capacity of the Third World countries." Paralleling this focus, the ISD should place emphasis on strengthening the information infrastructure for this community. This goal may best be accomplished by supporting national or sub-regional institutions and international networking activities.

In concert with support at the regional level to manage education information generally, some modest support will be provided to establish SIACs in selected areas of education such as adult education, non-formal education, and higher education.

Information on curricula and training methodologies and the production of manuals and tools for use by "trainers" is another area of specialization. The ILO has already established an international system - Inter-Regional Training Information Systems (IRTIS) - to handle such information, and IDRC will explore ways for national and sub-regional agencies to participate in IRTIS.

During the next four years, divisional activity in education information will probably centre on Southeast Asia, the Middle East, and South Asia. Some modest support may be given in the Caribbean for the development of a system to handle university examination questions, which will probably result in a model for use by any set of developing countries that conduct examinations on a regional scale.

2. Language and Communications. SEI's major concerns in language and communication share a general objective of all information projects, the provision of information in appropriate forms to end

users. The objective includes an exploration of the information needs of the target user groups and research on language policy and use and its impact on development. Reference materials, manuals, and training aids will be developed, as evidenced by the project to research the role of Creole Social Discourse in the Caribbean.

Most activities in this category are likely to be research projects that are finite and that will not necessarily lead to ongoing information services to be financed by the recipient once Centre support ends. Close contact will need to be maintained with the Social Sciences and Communications Divisions, and, at the outset, the role of the ISD in the area of communications research must be clearly defined.

3. Legal and Humanitarian Affairs. "Law and development", including legal information, is identified in all of the Regional Office reports as an issue of importance and priority. During 1985-86, exploratory work (using consultants) is underway to review the current state of legal information systems in the world and their relevance to developing country users.

Humanitarian affairs forms part of the program because of the Centre's concern with the "right to development" and the fulfillment of basic needs, such as food, shelter, and social justice. Other areas of interest include the right of indigenous peoples and of marginalized groups in rural and urban areas to full participation in the development of their country and the integration of and impact of refugees on countries of asylum.

4. Women in Development. The United Nations Conference in Nairobi in the summer of 1985, will mark the end of the "UN Decade for Women", yet the problem of providing and making accessible information related to issues affecting women has not been properly addressed. According to CIDA's **Women in Development Policy Framework**, "women are an integral part of the development process" and must be included as both "agents and beneficiaries of the development process".

During the next four years, no major expenditure is anticipated in IS for Women in Development, but several modest projects aimed essentially at fostering information exchange among researchers working in the field of women's issues will be processed. Cooperation at the international level (through the UN Economic Commissions and the UN International Research Training Institute for the Advancement of Women [INSTRAW]) will be explored to develop mechanisms to integrate women's issues into existing global, regional, and national information systems.

Human Environment, Health, and Population Information

During 1985-86, CAD 1.1 million have been allocated for appropriation for this sub-program. While the program as a whole had been earmarked for a substantial change during the coming years, the change may now be difficult to achieve with the present restraints. However, should additional funds become available, several shifts of emphasis and possible new activity thrusts are expected to be introduced. Under environment, these include ecology and waste management. In the population sector, they would include issues relating to the problem of refugees, migration, and contract labour and urbanization, again, all of which have been identified as areas of concern by our Regional Offices. In the health field, support for health service

management information systems and hospital information systems will be pursued, the latter primarily to strengthen the service capacity of hospitals to provide primary health care through community hopsitals at the district and village levels. Support for activities in the field of nutrition and the newly established programs in the area of occupational health and safety and traditional medicine should also be strengthened.

While implementing the activity thrusts, the ISD wishes to examine how the recent breakthroughs in modern information technology and communication systems, including low-cost microcomputers, can benefit developing countries.

The Human Environment information program includes "Ecology", "Human Settlements", "Waste Management and Utilization", and "Water and Sanitation". During the coming year, these broad fields will be defined before the undertaking of any major initiatives. The program, however, is expected to continue support for the water and sanitation information sector, especially in Asia and Africa, during the coming four years. Modest support will also be provided for information activities on human settlements, particularly in Asia.

The second sector is Health. The clinical orientation of medical education systems in developing countries places little emphasis on public health. The result is an emphasis for clinical and biomedical literature - an emphasis that caters to tertiary level health care and to a very select clientele of doctors in major hospitals, professors in medical schools, and scientists. This literature along with the systems built around it is not oriented towards meeting the needs of health practitioners concerned with the management and operational aspects of programs to deliver health care to large populations. Over the next one to two years, therefore, the ISD expects to strengthen health information-handling capabilities in national environments, particularly in francophone West Africa.

The health information sector is divided into five distinct disciplines which correspond to the program sectors within the Health Sciences Division. Two areas, Occupational Health and Traditional Medicine, reflect new program thrusts identified in the 1985-86 PWB. The subject scope of the five areas is presented briefly.

1. Biomedicine. The most common health problems of children in developing countries are communicable diseases and, of these, diarrheal disease is the most widespread. It is estimated that five to ten million deaths occur each year from diarrheal disease alone. The Centre has supported the International Center for Diarrheal Disease Research, Bangladesh (ICDDR,B), to establish the International Diarrheal Disease Information Service and Documentation Centre (DISC), which collects and disseminates information on diarrheal disease research.

A regional information exchange program on mosquito-borne diseases (malaria, dengue fever, filariasis, etc.) has also been established at the Tropical Medicine and Public Health Project (TROPMED) in Thailand, a part of the Southeast Asian Ministers of Education Organization (SEAMEO).

Over the next four years, the ISD expects to continue its efforts to strengthen the information capabilities of centres of excellence, particularly those specializing in tropical and infectious diseases in the developing world. Support for an information centre on poisons is presently under consideration in Sri Lanka.

2. Occupation Health and Safety. As developing countries begin to industrialize, they are recognizing occupational health and safety as an increasingly important area of research and study for building safer working environments for their people. SEI had hoped to launch a new program of support in this area beginning in 1985-86. However, with the present constraints, support will probably be modest in this sector in the next two to three years.

3. Public Health (SALUS). In the 1970's, the ISD's health information program was concerned entirely with information activities related to public health. Lately, as already indicated, this focus has shifted slightly to include support for other health-related and medical-related topics, such as tropical and infectious diseases, occupational health, and traditional medicine. However, public health itself still continues to be a major area of interest and concern to SEI. Last year the Centre provided support for a major Latin American network devoted to public health (and biomedical) information. It also supported the establishment (in Colombia) of a national health information network within the framework of the regional network.

The Division expects to continue to provide active support for programs in this sector during the next four years. Projects to help build or strengthen national capacities for handling health-related information in such diverse places as Burma, China, Cameroon, Senegal, and the Andean block are distinct possibilities. Also expected is the transfer of the Ottawa-based SALUS operations to developing countries (before April, 1987).

4. Traditional Medicine. This program was introduced for the first time in the 1985-86 PWB, which states:

> Utilization of traditional healers and traditional modes of medical treatment remains widespread in most developing countries. This applies particularly to rural areas where the formal health system, made up of professional medical practitioners, is often physically or economically inaccessible and culturally unacceptable to the majority of the population. Recognition has grown in recent years that greater understanding is needed of the role of interaction with the formal health system. We will continue to explore opportunities to establish information services and systems that will stimulate the understanding of traditional healers and their techniques.

5. Nutrition. Given the prevailing drought and famine conditions in several regions of the world, the question of food supplies and human nutrition is taking on critical proportions. SEI expects to increase substantially its support for nutrition-related information systems during the next four years. Assistance is needed for developing model food accounting matrices, manuals, handbooks and data banks concerning the nutritive values of local foods, systems that incorporate health, agricultural, demographic, and meteorological data for tracking nutritional information, etc. Discussions concerning such projects are already underway in Asia and Eastern and Southern Africa.

The ISD's Population program includes Demography, Family Planning, Migration and Transportation, and Urbanization. Despite recognition of the importance of information in the attainment of the objectives of the World Population Plan of Action, population databases and documentation systems as resources have been sadly overlooked. Over the years, the ISD has actively supported the establishment of regional population information systems in anglophone Africa, Latin America, and the Sahel and national level systems in Brazil, Peru, and Mexico.

It is well known that demographic information infrastructures in Africa are poor, weak, and deficient. Therefore, over the next two to three years support for population information activities in Africa will be increased. The Institut de Formation et de Recherche Démographique (IFORD), in Yaoundé, the Cairo Demographic Centre (CDC) in Cairo, and the Regional Institute for Population Studies (RIPS) in Accra are the three primary demographic training institutes in Africa and also the three key components of the POPIN-Africa network. It is anticipated that assistance will be given to them to strengthen their information infrastructures to enable them to provide information services to their immediate clientele and to lay the necessary foundations for active participation in the continent-wide system POPIN-Africa.

Mother and Child Health and Family Planning, a new program thrust, will probably emphasize the support of "communication" and "education" programs as opposed to bibliographic databases. Most activities to be supported here will likely be targeted directly at the end-user of the information services or at intermediary extension agents. However, again with the present budgetary restraints, it is highly unlikely that any major activities in this area will be supported by the ISD during the next four years.

One of the major problems facing developing countries is Migration. Migration, whether due to political, environmental, or economic factors, can be divided into two main areas - refugees and/or displaced persons and labour force. World attention over the past few months has focused on the refugee situation in Ethiopia. However, the situation there is only part of the global scenario. As stated previously, possibilities of a sub-program on refugees both within the context of the ISD's programs or "Humanitarian Affairs" and "Migration", will be explored.

Urbanization is one of the most pressing problems facing developing countries with rapidly growing cities. Urbanization is taking place at a much faster pace in developing countries than in developed countries. What role the ISD can play in this area is not certain, but information will play an essential if not crucial role in the urban planning process so that a significant impact can be made. An in-depth review of this entire field will be made with the help of consultants, and, should additional funds become available, a portion will be directed to support this extremely vital program area.

Information Infrastructure Development

This third sub-program relates to support for multi-sectoral activities at national, regional, and global levels. Its three broad categories are described in some detail.

Libraries and Archives are the traditional storehouses of information. Because of the history associated with them, they form the bulk of the information infrastructural facilities in developing countries. They are, therefore, one of the most well developed sources of information in the developing countries at present.

The Archives sub-program is likely to emphasize training and education, particularly in Eastern Africa and francophone West Africa. Other possibilities include the strengthening of national library and archives infrastructures and the repatriation of archives to their place of origin/relevance as is the case in the current archives repatriation project undertaken jointly by Malawi, Zambia, and Zimbabwe.

Records Management, a topic of growing concern in developed and developing countries alike, links naturally with archives. The use of microforms makes up a large, growing area of support in IS projects. They help to ensure that information is indeed getting to those who need it and, therefore, is of particular relevance to the programs described above. In order to have a better understanding of the use of microforms in the tropics, SEI will also support limited micrographics research into field testing new technologies.

Due to a past organizational accident, the expertise relating to micrographics research rests with the program officer who has responsibility for Information Infrastructure Development. Thus, the activities supported in the next four years will be initiated within the SEI program. However, the overall responsibility for technologies appropriate for the efficient and effective information transfer process rests with the IT&M. Therefore, any projects supported within this four-year review period will be charged against the IT&M budget line item. This procedure will be discussed further in the forward plans for the IT&M Section.

Centre support for National and Regional and Information Systems has been primarily for multi-disciplinary or cross-sectoral programs. The major interest within this sub-program is the testing of models, including methodologies, techniques, and technologies, in order to explore and create alternative methods for handling national information. Thus far, the ISD has supported four national information systems projects (Bolivia, Barbados, Jamaica, and Morocco), and anticipates over the next two to three years several more national projects will be developed. By the end of this decade, with the considerable experience that is expected to be gained, an attempt will be made to compare the different projects through an evaluation study and, possibly, an evaluation meeting. The evaluation should recommend a future course of action for the ISD and for other technical assistance agencies.

Curriculum Development is the last category within Information Infrastructure Development. The establishment of training programs in developing countries for librarians and information specialists provides access to training relevant to the real working environments and needs of the recipients and strengthens the development of regional human resources and training capacities in the field of information science.

The ISD interest in curriculum development is specifically aimed at supporting the development and provision of formal degree and postgraduate education for future managers and administrators of regional and national information programs, specifically, the "training of the trainers". The ISD is concerned with building facilities and programs for education in library and information science, another "new thrust" area where significant growth is expected, especially if additional funds should become available.

A joint UNESCO/IDRC mission to English-speaking Africa was mounted in 1983 to identify a suitable location for a regional postgraduate program in information science. (Regional Postgraduate Program in Information Science in Anglophone Africa: Identification of an Appropriate Location. Report of a Joint UNESCO/IDRC Mission, 31 January - 26 February 1983.) The team confirmed the urgent need for human resource development in information science and recommended the establishment of two regional programs, one at the University of Ibadan for West Africa and the other at the University of Addis Ababa for Eastern and Southern Africa.

The governments and universities involved accepted the recommendations of the mission and are trying to establish the postgraduate programs. Several DAPs aimed at further defining the program have resulted. Of special importance are the Curriculum Development meetings at Ibadan and the mission from Addis Ababa to study the programs of select North American universities. On occasion, these programs will be supplemented by support for short-term courses on specialized aspects of information handling.

DEVSIS/SALUS

It is appropriate to mention two bibliographic activities which began as Within-Centre Activities: **SALUS** and **DEVSIS Canada**. These activities are now managed within one unit which is organizationally located within the SEI Section.

No new program thrusts are envisaged for these two activites. Rather, one, SALUS, as stated in the Centre's 1984-85 PWB, will be terminated in March, 1987. Therefore, within the context of an in-depth review, a brief description should be given of their special activities.

In 1974, the ISD established the health care bibliography and database SALUS in response to a suggestion from the Health Sciences Division as to what was perceived as a need in developing countries for information on low-cost rural health care and health manpower training. The original intention was for the informative abstract printed in the bibliography to obviate the need for the user to read the entire document. To date, fifteen volumes of the bibliography and two cumulative indexes have been produced. There are over 12,500 items in the database.

It was always the intention of the ISD to transfer this entire activity, at a global level, to a new home, preferably in the Third World. This change does not now seem feasible. Moreover, several initiatives, at regional and national levels, have taken place making ISD realize that SALUS as a global system may not have been the answer to the perceived need and that small operations more in-tune with their regional or national concerns would be in a much better position to fulfill the information needs of their health care communities. As these regional and national centres become operational, the flow of documents through the in-house operation should be reduced to reflect the changing geographic coverage and to lessen the possibility of duplication of work in SALUS operations.

The Latin American Health and Medical Library (BIREME) Biblioteca Regional de Medecina, in Sao Paulo, should soon be setting up a SALUS system for the region and the Centre for Community Medicine (CCM) of the All India Institute of Medical Sciences (AIIMS) and the Centre for Development of Instructional Technology (CENDIT) are cooperating to produce a SALUS India.

Before the DEVSIS Study Team published its report, the IDS began an in-house DEVSIS Canada activity in early 1975. Through the collection and analysis of the Canadian socio-economic development literature, the project sought to provide: an experience in implementing DEVSIS at the national level; the opportunity to test DEVSIS methodologies as they were developed; a tool for the use of the Canadian development community; a way to draw Canadian development literature to the attention of the world development community; and a concrete example of the sort of output that DEVSIS was expected to yield. Two issues of Devindex Canada (1975 and 1976) were produced under this project. In 1977, input (via worksheets) was accepted from the Federal Republic of Germany, thus starting a trend of encouraging contributions from other countries. Seven issues of Devindex, containing input from several countries including Bangladesh, Germany, Indonesia, India, Sri Lanka, Morocco, the Netherlands, the Philippines, and the Soviet Union, have now been published. Other countries have produced their own Devindex such as India, Australia, Pakistan, Tunisia, and Thailand. Only Pakistan, however, has produced more than one contribution. Devindex 1984 contains input from Canada, Morocco, Sri Lanka, and the Soviet Union.

A correspondence campaign aimed at Canadian organizations and university departments to produce documents dealing with the Third World has been successful and will be continued and expanded. The flow of a large number of documents collected for DEVSIS through the Centre Library may seem to indicate a duplication of work; however, care has been taken to avoid such a situation, for bibliographic description and content analysis that is common to the two systems is shared, not duplicated. The portion of the DEVSIS database that is made available on-line through the Development Data Bases activity of the Centre Library has been reduced to Canadian development literature for which document delivery can be provided.

In the interests of allowing countries to gain experience with DEVSIS before setting up their own national activity and participating in the appropriate regional or sub-regional network, guidelines regarding who should be allowed to contribute and for what period of time, have been proposed and will soon be implemented

C. CENTRE LIBRARY

The Centre Library, an integral part of the ISD, has as a mandate service to the Centre as a whole as well as to a broader community. The specialized information needs of a dedicated research organization such as IDRC cannot be met efficiently by recourse to external agencies because of factors relating to access time, competition for resources, organization of materials, cost and coefficient, of interest where the clientele is not the primary audience.

An organization like IDRC, to which information is an essential resource for decision and action, requires an in-house library in exactly the same way a major research division of a private corporation or government bureau does. The Library represents the most efficient means for organizing certain forms of information sources and for providing distinctive routines to handle information of permanent value

(primarily in the form of books), of medium-term value (primarily in the form of journals), and of information with a real, yet ephemeral, value (primarily in the form of vertical files).

In addition to providing service to the Centre, the Library plays an important role by setting an example of the range of services relevant to developing countries a specialized library can provide. Library development in the Third World is essential in building the infrastructure necessary to support the objectives of the ISD and of the Centre and also accounts for links between the Centre Library and the information infrastructure development sub-program of SEI. The Library remains a major component of any information service, one with particular relevance to scientific, technological, economic, and social development and one with special application to the Third World.

The Library as an institution has the unique capacity to operate effectively at widely differing levels of technological sophistication. This phenomenon agrees with the various information environments in developing countries. Moreover, because the Library can effectively add capabilities without dropping or replacing existing ones, it can remain relevant even as the information environment changes with improved circumstances.

The Library program serves as a resource for the conduct of research into the problems of the developing regions of the world, aids in the provision of means for applying and adapting relevant knowledge to Third World problems, and supports researchers in developing regions in the conduct of their activities. The objectives of the ISD as well as the Centre in the "establishment of better information systems and services for scientists, technologists, and officials in developing countries" are well-met by the Library program through support of cooperative information systems as a member of the particular network

concerned, through provision of training experiences for the developing countries' citizens who will staff the systems and services the Centre develops, through evolution of library standards and creation of thesauri relevant to information services in developing countries, and through provision of effective data based on the testing of methods and procedures relating to information work in a practical environment.

The current statement of the objective of the Centre Library is:

> In accordance with the objects and powers of the Centre, the Library has as its objective to facilitate access to information about the social and economic aspects of Third World development.

To meet its objective, the Library, in priority order, presently:

1. provides information and library service to the following groups:
   a IDRC staff regardless of location (in Canada and abroad);
   b IDRC projects (in cooperation with Regional Offices) where appropriate;
   c the Canadian community (governmental, academic, and NGOs) concerned with Third World development, as resources permit;
   d other communities concerned with Third World Development (institutions in the developing countries, international organizations, institutions in other developed countries);

2. acts as a test-bed for technological, methodological and bibliographical developments and stardards that may be appropriate for adoption by the international community and IDRC projects; and

3. provides advice and training on these developments and standards to:
   a IDRC projects,
   b developing country institutions,
   c international organizations with responsibilities for establishing guidelines and standards, and
   d Canadian institutions engaged in international cooperative information programs and/or training of information specialists.

However, to support the Centre's emphasis on scientific and technical research and the Library's growing awareness of providing services to developing countries as well as to Centre staff, the objective of the Library should be revised as follows:

> In accordance with the objects and powers of the Centre, the Library has as its objective to stimulate and facilitate access to information about Third World development with particular emphasis on research adapting scientific and technical knowledge to the economic and social advancement of developing countries.

In light of the restatement of the objectives of the Centre Library, the priority assigned to the test-bed activities and the advice and training activities should be revised so that advice and training has a higher priority than the test-bed activities. In addition, the first priority in providing advice and training should be to IDRC regional offices. A statement of the revised Library objectives and program is included as Appendix B.

The **Library's Collection** reflects the interests of IDRC as a whole and consists of books, documents, fiche, and serials on Third World development-related topics in the areas of agriculture, food and nutrition sciences, health sciences, information sciences, social sciences, and communications.

This current collection consists of approximately 43,000 titles (books, documents) and some 5,000 serial titles. According to a survey of the book collection in 1983, approximately half of the collection is unique in Canada. A large part of the collection includes "unconventional" literature (reports, unpublished material, etc.) which is received from the more than 700 institutions with which IDRC has exchange agreements. The collection also has a selection of newspapers of international importance and Centre archival material as well as annual reports of and information about organizations and associations interested in Third World development.

The Library acquires and processes material for itself, the Regional Offices, and IDRC projects in developing countries. In implementing its collection development policy, the Library takes into consideration and relies heavily on the substantial collections of other libraries in the Ottawa area, particularly the Canada Institute for Scientific and Technical Information (CISTI), Agriculture Canada, Health and Welfare Canada, and the National Library of Canada. The Centre Library's collection is considered to be a centre of excellence for Third World development literature.

In 1984-85, the Centre Library began to assist the Regional Offices in upgrading (or, in some cases, establishing) core reference collections including "grey literature" which would be paid for and processed by the Centre Library but situated in the Regional Offices. This activity is seen as on-going, with a substantial number of acquisitions purchased for the Regional Offices in 1985-86.

Even in a period of restraint, adequate resources must be made available for required acquisitions. Therefore, a thorough examination of the Library's collection, in particular the serials, must be undertaken. Serial subscriptions must be examined carefully to ensure that they fall within the collection development policy and that they are not readily available elsewhere. The in-depth review of serials was begun in 1984-85, and will be continued on an annual basis.

When the Centre is contemplating funding a new subject field or assisting the field in a more substantial way, consideration must be given to the type of Library support required, particularly in the terms of the Library collection. This procedure also holds true for subject areas in which the Centre plans to cease activity. For example, the Centre Library can play an active role in the Centre's new interest in biotechnology - in identification of materials, databases, etc. Similarly, as the program of the Energy Group comes to a close, the Library can take a leading role in absorbing relevant material and databases.

To best monitor and assess the collection, the responsibility of collection development which now rests with the librarians and indexers should be transferred to the Users' Services librarians since they are the ones who have an accurate picture of the Centre's information needs. Assistance in the monitoring of the collection can be provided by an automated circulation system to be implemented in 1986.

Maintaining a position as a "centre of excellence" for development literature must be carefully considered in the next four years. The goal does not imply that the Library would or should collect everything on development. The implication may be to use the same level of financial resources but considerably more human resources, not necessarily located in Centre headquarters, to achieve this goal. As resources tighten, reliance should be less on trade publications and more on developing country literature wherever possible.

And as the Regional Offices' libraries become established and better organized, much of this "grey literature" can be fed to the Centre Library through the Regional Offices. The Library, therefore, should emphasize this collection in its in-depth cataloguing and abstracting. The Library acquisitions also need to be regularly assessed with a view to which material should be duplicated or maintained in the Regional Offices.

To facilitate access to its collection, the Library uses MINISIS, the software package developed by IDRC for use on the Hewlett-Packard 3000 series of minicomputers. Items are catalogued, classified, and indexed according to the Unisist Reference Manual for Machine-Readable Bibliographic Descriptions, the Universal Decimal Classification (UDC), and the Organization for Economic Cooperation and Development's (OECD) Macrothesaurus for Information Processing in the Field of Economic and Social Development. The Library has played a major role in the international revision of the Macrothesaurus and in the development of a Manual for the Preparation of Records in Development-Information Systems.

Access to the Library's collection is provided through COM (Computer-Output-Microform) fiche indexes for personal author, title, serials title, and corporate name authority listings. On-line searches of the Library's database, BIBLIOL, provide numerous access points including access by subject and institution name.

The most important component of the Library's program is its **Reference and Information Services.** Seven primary elements which will be described briefly exist within these services.

In addition to its own data bases (the collection), the Library makes available, on-line, free-of-charge to researchers across Canada, IDRC's four in-house databases as well as the five received from other agencies. (See Appendix C)

The Development Data Bases Service (IDRC is the sole Canadian source for all databases) started as a two-year pilot project in 1980. Due to its success, it was incorporated as part of the regular Library services in 1982. The service is provided to more than one hundred institutions across Canada: universities, government departments, and other organizations. In 1983-84, approximately 6,000 searches were done on the system - over 3,000 by external users and about 2,900 by IDRC Library staff. Annual users' meetings of the Development Data Bases Service are held each year in Ottawa and across Canada in conjunction with the annual conference of the Canadian Library Association (CLA) and l'Association pour l'avancement des sciences et des techniques de la documentation (ASTED).

The question as to whether the Centre Library is the most appropriate organization to be providing this service to the Canadian research community must be raised. Since the databases themselves are required by Centre staff and projects, the incremental cost of offering this service to Canadian users is small. Moreover, at this point, no other alternative source for the service exists. (The question of charging Canadian users for this service is re-considered every year.) In 1984-85, however, the Centre Library cut back on the amount of time spent training and trouble-shooting for users of the service and diverted these resources to other sections of Users' Services. At this point in time, there is no other alternative source for the service.

In addition to searching MINISIS on-line, the Centre Library also has access to commercial database services to provide a complete answer to reference inquiries via On-line Searches Commercial, searches

for Centre and project staff and, as the situation warrants, for members of Canadian NGO's that might not otherwise have access to this type of information. The Library also serves as the Canadian centre for Medical Literature and Retrieval Service from the US National Library of Medicine (MEDLARS) searches in response to requests from developing countries.

The Library is continually evaluating new database suppliers to determine which databases are appropriate for access. In the coming years, the Library should play an active role in assisting the Centre to determine what access to statistical data is required and what the needs for regional data are.

To keep Centre and project staff up-to-date on the latest publications in their fields of interest, the Library provides Selective Dissemination of Information (SDI) services from its own databases as well as commercial database services. The profiles are monitored on a regular basis to ensure their usefulness.

In the interest of avoiding duplication, as part of its written collection policy, the Library does not collect materials in highly technical or scientific areas. It relies on the collections of the National Library of Canada, the Canada Institute for Scientific and Technical Information (CISTI), Health and Welfare Canada, and Agriculture Canada, as well as other government departments. Inter-Library Loans are monitored, however, to assess whether in some cases it may be more effective to purchase the item for the Library's collection. The Library also lends items from its collection to other libraries.

The Users' Services staff provide answers to a wide variety of questions arising from users' needs for information. Reference QUERIES is the projected growth area as Library services are expanded to IDRC-funded projects and Regional Offices.

In response to users' requirements for current information about organizations active in the field of Third World development, the Library has created for over 1,600 organizations vertical files known as InfoQuest. These files contain annual reports, brochures, and other descriptive information about the organizations. Access is by name of organization via the computer or printed index. As the Regional Offices become expert at collecting this type of material and forwarding a copy to the Centre Library, the usefulness of this service should grow.

To acquaint users with the Library, Orientation Tours are offered to new staff. Training sessions on MINISIS are provided to new external users of the system. To remain aware of users' needs, particularly as they reflect the development of the Library's collection, each professional Library staff member is responsible for regular liaison with the Centre staff in a specific subject area.

The Library provides **Advice and Training** on the automation of libraries using MINISIS, on collection building (e.g. Regional Offices), on specialized libraries, and on the application of the bibliographic standards used. The area of advice and training could expand substantially in future years.

The Library has served as a **Test-Bed** for automation (MINISIS applications), bibliographic developments (UNISIST Reference Manual for Machine-Readable Bibliographic Descriptions), thesauri building (OECD Macrothesaurus for Information Processing in the Field of Economic and Social Development) and other applications which may be of interest to developing countries. These activities have generally been in the area of Technical Services and have led to very high bibliographic standards followed by the Centre Library.

In a period of restraint, the Library must question whether it can maintain this level of bibliographic treatment for all of its material and must then assign support to these activities on a priority basis. The cost of acting as a test-bed previously has been absorbed in the Library's regular Technical Services processing. As the costing mechanisms used by the Library become more sophisticated, it is possible to estimate more accurately what this processing entails. The Library cannot, in the immediate future, undertake any new test-bed activities which involve accepting untested products, testing them, providing input on improvements and updates, and writing documentation and manuals. Although this work has been intellectually stimulating, other institutions, in particular MINISIS installations, are better equipped to handle these activities. The Centre Library's resources must be diverted to other activities of higher priority.

The target audience to be served by all activities within the ISD is of ultimate concern. Unless the beneficiaries of the outputs of the programs and services are clearly articulated, no acceptable mechanism to measure "impact" or success/failure of objectives exists. The target audience or user group is, thus, of paramount importance to the program of the Library to ensure that resources are effectively and efficiently directed. Who the users are, what their information needs are, and what the most appropriate modalities to supply the information services are must be clearly defined.

The Library's most important clientele are the Centre staff in Canada and abroad and IDRC projects. The Library must ensure that these groups receive the highest proportion of the Library's resources. In order to sustain their response, the Library will implement the following plan of action over the next four years.

An examination of the Development Data Bases Services will show that the overall use of the databases is equally divided between IDRC and outside users. Detailed analysis, however, shows differences in users of specific databases. For example, an analysis of the use of the ILO database indicates that it is of lowest priority to IDRC yet of highest priority to outside users. Consequently, the Library has decided to maintain on-line only the most recent five years and use the disk space for other databases of greater interest to the Centre.

In determining which new databases to acquire (e.g. the UN Bibliographic Information System, UNBIS) or to make available (e.g. World Bank), the Library will consider the needs of Centre staff and projects and not attempt to broaden the appeal of the service to additional outside users. This strategy is especially necessary if no real increase in resources can be anticipated.

The number of reference questions has more than doubled in the period 1980-81 to 1984-85. During 1984-85, the percentage of lengthy reference questions for Headquarters staff was 67.8%, for Regional Offices 21.8%, and for projects 10.3%. ISD anticipates a substantial increase in volume and a significant increase in the number of requests from projects because these groups are aware of the ISD's services. To accommodate this increase, the Centre Library will, in September, 1985, decrease the level of services it offers to external users who visit the Library facilities. More than half the external requests for reference service are handled on-site in person. (It is interesting to note that 50% of the internal requests are received via telephone.) In reference work, the order of priority assigned to questions is in person, by telephone, and by letter. External users who have access to the Library's collection on-line and must borrow books via inter-library loans will continue to receive service, but through their host institution or through the National Library of Canada.

REFERENCE QUESTIONS - 1980-85

REFERENCE QUESTIONS	1980/81 #	1981/82 #	1982/83 #	1983/84 #	1984/85 #
EXTERNAL	1082	2321	5005	7594	8359
INTERNAL	4794	3801	7722	11209	11380
TOTAL	5876	6122	12727	18803	19739

Based on an analysis, this action could save more than half a person-year and would assist in handling expected increases from internal users.

Growth in other areas of Users' Services has been signficant, Inter-Library Loans have also grown since 1980-81. In this five-year time period, requests for borrowing IDRC Library materials by other libraries has increased 113%. Also interesting to note is that 1983-84 to 1984-85 saw a decrease in external requests for IDRC material by 16.4%. However, IDRC staff and project requests for materials not in our Library increased almost by one fifth, 19.9%.

A similar situation can be found in Circulation. Overall there is an increase of 16.8% of total loans from 1983-84 to 1984-85, and a decrease of about 17% in the number of loans to embassies, etc. If the Library, however, is to respond to users' needs and broaden its user base within the Centre and to projects, additional databases must be made available and additional products and services must be developed. In the area of current awareness, the Library should be developing new products directed to the needs of Centre management, such as lists of international meetings. The Library must take the lead in re-packaging information and making it available to Centre staff and projects (e.g. Regional Office reports, IDRIS printouts).

The major user group to whom the Library has been providing advice and training has been IS projects, particularly those relating to MINISIS applications and specific bibliographic standards application. Generally, this service averages three trainees per year. However, the Library should increase this aspect of its mandate and play a central role in the advisory and training activities of the Centre.

First, the Library staff are very well qualified to advise and to provide input to Centre management on the information aspects of a variety of activities such as establishing, databases, e.g. trip reports, travel, projects, etc. Second, the Library should play a major part in assisting Centre management to analyze their information needs and priorities. In fact, the Library's authority files for institutional names are used as the authority in many units of the Centre.

The Library has already taken a leading role in advising the Regional Offices on how best to meet their information needs and how to strengthen or, in some cases, establish their library and acquire and organize the collection. Since only one regional office has a professional librarian, the requirement for advice and training over the next four years will be significant. Priority must always be given to institutions with which IDRC has/or will have a project. The Library should also be developing basic "reference" lists aimed at project recipients in developing countries in an effort to reach the end-user of Centre projects.

In addition, the Library can play a major role in providing IDRC projects in IS and other divisions with basic advice on how to organize library and information services. Centre staff are discovering time and time again that unless the library and information services of a recipient are strengthened, the benefits of a research project are decreased or evaporate at the project's conclusion. Furthermore, before institutions can participate in national/international information networks, they must have a basic information infrastructure. The Library can assist by providing advice and training either on-site or in Ottawa and either alone or in combination with other institutions.

D. INFORMATION TOOLS AND METHODS ("The best way developing countries can deal with the information revolution is to have the right tools at hand.")

Earlier in this in-depth review, the creation of the Systems and Methods Group was discussed. Although this group assumed its own identity as a full-fledged program section, using the project modality as its mechanism for carrying out the mandate of the ISD in fiscal year 1984-85, it was in 1982-83 that many of the components of the group were established within the ISD. The role of the group at that time was to provide advice directly to developing country institutions in fields such as computing, telecommunications, documentation systems, standards, and methodologies. A new program, IT&M, was then created in response to the requests for assistance in the identification, selection, and effective utilization of information technologies or "tools" in systems which were themselves being supported by other sections within the ISD.

As the program of IT&M is very young, the conceptual framework is still in the process of being fine-tuned. In addition to three subject areas which will be defined in detail, the program itself can be described in the following dimensions:

- fundamental technologies underlying the information tools
- information tools
- types of information

Although the presentation in this section will concentrate on activities supported by IT&M, a review of the fundamental technologies and the various forms of the information handled is necessary for a meaningful assessment of the new program thrusts.

Although developing country interest in using computers for information processing has been with IDRC almost from the start (through its early Integrated Set of Information Systems [ISIS] activities), the

technological advances in microelectronics leading to relatively inexpensive minicomputers and microcomputers have led to an almost overpowering demand by developing country researchers for such tools and the related methods. Because of the interconnectedness and pervasiveness of computing, there has been pressure, both from within the Centre and from developing countries, for support for computer-related activities in a broad spectrum of areas. For example, questions on computer education in schools, computer literacy, administrative applications in government and industry, industrial development in national and regional informatics, medical diagnosis applications, research data analysis, etc., across most development fields and IDRC program divisions, have arisen.

The ISD, much in line with its program as a whole and the general orientation of the Centre, has so far focused its efforts on the use of computer-based tools for information activities in support of research in developing countries. The concept of "information activities" is rather ambiguous since any application of computers involves manipulation of data elements which can be considered information. However, in practical terms, it has been necessary to limit the ISD's involvement to applications which directly provide information support for research and for development planning; however, in the future, a somewhat more flexible approach will be required in regions such as Africa to allow for meeting basic needs related to the introduction of the technology itself.

The emphasis will continue to be on software and the applications of the technologies rather than on hardware and the underlying technologies per se. This emphasis holds for most of the other technologies discussed later. The capital intensive nature of hardware technology research and development precludes many developing countries (and IDRC) from venturing too far in this area although, in specific cases, an "appropriate" technology may have to be developed by the developing countries which will use it. However, there is an enormous field open in the construction of new tools and systems from

existing hardware by programming and system integration. This field requires the acquisition of know-how and the application of intellectual effort, areas the ISD can support in the developing-country research community which it serves.

Telecommunications Technologies

The program's focus has been and will continue to be on the use of asynchronous techniques, such as computer conferencing and messaging, in support of research in developing countries. This focus also covers the data communication aspects of remote data processing, computer-to-computer communications, packet-radio, on-line retrieval, and communication satellites.

The continuing expansion of the world telecommunications infrastructure and recent developments involving low-cost communications satellite techniques have increased the potential for developing countries to use communications effectively within their information systems. Although IDRC cannot support telecommunications infrastructure development per se because of the scale and cost normally involved, there are cases where feasibility studies and trials can provide useful punctual input for developing countries. However, it is in the innovative applications of the technologies, especially in research environments, that the program can play an important role.

Cartographic and Remote Sensing Technologies

Cartographic and remote sensing are the technologies and techniques used to process and present spatially-related information, usually related to resource management in a development planning or monitoring context. They span a variety of methods including manual cartography, visual data analysis and presentation, digital data analysis, computer graphics, integrated geo-referenced systems, etc. To some degree, these involve more effort in the areas of data collection and primary processing than do other segments of the ISD's program.

Furthermore, there is a greater emphasis on transferring basic techniques to developing country researchers and in demonstrating the utility of the technologies as a way of providing information for planning and monitoring as well as research purposes.

Other Information Technologies

These include technologies and techniques for storing information in a visual presentation form, such as micrographics, analogue videodiscs, photographic and other audiovisual media, and so on. Related issues include information archiving and document delivery and dissemination. The IT&M program currently does not focus on these technologies.

Finally, there is the "technology" (in a very general sense) of documenting and packaging experience in the discipline of IS. This service involves products such as thesauri, documentation manuals, data and information representation rules, database structures, standards for information compatibility and exchange, etc. The related activities are no longer handled within a separate sub-program (previously "Documentation Systems" within the Systems and Methods Group), but are mainly addressed in the context of subject-specific requirements within the sectoral information programs.

With this section, as with the other sections in the ISD, the information handled or processed is not "form" dependent. Within IT&M, seven forms of information are considered:

1. Bibliographic Information has been the cornerstone of the Division's program to date and encompasses a variety of components aimed at improving access to the collected literature (bibliographic references, databases, indexes, etc.).

2. Textual Information is primarily information about research infrastructures (projects, researchers, institutions, services, and referral tools in general) but also encompasses "factual" information about the subject in question

3. Administrative and Coordination Information has not been emphasized within the Division, even for research administration and coordination, as it is easy to be sidetracked into a broad spectrum of administrative applications which could diffuse limited resources. This form does arise, however, within the context of telecommunications technologies since such information can be used to improve research communications and, hence, efficiency. In addition, there may be cases when data collected primarily for administrative purposes may be useful for research and development planning activities.

4. Spatially-referenced Information is geographic or geo-coded resource information usually represented by maps or within integrated geographic information systems. This form is mostly used for resource management, development planning, and monitoring.

5. Statistical Information refers to numerical information (usually socio-economic data) which has been processed and aggregated to some degree.

6. Other Numerical Information is a "catch-all" term for scientific data, including evaluated data and scientific data banks, financial and economic data, etc.

7. Technologies Information is written information about information-handling technologies themselves and related standards, methods, techniques, and experiences, etc.

The activities supported by the IT&M section have been divided into eight basic categories, described briefly as follows:

1. Information systems, networks, and services on specific subjects. This category has been the focus of most of the Division's projects and is aimed at the delivery of information to a particular research community, such as health, agriculture, and development planning. In the context of the IT&M program, this service is support for information delivery about technologies and tools. For example, the Information Centre on Development-Policy Modelling disseminates information about computer-based modelling techniques for socio-economic development. A feasibility study on a Latin American Regional Informatics Network to manage information about informatics (computerized tools and applications) is underway. Other sectoral information programs are being considered as well (remote sensing, standards information in Africa, etc.).

2. Technology assessment, selection, and evaluation. In many cases, developing country researchers and decision-makers need to judge the capabilities or appropriateness of technologies for their information needs. For example, the area of microcomputers in information work has attracted a great deal of attention and the program has sponsored several activities, including an evaluative survey of database management software by a Latin American regional organization, leading to a Latin American regional meeting on microcomputer use in information systems. Developing country institutions now desire to strengthen their own capacities to perform this sort of assessment and to establish mechanisms for doing so on an ongoing basis. This know-how would lead to increased capabilities for developing countries to provide their own advice to local information workers on selection and evaluation of technical alternatives. Another example is the support given by the program to bring developing country experts to a meeting to ensure the appropriateness of the technical content of two forthcoming issues of UNCSTD's Advance Technology Alert System (ATAS) Bulletin.

3. Feasibility studies and technology demonstrations. These generally short activities are focused on assessing the feasibility or the parameters of using a particular technical solution to an information problem; they are sometimes the first steps in developing a pilot project or other activity. For example, several studies were carried out to determine the viability of introducing a data transfer network within the centres of the CGIAR prior to funding a pilot project. Technology demonstrations are aimed at showing the "proof-of-concept" of a particular technique, as in the case of the demonstration of the possibilities for packet satellite communications sponsored at a Pacific regional telecommunications conference.

4. Pilot projects and experiments. These activities are in the same sphere as the preceding category but have a longer duration during which the technology may be tested and evaluated in more detail. For example, a first extensive international computer conference on a scientific subject (the Bioconversion of Lignocellulosics) was sponsored as a means of determining the usefulness of the technique among scientific researchers.

5. Technology introduction and transfer. These activities are directed at introducing an entire technology to a country or region for general uses rather than focused on a specific application. The distinction is somewhat arbitrary since support for projects is still aimed at solving specific problems and, hence, demonstrating the viability of an approach. The program in remote sensing is directed in this way. This area is one which can benefit greatly from cooperative links with Canadian research institutions through IDRC's Cooperative Program; examples are remote sensing projects with China and Nigeria.

6. Technology adaptation and development. The area of adapting or creating appropriate methods and tools is perhaps the most important of the program since its goal is to provide developing countries with tools which meet their own needs and, whenever possible, the experience to do the job themselves. As already discussed, most of the support will be for the development of "software" rather than "hardware" although in some cases system integration may involve both. Computer software development is the major activity; hence, projects encompass the development of bibliographic software for a Brazilian computer, the development of a microcomputer program to help developing countries manage debt information, the development of software to enable developing country planners to handle and analyze small-area census data, etc.

An area of particular interest is enabling developing countries to handle their own languages and scripts on computers. Examples include a project assisting China in developing a union catalogue of scientific and technical periodicals in Chinese, and a project under development with Ethiopia to adapt microcomputers to handle Amharic script.

As new areas of technology open up, it is important that developing countries have the opportunities to experiment with, test, adapt, and even develop appropriate tools and techniques. Aside from those research activities requiring major capital investments, important work using technology for information handling can and should be done in developing countries and supported by the ISD.

7. Education and training. Education and training are key components in the successful transfer, adaptation, development, and use of technology. Thus, the program supports education and training which, in turn, enhance the capacity of developing country researchers and information workers to carry out the range of activities supported within the program items 1 through 6. This element is especially true in regions where technology-based tools are first being introduced.

8. Documentation and exchange of experience. These are normally integral parts of the program's activities. In some cases, however, it may be useful for developing country researchers to stand back and integrate a range of experience with a particular technology or type of activity. Vehicles for doing this include meetings and workshops, such as one sponsored on computerized Chinese character handling for bibliographic information exchange, state-of-the-art reviews, technology guides, etc.

Program Matrices

Table 1 (page 112), Table 2 (page 113), and Table 3 (page 114) show the current and planned activities for support in different information domains in each of the three main technology areas of the program. These tables are indicative only and do not represent an unvarying parametrization.

To recognize a matrix, a reading of Table 1 on Computer Technologies is offered. Row 1 indicates potential support for information systems and services about computer technology normally incorporating bibliographic and textual information and information about experiences with the technologies themselves. Row 2 indicates potential support for assessment and evaluation of technology in all information domains.

Matrices can also be useful for locating activities already supported in the context of the program. For example, in Table 1, the previously cited project on Development-Policy Modelling can be identified with row 1, columns 1, 2, and 7 (an information system containing bibliographic, textual, and technologies information), and row 6, column 6 (adaptation of models to run on microcomputers).

TABLE 1

COMPUTER TECHNOLOGIES

ACTIVITIES	INFORMATION TYPES 1 BIBL	2 TEXT	3 ADMIN	4 SPAT	5 STAT	6 NUM	7 TECH
1. INFO SYSTEMS	X	X					X
2. ASSESSMENT	X	X	X	X	X	X	X
3. FEASIBILITY			X	X	X	X	
4. PILOT				X	X	X	
5. TRANSFER	X			X	X	X	X
6. ADAPTATION/ DEVELOPMENT	X	X	X	X	X	X	X
7. TRAINING	X	X		X	X	X	
8. EXPERIENCE	X	X	X	X	X	X	X

Key:

INFORMATION TYPES

1. Bibliographic information
2. Textual information
3. Administrative and coordination information
4. Spatially-referenced information
5. Statistical information
6. Other numerical information
7. Technologies information

ACTIVITIES

1. Information systems, networks, services on specific subjects
2. Technology assessment, selection, and evaluation
3. Feasibility studies and technology demonstrations
4. Pilot projects and experiments
5. Technology introduction and transfer
6. Technology adaptation and development
7. Education and training
8. Documentation and exchange of experience

TABLE 2

TELECOMMUNICATIONS TECHNOLOGIES

ACTIVITIES	INFORMATION TYPES 1 BIBL	2 TEXT	3 ADMIN	4 SPAT	5 STAT	6 NUM	7 TECH
1. INFO SYSTEMS	X	X					X
2. ASSESSMENT	X	X	X			X	
3. FEASIBILITY	X	X	X			X	
4. PILOT	X	X	X			X	
5. TRANSFER	X		X				X
6. ADAPTATION/ DEVELOPMENT	X	X	X			X	X
7. TRAINING	X		X				X
8. EXPERIENCE	X	X	X			X	X

Key:

INFORMATION TYPES

1. Bibliographic information
2. Textual information
3. Administrative and coordination information
4. Spatially-referenced information
5. Statistical information
6. Other numerical information
7. Technologies information

ACTIVITIES

1. Information systems, networks, services on specific subjects
2. Technology assessment, selection, and evaluation
3. Feasibility studies and technology demonstrations
4. Pilot projects and experiments
5. Technology introduction and transfer
6. Technology adaptation and development
7. Education and training
8. Documentation and exchange of experience

TABLE 3

CARTOGRAPHY AND REMOTE SENSING TECHNOLOGIES

	INFORMATION TYPES						
	1 BIBL	2 TEXT	3 ADMIN	4 SPAT	5 STAT	6 NUM	7 TECH
ACTIVITIES							
1. INFO SYSTEMS	X	X		X			X
2. ASSESSMENT				X	X	X	
3. FEASIBILITY				X	X	X	
4. PILOT	X	X	X	X	X	X	
5. TRANSFER				X	X	X	
6. ADAPTATION/ DEVELOPMENT				X	X	X	
7. TRAINING				X	X	X	X
8. EXPERIENCE			X	X		X	X

Key:

INFORMATION TYPES

1. Bibliographic information
2. Textual information
3. Administrative and coordination information
4. Spatially-referenced information
5. Statistical information
6. Other numerical information
7. Technologies information

ACTIVITIES

1. Information systems, networks, services on specific subjects
2. Technology assessment, selection, and evaluation
3. Feasibility studies and technology demonstrations
4. Pilot projects and experiments
5. Technology introduction and transfer
6. Technology adaptation and development
7. Education and training
8. Documentation and exchange of experience

The future direction of the IT&M Section in the next four years is affected greatly by the no-growth situation in which the ISD finds itself. As a relatively new program section, a change in its relative position of absorbing approximately 16% of the ISD's total project appropriations is not anticipated.

In the area of **Computer Technologies**, in the next four years, the emphasis will continue on project activities involving the adaptation and development of computer software in the Third World to meet specific developing country needs, especially in the area of non-textual information. This service will be executed in subject areas which are of interest to the sectoral components of the ISD's program. Directions which will be explored in the near future include the use of computers in technology-related training and in research support and mangement, expert systems (for intelligent retrieval and discipline-specific applications such as medical informatics), and "grass roots" uses of microcomputers for development applications (these could include applications like gathering health data at the village level or crop planning and management by agricultural cooperatives). In addition, training and education in informatics will receive special attention in selected geographic regions.

The program of **Telecommunications Technologies** will continue to support computer-based communications activities that support researchers, but with an additional emphasis on access to and exchange of scientific data. To facilitate these activities, the promotion of packet-switching technologies in developing countries will be pursued. Research and experimentation with inexpensive and novel telecommunications techniques (such as ground and satellite-based packet-radio and digital signal processing applied to high frequency digital radio) in developing country environments will be encouraged whenever possible. Appropriate support for information services on telecommunications will be provided.

In **Cartographic and Remote Sensing Technologies** the current program of promoting the general transfer of the technology with demonstrations of the utility of the techniques in specific contexts, especially resource management, will continue. Emphasis will continue to shift to digital methods of data analysis and presentation. In addition, work will be supported for techniques and tools (usually computer-based) to integrate a wide variety of different data and information types using spatial coordinates as referencing systems.

As mentioned previously in the SEI Program presentation, due to historical reasons, the **Micrographics Research program** is managed by the SEI Section rather than the IT&M Section. However, effective 1985-86, all projects supported in this area will be costed against the IT&M budget line item. This step although small, is a step toward regularizing the program activity and associated financial costs.

The second step concerns a Within-Centre micrographics activity. Since 1979, when the unit was created, this activity has been associated with the Centre Library. The current objectives of the Micrographics Unit are:

- to provide micrographic services to the programs and projects for the ISD dealing with information on and for development;
- to provide micrographic services in support of Centre operations in Ottawa and in the regional offices; and
- to function as a test-bed and in-house training facility for micrographic techniques that can be applied to developing country institutions.

This last objective, a most important technology which is seen as a viable option in addressing the serious problem of "document delivery", must be strengthened . No matter how relevant an information system, network, or service may be, if it cannot be supported by the documents or source material referred to, the result is frustration and unmet expectations on the part of the end-user. Micrographics, therefore, is a technology which must be explored more seriously in an attempt to overcome some of the immediate drawbacks, i.e. user reluctance, capital costs, etc.

Serious questions, however, are being raised regarding the role, costs, and outputs of the present Micrographics Unit. The ISD is, at the writing of this review, preparing a position paper which attempts to answer these questions. Until managerial decisions are made, the Unit must continue to be productive. This end can be achieved most effectively by having the Micrographics Unit, as an important information technology (with its two person-years), report to the IT&M Section. This organizational change is under consideration.

E. COMPUTER SYSTEMS GROUP

Among the corporate objectives of the Centre are the objectives "to assist the developing regions to build up the research capabilities, the innovative skills, and the institutions to solve their problems", ... "to encourage generally the coordination of international development research", ... and "to foster cooperation in research or development problems between the developed and developing regions for their mutual benefit". In addition, the very first power assigned to the Centre is "to estabish, maintain and operate information and data centres and facilities for research and other activities relevant to its objects."

The MINISIS program is one of the means by which the ISD can carry out these objectives. The MINISIS software is a tool that can assist organizations to maintain and operate information and data centres and facilities for research both in developed and developing countries. It is also a mechanism for teaching and transferring technical skills to developing country institutions to assist them in solving their information problems. This aspect is supported by the fact that at the Fifth Annual MINISIS Users Group Meeting held in Addis Ababa in October, 1984, representatives from 33 different organizations from 18 countries came together to share their ideas and experiences on managing and exchanging information.

As a tool that adheres to the international standards for the exchange of information, MINISIS greatly facilitates the cooperation between institutions by providing a method of exchanging information in machine-readable and printed form. Projects such as the Inter-Agency Development Research Information System (IDRIS), demonstrate that MINISIS can be effectively used to allow donor agencies to share information in order to coordinate research activities. Indeed, MINISIS has been adopted and is being currently used by the staff of many of the world's major donor agencies (CIDA, World Bank, IMF, USAID, NUFFIC, SAREC, GTZ, BOSTID, UN, and soon OECD). MINISIS is a software contribution unequalled in development aid history.

The IS Computer Systems Group, in one form or another, has been a major arm of the ISD's programs since 1975. Until 1982, when a separate administrative EDP section was established to cater specifically to IDRC's internal automation needs, it was responsible for all aspects of computer sciences throughout IDRC.

However, the primary mandate of the ISD has always been to serve the needs of developing countries and the development commmunity at large. It was appropriate, in light of growing demands, to relieve ISD programs of Centre-wide administrative automation responsibilities.

The size in numbers of projects and other activities of ISD programs grew three-fold between 1978, when MINISIS was released, and 1984. The access of developing countries to computers has grown even faster over the same period with the result that demands on the section for MINISIS and related services have increased explosively over the past few years.

In 1981, the section had a staff of 15 with only 27 MINISIS users. Today the staff counts 14, and there is an annual growth in new MINISIS users equal on average to the total number achieved during its first three years from 1978-1981. (See Appendix D: MINISIS Licensees.) Therefore, the strategic issue for the program is not a question of direction, value, or impact. The quality and quantity of ISD's clientele in developing countries and among donor agencies (as well as the income to the Centre from royalties) speaks for itself. (See Appendix E: MINISIS Revenue.) The issue, thus, is one of management of momentum and growth without increasing the staff or the budget exorbitantly. Our strategic plan addresses the options that will be explored over the next four years to 1990.

The IS Computer Systems Group is composed of three sections: Future Systems, MINISIS Outreach, and Computer Operations and Applications, each of which contributed essential functions to the overall program and workd together as an integrated whole.

The **Future Systems Group** is responsible for the development and maintenance of MINISIS and related software. It also provides technical advice and training to MINISIS users.

The **MINISIS Outreach Group's** responsibilities lie primarily in distributing the MINISIS software, training new users in developing countries in the use and application of MINISIS, and providing a liaison between the developing country users and distributors and the Future

Systems Group for the purpose of identifying and resolving problems as well as implementing new enhancements to the package. It also provides advice on the implementation of new enhancements developed by MINISIS users.

The **Computer Operations and Applications Group** is responsible for operating the ISD's Hewlett-Packard 3000, providing technical support to the users of the computer, including the Library, Communications Division, IS Division Management, and the IS Computer Group, and maintaining a library of software contributed by MINISIS users to be distributed to other members of the MINISIS community. Individuals from 138 institutions across Canada and selected development aid agencies around the world have direct access to the databases on ISD's computer via telecommunications. In addition, information services are provided annually by mail around the world to thousands of development information users using the databases on the ISD's computer.

At the preparation of this in-depth review, the MINISIS User Community consists of 119 licensees and sublicensees in 36 countries. Of these, 59 users are in developing countries. This number is consistent with the numbers over the last four years when at least 43% of the users of MINISIS were in developing countries. With 67% of the developing country organizations using MINISIS having had their initial contact with IDRC through the MINISIS program, this activity gives the Centre exposure where it was previously unknown.

Commercial distributors have sublicensing agreements with all but 10 MINISIS users in developed countries. The direct developed country licence agreements IDRC has are with governmental, UN, or non-profit organizations that acquired MINISIS before a commercial distributor was operational in the country.

Since 1981, over 50% of the developing country installations have been in countries covered by ASRO. The next largest territory at

15-20% is countries covered by MERO. This trend will probably continue in the next four years for several reasons, the major one being the capability of MINISIS to process and interact with users in alternate character sets including Arabic and Chinese. The number of MINISIS installations in India will increase significantly, particularly if Hewlett-Packard follows through with its proposal to open an assembly plant in cooperation with the Indian Government. The number of installations in Latin America and West Africa are expected to grow at a steady rate, but no sharp increase in the rate of growth is expected in East Africa.

The Hewlett-Packard Corporation has recently announced a new low-cost HP3000 model which will put the hardware and MINISIS within reach of many smaller documentation and information centres. The impact of this announcement is just starting to increase the number of requests for MINISIS. Although the percentage of installations will probably remain the same in various regions of the Third World, with the possible exception of India, the number of new MINISIS installations will probably increase from the current 25-30 annually to 35-40 annually or even higher.

The following four-year program for the Computer Systems Section only highlights the crucial problem of increased demand for services and no growth in resources, either human or financial.

The Future Systems Group will continue with its plan to optimize and stabilize the internals of MINISIS so that future enhancements and new applications can be built with no adverse effects on the MINISIS user community. The actual maintenance function of the MINISIS software will be reduced to one person-year per year, thus freeing resources to undertake development of new applications in cooperation with users of MINISIS. As the amount of time required for MINISIS support and development is reduced, resources can be directed toward intensifying and applying the experience already acquired in the use of microcomputers in managing bibliographic information.

One feature that makes MINISIS somewhat unique is its ability to process data and interact with users in a variety of character sets. The Future Systems Group will continue to work with selected MINISIS users to enhance existing language tools and develop new language tools to improve MINISIS' multilingual capability. In some cases, this work will require the purchase of specialized hardware or new hardware to carry on certain work in Ottawa. The costs of a lengthy trip and stay in a developing country must be weighed against the cost of the equipment. As hardware prices fall and the size of ISD's user community grows, the balance is changing.

There are a variety of new applications which can be built around the MINISIS internals to perform specific tasks which would be advantageous to many developing country organizations that may not have the resources to do the work themselves or who may need specialized coaching or training in order to carry out the work themselves. Such software which has already been developed stimulates users to implement Selective Dissemination of Information (SDI) service. Other tools that may be considered, when time is available, include thesaurus development aids and applications to manage and process different types of data (e.g. numeric or statistical) more effectively.

The Future Systems Group has already become involved in the transfer of technical information relating how MINISIS works to the user community. In the future, this service will be done in a more formal manner with additional documentation and active participation in advanced training courses. This activity will benefit all experienced MINISIS users but is extremely important in providing assistance to developing country organizations who are planning to develop software similar to MINISIS but operational on locally produced hardware.

During the next four-year period, the MINISIS Outreach Group must continue to come to grips with the reality that the number of MINISIS installations in any one year is extremely difficult to

predict. One organization may be acquiring MINISIS as part of some IDRC project; however, the time between the initial contact and the installation of the software may be one or two years. In another case, an organization that already has an appropriate computer and has had no previous contact with IDRC may request MINISIS. In this case, the time between initial contact and software intallation may be only a month or two. It is quite clear, however, from the rapidly increasing number of inquiries, that the number of requests for MINISIS from developing countries will rise sharply in the next few years. The anticipated largest growth areas, in descending order, are Southeast Asia, China, India, and the Middle East. These will be followed at some distance by Latin America and North Africa. A significant question to ask then is "How can the MINISIS Outreach Group support the sharp increase in the number of installations?".

There are essentially four options, with some minor variations, that respond to this question:

- continuing with the existing structure and method of support;
- delegating part or all of the responsibility of the MINISIS activities to commercial organizations;
- contracting individuals from the developing country regions to assist or perform support functions;
- establishing national or regional resource centres to provide MINISIS support services.

The existing method of MINISIS distribution, training, and support relies primarily on the technical staff of the MINISIS Outreach Group. This staff consists of five members located in Ottawa and one posted in Southeast Asia. Occasionally, individuals from experienced MINISIS installations are called upon to assist this staff. As the number of new MINISIS installations grows, the demands on these resources will increase in a larger rather than direct proportion as requests for assistance are made by existing users as well as new users. The group has already received, and started to react to, demands from

experienced users of MINISIS for more advanced training in the use of some of the more sophisticated features of MINISIS. A recent pilot training course on these topics was very popular, and certainly more requests will be made for courses of this type.

It becomes obvious when studying the projections for dealing with new MINISIS installations and supporting existing installations that the existing structure with the existing resources can manage the load for only 12-18 months before serious backlogs of new installations occur. A possibility would be to supplement the resources of the group with more positions. This action, however, would not be consistent with the Centre's policy of restraint in personnel growth, nor would it be as effective as other alternative methods in transferring technical knowledge to developing country organizations.

There are currently several commercial organizations that are either distributors of MINISIS or using the software to give demonstrations of its capabilities in order to sell HP3000 computers. Although distributors have generally been effective in developed countries where the commercial market is large, there are some drawbacks to using these organizations to handle developing country installations. There would have to be a fairly large and continually growing community of users in the territory for a commercial organization to justify at least two staff (one primary plus one backup) for this purpose. Major distributors in developed countries admit that although the initial licence fee they receive for the software does add to their revenue, they make their real profits from the consulting contracts following the MINISIS sale. Through experience with commercial software organizations in developing countries, the IDS feels it is not worth its while to dedicate a group of people to supporting MINISIS. It feels, quite justifiably, that it is more beneficial to allocate its talented resources to the more lucrative activities of selling hardware and developing accounting and manufacturing packages for large firms.

One of the strong points of MINISIS in developing countries is its reputation of having a knowledgeable, dedicated support group. There is a possibility of losing this reputation if MINISIS is over-commercialized. If use is to be made of commercial distributors to disseminate MINISIS in developing countries, either the policy of providing MINISIS free of charge which is under regular review will have to be changed, or a substantial increase in the budget of the MINISIS program will be required to pay a fee to the distributor directly.

Another serious concern with this option is the loss or weakening of the link between IDRC programs and objectives and the MINISIS support function. As stated earlier, the MINISIS program is tied closely to the corporate objectives of the Centre. There is some risk that these objectives would be compromised if the MINISIS activity were delegated to a large extent to a commercial organization. However, it would be unrealistic not to make use of the experience and talent of some of the more established commercial distributors when the volume of work becomes too great for the Outreach Group to manage.

A more attractive alternative, particularly in terms of transferring knowledge to the developing countries, is to contract experienced individuals from existing MINISIS installations to assist with the distribution and support functions. This alternative could result in more effective training of new users as a large portion of the training courses could be conducted in the local language. This procedure has been used to a limited extent already and has proved successful.

There are some disadvantages, however, to using this alternative exclusively. The individual who would be the ideal candidate for this type of work is most likely a key person in the MINISIS operation. The management of the organization may be reluctant to lose a valuable staff member three to four times a year for three weeks at a time. Also a considerable investment on the part of IDRC is required to ensure that the individual has the suitable additional skills to provide an

effective service to the MINISIS user community in the region. Given the mobility within the computer field in certain regions, no guarantee that the individual would be available on a long-term basis also exists.

A more effective investment would be to identify and support national or regional organizations with a suitable mandate, sufficient interest, commitment, and resources to become MINISIS resource centres. This alternative would provide the best vehicle to transfer MINISIS information and knowledge to developing countries. The Centre currently has an agreement of cooperation with the Documentation and Information Centre of the Arab League (ALDOC) to assist IDRC with the installation and support of MINISIS in member countries of the Arab League. ALDOC will receive additional intensive training in advanced features of MINISIS as well as in-depth technical training on developing new applications and interfacing Arabic terminals and printers to MINISIS. An example of a national resource centre might be in China, where an organization would assist with the development and maintenance of Chinese language MINISIS tools as well as provide MINISIS support to installations in China.

Projects to establish these centres would be most effective where technical resources are required to develop and support special language software tools for users. These centres would also be able to assist with or conduct MINISIS training courses for new users. Introducing a small fee for MINISIS in developing countries could also provide income to the resource centre and allow them to operate in the long-term without IDRC financial support.

One of the objectives of the Centre is to build resources in developing countries and MINISIS has played an integral part in the ISD's commitment to that objective. Over the last four years, the linkages between the MINISIS program and the projects has been strengthening. This trend will accelerate in the future, particularly with the availability of even less expensive hardware on which to run MINISIS.

No one option for supporting MINISIS can be applied universally. The Outreach Group will continue to utilize all the resources available from its own staff and from the MINISIS user community to conduct MINISIS installations and provide MINISIS support as effectively and efficiently as possible.

In addition to providing smooth and effective operation of the ISD's HP 3000 computer, a major on-going activity of the Computer Operations and Applications group is to provide technical advice and assistance. This service is provided not only to the Future Systems and Outreach groups but also to the MINISIS user community, particularly developing countries. This group will continue to develop, maintain, and advertise tools and techniques that will assist data centre managers with the operation of their computers in a MINISIS environment.

Another significant contribution the group makes to the MINISIS program is in the area of the MINISIS User Contributed Library. This collection of MINISIS-related programs and utilities has been submitted by members of the MINISIS community to IDRC for distribution to other members of the community. With recent changes regarding the proprietary rights of this user contributed software and the expansion in the size of the user community, the number of submissions will increase and, thus, will require more resources from the Computer Operations and Applications group to collect, test, document, and prepare for distribution the contributed software. The MINISIS User Contributed Library has already proven to be a useful mechanism to exchange software within the MINISIS family, and its importance will continue to grow as the number of users increases.

As the number of donor agencies involved in the IDRIS expands, the Computer Operations and Applications Group will become more involved in the technical support necessary for overseas users to have accessibility to the ISD's computer. When copies of the IDRIS database are mounted on other computers, the group will establish and maintain

transfer mechanisms. They may also have to write and maintain software to ensure these transfers take place in an effective, timely, and regular manner.

The Computer Operations and Applications Group will need to develop additional practical skills and software tools in the area of telecommunications as more and more organizations from remote locations want access to ISD's computer. These skills and tools are also required to provide advice and assistance to developing country MINISIS users on the practical use of telecommunications in a MINISIS environment.

This know-how also applies to the area of photocomposition. The group will be required to study different methods of interfacing and using photocomposition with the HP 3000 and MINISIS not only to benefit in-house users of the IS computer but also to be able to advise and assist developing country MINISIS users.

Several years' experience of trying to satisfy in one operations group the often conflicting needs of internal administrative automation and of programs for developing countries and users outside IDRC led to the separation of the groups. This separation has proved to be an effective decision-making influence and has resulted in two improved programs within the Centre. The close liaison and cooperation which has existed between the two computer operations groups and which has contributed to their mutual effectiveness will continue.

The computer system was first installed in 1976. Although there has been a modest growth in size of the installation and significant growth in number, geographic distribution, and activity of uses over the past few years, the budget line for capital expenditures has not increased. Most new acquisitions are made for replacement that will improve efficiency or give ISD access to equipment used by developing country intallations. This pattern will continue during the next four years.

PART IV: APPENDICES

A. Information Sciences Division's Organizational Charts

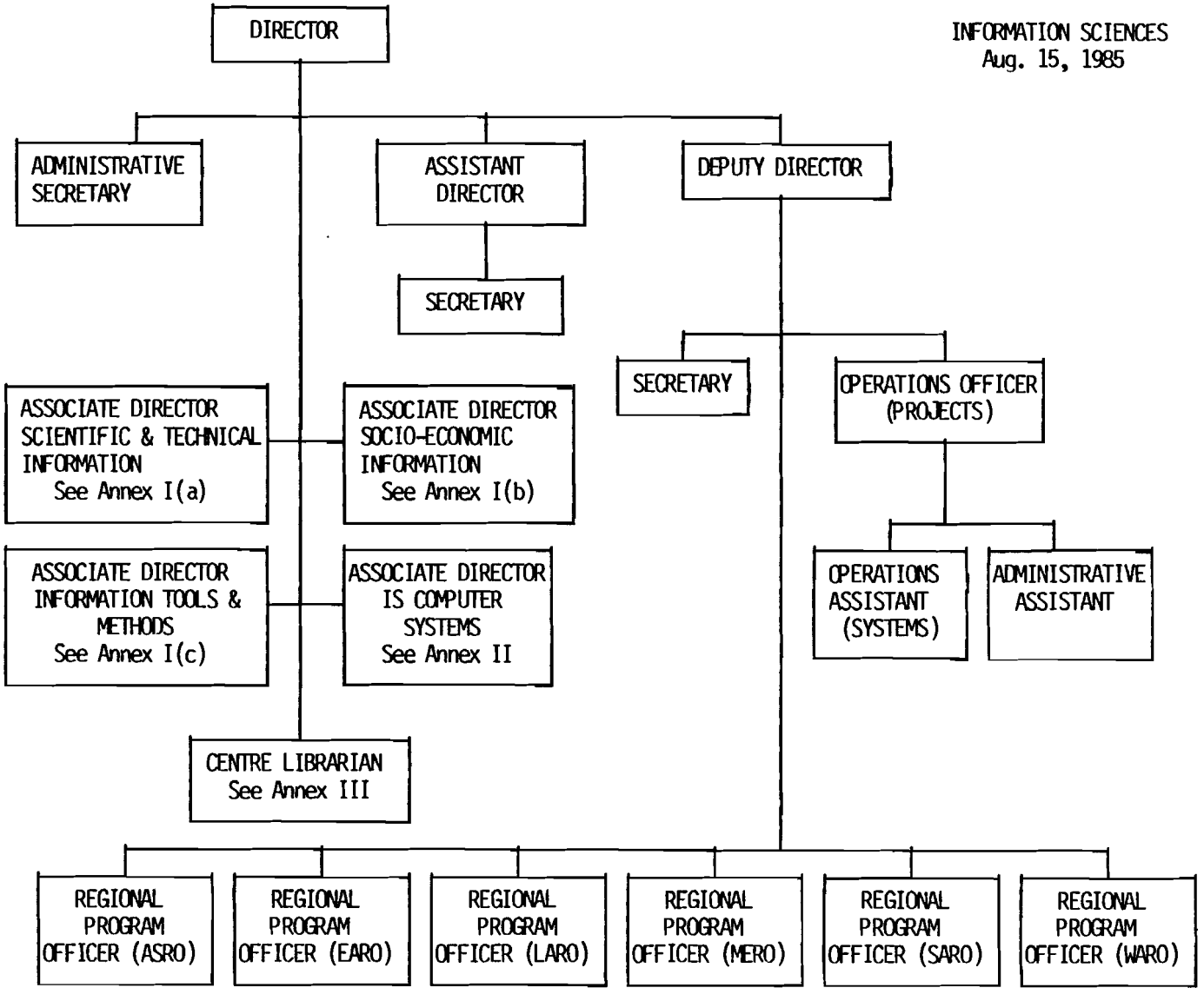
B. Library Objectives

C. Development Data Bases: Description

D. MINISIS Licensees

E. MINISIS Revenue

F. List of Acronyms and Abbreviations


DIRECTOR
INFORMATION SCIENCES
Aug. 15, 1985
ADMINISTRATIVE SECRETARY
ASSISTANT DIRECTOR
DEPUTY DIRECTOR
SECRETARY
SECRETARY
OPERATIONS OFFICER (PROJECTS)
ASSOCIATE DIRECTOR SCIENTIFIC & TECHNICAL INFORMATION See Annex I(a)
ASSOCIATE DIRECTOR SOCIO-ECONOMIC INFORMATION See Annex I(b)
ASSOCIATE DIRECTOR INFORMATION TOOLS & METHODS See Annex I(c)
ASSOCIATE DIRECTOR IS COMPUTER SYSTEMS See Annex II
OPERATIONS ASSISTANT (SYSTEMS)
ADMINISTRATIVE ASSISTANT
CENTRE LIBRARIAN See Annex III
REGIONAL PROGRAM OFFICER (ASRO)
REGIONAL PROGRAM OFFICER (EARO)
REGIONAL PROGRAM OFFICER (LARO)
REGIONAL PROGRAM OFFICER (MERO)
REGIONAL PROGRAM OFFICER (SARO)
REGIONAL PROGRAM OFFICER (WARO)

APPENDIX A

INFORMATION SCIENCES
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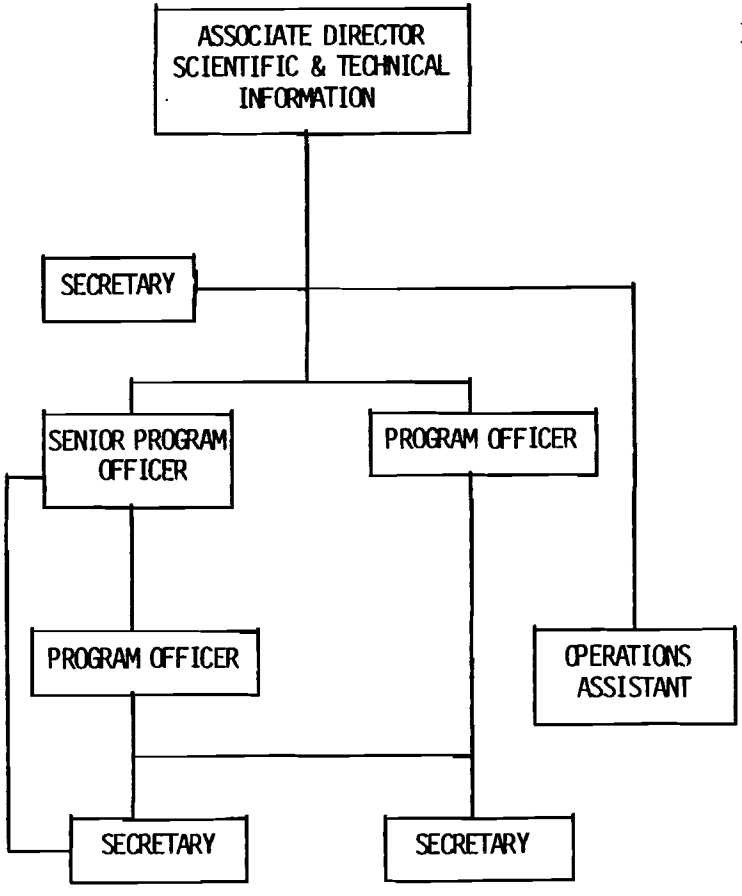
Annex I(a)



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Aug. 15, 1985
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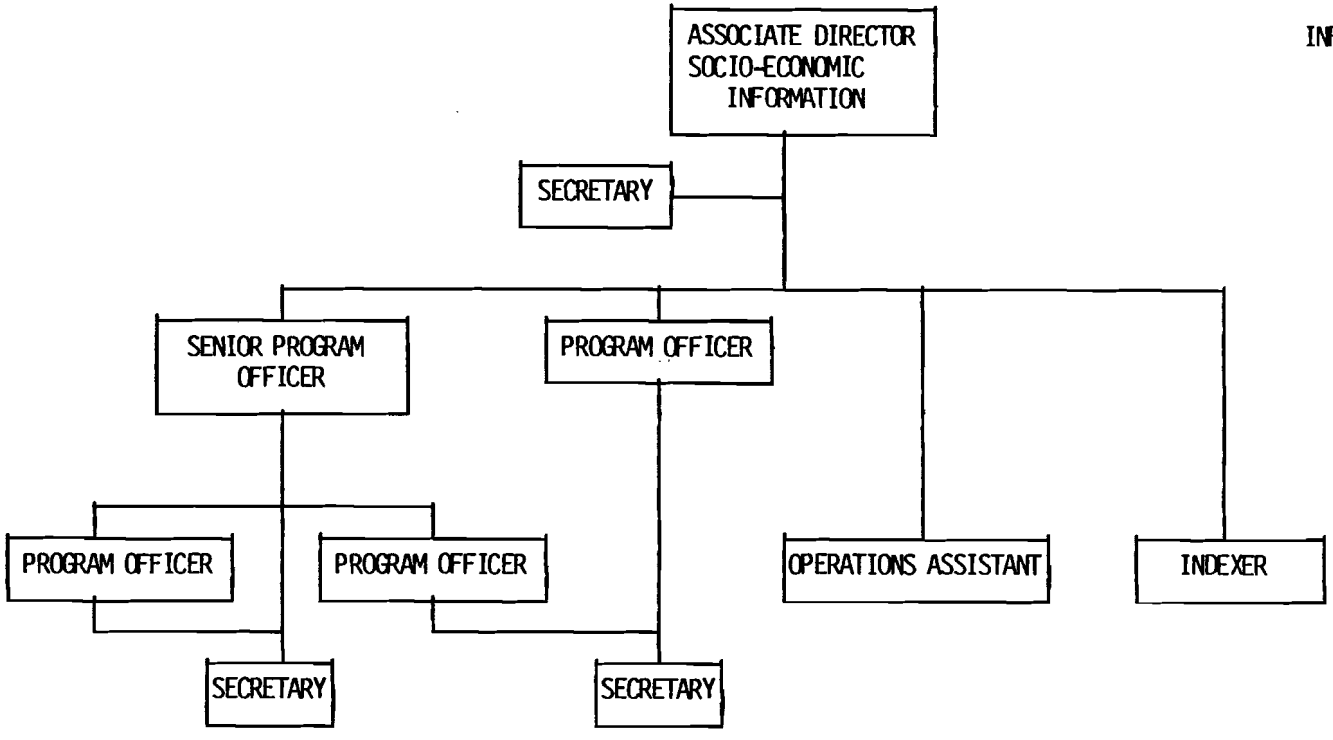

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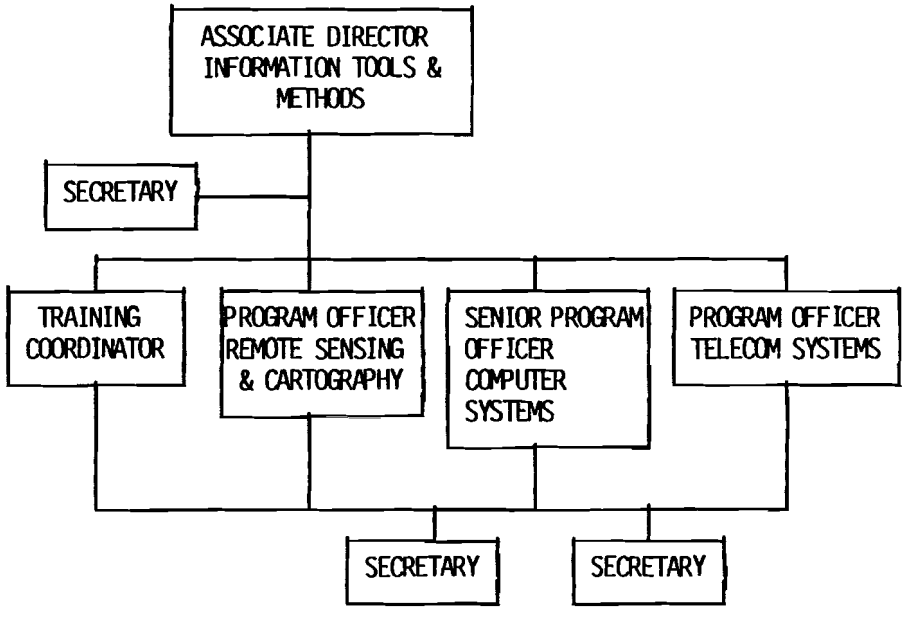

INFORMATION SCIENCES
Aug. 15, 1985
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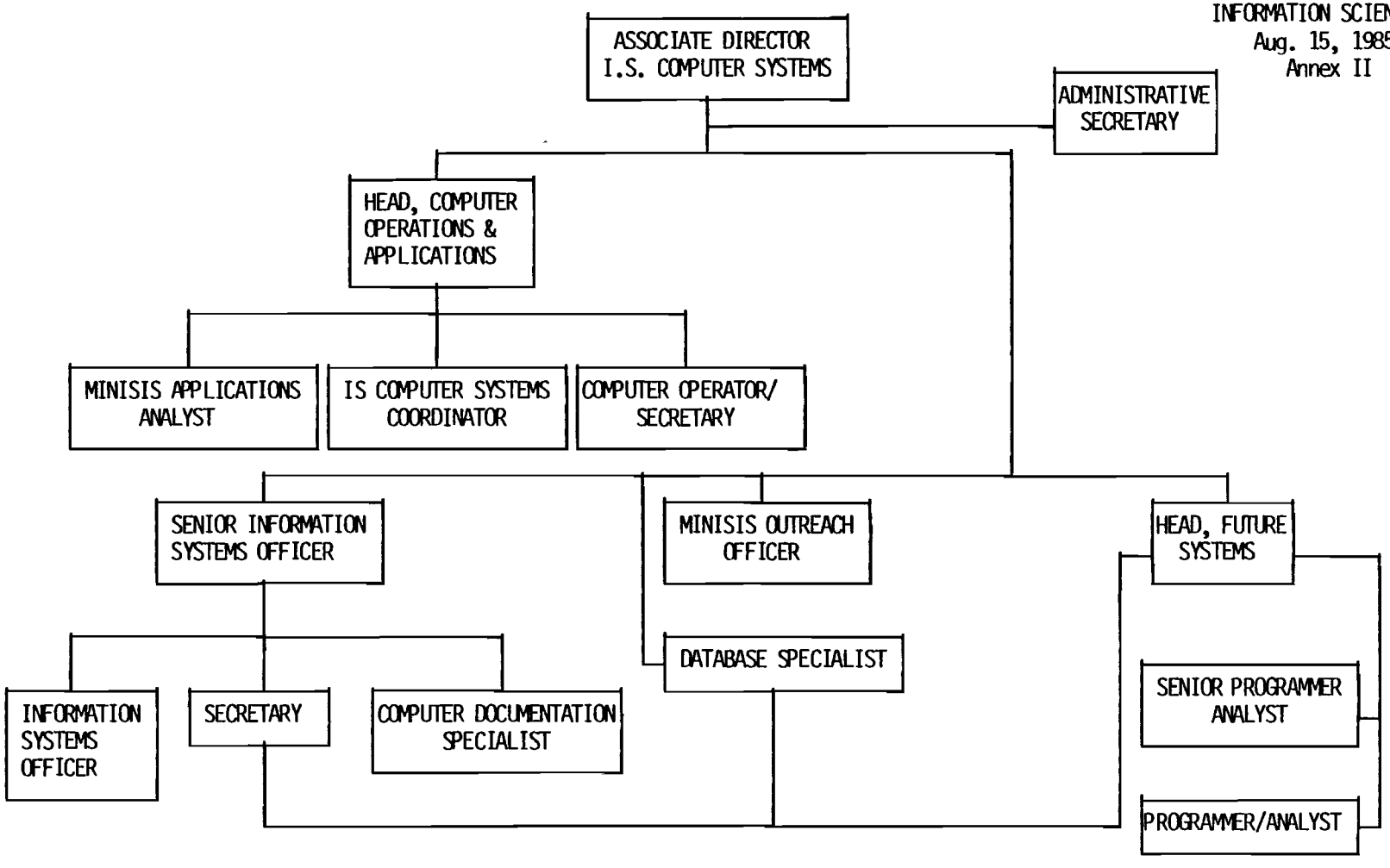

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Aug. 15, 1985
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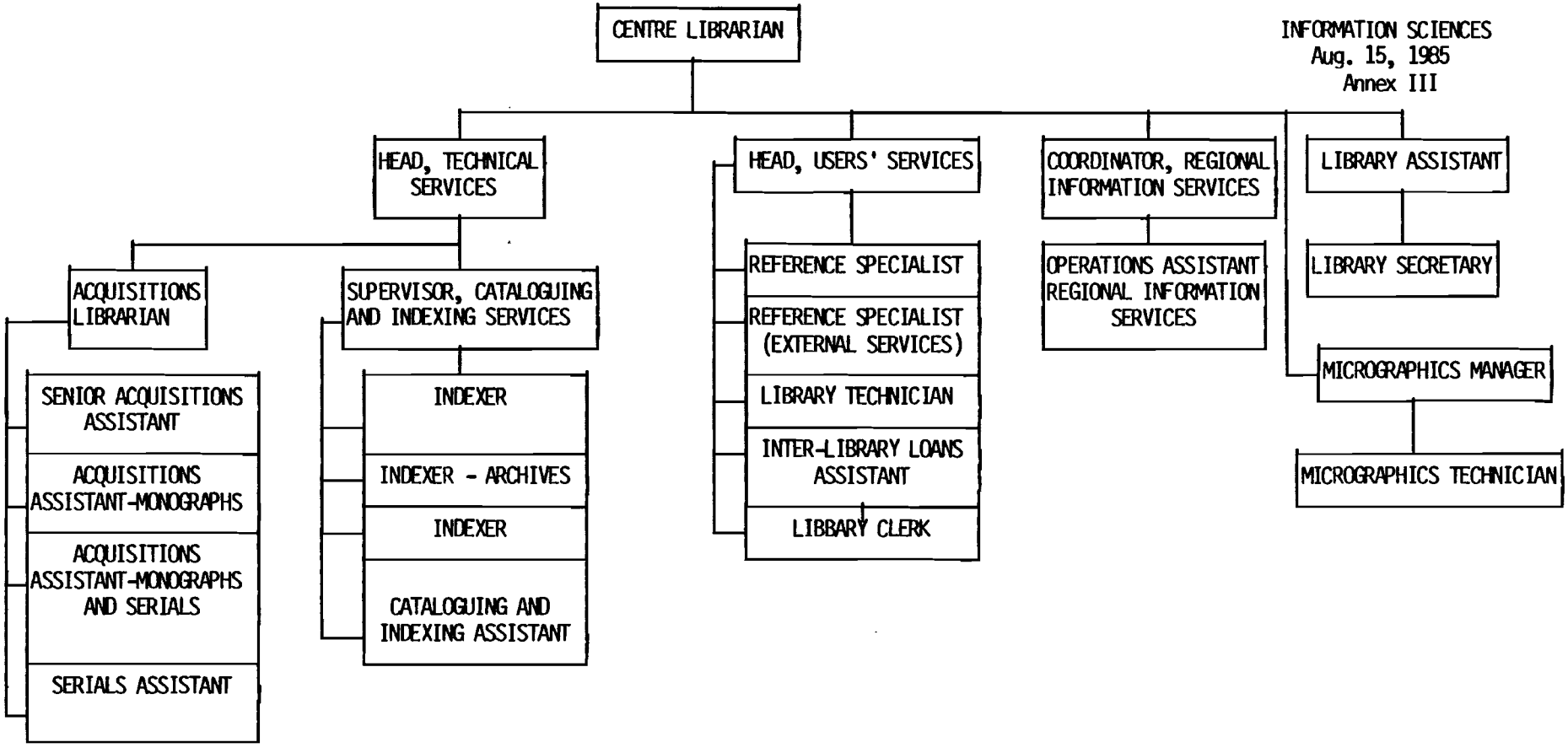

APPENDIX B

Revised, April 12, 1985

LIBRARY OBJECTIVES AND PROGRAM

In accordance with the objects and powers of the Centre, the Library has as its objective to stimulate and facilitate access to information about Third World development with particular emphasis on research in adpating scientific and technical knowledge to the economic and social advancement of developing countries.

To meet this objective, the Library:

1. provides information and library service to the following groups:

   a) IDRC staff in Canada and abroad;

   b) IDRC projects (in cooperation with Regional Offices where appropriate);

   c) the Canadian community (governmental, academic, and voluntary) concerned with Third World development, and as resources permit; and

   d) other communities concerned with Third World development (institutions in the developing countries international organizations, institutions in other developed countries).

2. provides advice and training to:

   a) IDRC regional offices;

   b) IDRC projects;

   c) developing country institutions;

   d) international organizations with responsibilities for establishing guidelines and standards; and

   e) Canadian institutions engaged in international cooperative information programs and/or training of information specialists.

3. acts as a test-bed for technological, methodological, and bibliographical developments and standards that may be appropriate for adoption by the international community, IDRC projects, and developing countries.

DEVELOPMENT DATA BASE DESCRIPTIONS

ACRONYM

Supplier: International Development Research Centre (IDRC), Ottawa, Canada

Content: This data base provides information on acronyms which relate to international development and which are used by IDRC.

AID

Supplier: Agency for International Development (AID), Washington, D.C., USA

Content: This data base contains technical research and development materials produced by AID programs. The subject fields covered are: development assistance, economics, education, energy, human resources, physical and social sciences, science and technology, and urban development.

Period of Coverage: 1962 to date

BIBLIOL (IDRC Library Data Base)

Supplier: International Development Research Centre (IDRC), Ottawa, Canada

Content: This data base covers literature collected to service the needs and objectives of the International Development Research Centre as a whole. The literature relates primarily to the economic and social development of the Third World, particularly its rural areas. Topics covered include: agriculture, demography, development aid, education, energy, family planning, health, information systems, migration, nutrition, science policy, technology transfer, and urbanization.

Period of Coverage: 1970 to date

DEVSIS (Development Sciences Information System)

Supplier:	International Development Research Centre (IDRC), Ottawa, Canada
Content:	This data base covers literature emanating from Canada on the economic and social aspects of Third World development.
Period of Coverage:	1975 to date

FAO

Supplier:	Food and Agriculture Organization of the United Nations (FAO), Rome, Italy
Content:	This data base includes worldwide coverage of documents written by or for FAO on such topics as: agricultural chemicals technology; agriculture; agronomy; animal biology; animal husbandry; botany; conservation; crops and soil; ecology; economics; farming; fishing and fisheries; food and nutrition; human geography; industry and trade; livestock farming; natural resources; physical geography; rock, soil and sciences; and zoology. Much of the documentation deals with developing countries, the enhancement of food production in these countries, and questions of trade in agricultural products between these countries and the rest of the world.
Period of Coverage:	1968 to date

IDRIS (Inter-agency Development Research Information System)

Supplier: There are presently five organizations cooperating in this project:

Board on Science and Technology for International Development (BOSTID), Washington, D.C., USA

German Appropriate Technology Exchange (GATE), Eschhorn, Federal Republic of Germany

International Development Research Centre (IDRC), Ottawa, Canada

International Foundation for Science (IFS), Stockholm, Sweden

Swedish Agency for Research Cooperation with Developing Countries (SAREC), Stockholm, Sweden

Note: Also included in the data base are a few project records from the Netherlands Universities Foundation for International Cooperation (NUFFIC), The Hague, Netherlands

Content: This data base provides information describing the research activities located in, or concerned with, developing countries, and funded or coordinated by the agencies mentioned above. Included in this data is the project description, the name of the recipient institutions, the researchers' names, the geographical area under study, the subject headings, and the amount of funds committed.

Period of Coverage: 1970 to date

ILO

Supplier:	International Labour Office (ILO), Geneva, Switzerland
Content:	This data base includes worldwide coverage of journal and monographic literature in the field of economic and social development and industrial relations, including such topics as: agriculture, demography, economic conditions and policies, education, environment and earth sciences, international relations, and management. Much of the information is specific to developing countries, for example: employment creation, labour-intensive manufacturing methods, and the role of women in development.
Period of Coverage:	1980 to date

SALUS

Supplier:	International Development Research Centre (IDRC), Ottawa, Canada
Content:	This data base covers literature mainly on low-cost rural health care and health manpower training in developing countries.
Period of Coverage:	1970 to date

UNESCO

Supplier: United Nations Educational, Scientific, and Cultural Organization (Unesco), Paris, France

Content: This data base includes worldwide coverage of literature consisting of monographs, serials, reports, proceedings and unpublished documents written by or for Unesco. These deal with a broad range of educational, scientific, and cultural programs with an increasing emphasis on development issues. Topics covered include: area studies; arts; communication science and technology; economics, industry, and trade; education; environment and nature conservation; geography; information sciences and documentation; international law; language, linguistics, and literature; legal organizations and procedure; music and the performing arts; political science and politics; psychology; religion and atheism; social sciences; social welfare and relief services; work and leisure.

Period of Coverage: 1970 to date

UNIDO

Supplier: United Nations Industrial Development Organization (UNIDO), Vienna, Austria

Content: This data base covers documents, prepared by or for UNIDO, concerned with the improvement of industry in developing countries. The literature covers macro- and micro-economic aspects of industrial development such as: infrastructure; institutional services; management; marketing; planning; policies; pre-feasibility and feasibility of industry or plant; product development and design; production and productivity; quality control; research; surveys; technology and techniques.

Period of Coverage: 1968 to date

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APPENDIX E

MINISIS REVENUES

LICENCE REVENUES (1978-81)	$ 113 795
LICENCE REVENUES (1981-82)	134 450
LICENCE REVENUES (1982-83)	131 326
LICENCE REVENUES (1983-84)	125 965
LICENCE REVENUES (1984-85)	22 586
SHL QUARTERLY PAYMENTS	225 000
1978-79 SUPPORT FEES	1 200
1979-80 SUPPORT FEES	15 500
1980-81 SUPPORT FEES	28 000
1981-82 SUPPORT FEES	49 210
1982-83 SUPPORT FEES	94 377
1983-84 SUPPORT FEES	125 983
1984-85 SUPPORT FEES	124 894
1985-86 SUPPORT FEES	2 500
TOTAL AS OF 1 APRIL 1985	**$1 194 786**

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LICENCE REVENUES RECEIVED TO DATE	$ 753 122
SOFTWARE SUPPORT FEES RECEIVED TO DATE	$ 441 664
TOTAL AMOUNT INVOICED TO DATE	$1 359 014
AMOUNT OUTSTANDING	$ 164 228
TOTAL AMOUNT AWAITING INVOICE	$ 0

LIST OF ACRONYMS AND ABBREVIATIONS/

LISTE DES ACRONYMES ET ABREVIATIONS

AAAS	American Association for the Advancement of Science
AARD	Agency for Agricultural Research and Development
ACDI	Agence Canadienne de développement international
ACTC	Ateneo Computer Techynology Center
AFNS	Agriculture, Food, and Nutrition Sciences
AGRIS	International Information System for Agricultural Sciences and Technology/Système international d'information pour les sciences et la technologie agricoles
AIDO	Arab Industrial Development Organization/Organisation arabe de développement industriel
AIEA	Agence international de l'énergie atomique
AIIMS	All India Institute of Medical Sciences
ALDOC	Arab League Documentation and Information Centre/Centre de documentation et d'information de la ligue des etats arabes
ALECSO	Arab League Educational, Cultural, and Scientific Organization/Organisation éducative, culturelle et scientifique de la ligue des etats arabes
AOAD	Arab Organization for Agricultural Development/ Organisation arabe pour le développment agricole
ARCT	African Regional Centre for Technology/Centre régional africain de technologie
ASLIB	Association of Special Libraries and Information Bureaux
ASRO	Asian Regional Office
ASTED	Association pour l'avancement des sciences et des techniques de la documentation
ATAS	Advance Technology Alert System
AVRDC	Asian Vegetable Research and Development Center

BIIT	Banque d'information industrielles et techniques
BIREME	Latin Americna Health and Medical Library/Biblioteca Regional de Medicina
BIT	Bureau international du travail
BOSTID	Board on Science and Technology for International Development
BPPP	Badan Pengkajian Dan Penerapan Pertanian
BRACO	Bureau régional pour l'Afrique centrale et occidentale
BRAFO	Bureau régional pour l'Afrique orientale et australe
BRALA	Bureau régional pour l'Amerique latine et les Antilles
BRASI	Bureau régional pour l'Asie du sud-est et de l'est
BRASU	Bureau régional pour l'Asie du sud
BREMO	Bureau régional pour le Moyen-Orient et l'Afrique du Nord
CAIS	Centres d'analyse de l'information spécialisés
CARICOM	Caribbean Community/Communauté des Caraibes
CARIS	Current Agricultural Research Information System/Système d'information sur les recherches agronomiques en cours
CCI	Centre CNUCED/GATT de commerce international
CCM	Centre for Community Medicine
CDC	Cairo Demographic Centre
CDU	Classification décimale universelle
CEA	Commission économique pour l'Afrique
CENDIT	Centre for Development of Instructional Technology
CEPAL	Commission économique pour l'Amerique latine et caribe
CGIAR	Consultative Group on International Agricultural Research
CGT	Office of the Comptroller General and Treasurer/Bureau du controleur général et trésorier

CIDA	Canadian International Development Agency
CIDE	Centro de Investigacion y Desarollo de la Educacion/ Centre for Educational Research and Development
CIEA	Centre international de l'élevage pour l'Afrique
CIP	Centro Internacional de la Papa/International Potato Centre/Centre international de la pomme de terre
CIRA	Centres internationaux de recherche agricole
CISTI	Canada Institute for Scientific and Technological Information
CLA	Canadian Library Association/Association canadienne de bibliothèques
CNUCED	Conférence des Nations Unies sur le commerce et le développement
CNUDST	Centre National Universitaire de Documentation Scientifique et Technique
CNUSTD	Conférence des Nations Unies sur la science et la technique au service du développement
COI	Commission océanographique intergouvernementale
COM	Computer-Output-Microform/Microfiches en sortie d'ordinateur
CONICIT	Consejo Nacional de Investigaciones Cientificas y Tecnologicas/National Council for Scientific and Technological Research
COOP	Cooperative Programs/Programmes de coopération
CRDI	Centre de recherches pour le développement international
DAP	Divisional Activity Project/Projet Préliminaire au programme
DEVSIS	Development Sciences Information System/Système d'information sur les sciences du développement
DIESA	Department of International Economic and Social Affairs

DIESA	Department of International Economic and Social Affairs
DISC	International Diarrheal Disease Information Service
EARO	East African Regional Office
ECA	Economic Commission for Africa
ECLAC	Economic Commission for Latin America and the Caribbean
EDP	Electronic Data Processing
EEP	Etude des programmes et politiques
EEZ	Economic Exclusive Zones
ENSI	Entreprise nationale des Systèmes Informatiques
FAO	Food and Agricultural Organization of the United Nations/ Organisation des Nations Unies pour l'alimentation et l'agriculture
FIS	Fondation internationale pour la science
FMI	Fonds monétaire international
FMOI	Fédération mondiale des organisations d'ingénieurs
GATE	German Appropriate Technology Exchange/Centre Allemand d'inter-technologie appropriée
GCRAI	Groupe consultatif pour la recherche agricole internationale
GTZ	German Agency for International Development/Office Allemand de la coopération technique
HCR	Haut commissariat des Nations Unies pour les réfugiés
HKPC	Hong Kong Productivity Centre
HOMMEH	Hellenic Organization of Small and Medium-sized Industries and Handicrafts
HP	Hewlett-Packard

IAEA	International Atomic Energy Agency
IARC	International Agricultural Research Centres
IATUL	International Association of Technological University Libraries/Association internationale des bibliothèques d'universités polytechniques
IBI	Intergovernmental Bureau for Informatics/Bureau intergouvernemental pour l'informatique
ICDDR,B	International Center for Diarrheal Disease Research, Bangladesh
ICIST	Institut canadien de l'information scientifique et technique
IDO	Institut fur Datentechnik und Organisation GmbH
IDO	International Development Office
IDRC	International Development Research Centre
IDRIS	Inter-Agency Development Research Information System
IERS	International Educational Reporting Service
IFORD	Institut de Formation et de Recherche Démographique/ Institute for Training and Demographic Research
IFS	International Foundation for Science
IIMI	International Irrigation Management Institute
ILCA	International Livestock Centre for Africa
ILO	International Labour Office
ILPES	Instituto Latinoamericano de Planificacion Economica y Social/Latin American Institute for Economic and Social Planning/Institut latino-americain de planification économique et sociale
IMF	International Monetary Fund
IMI	Information Management Incorporated
INFOPLAN	Information System for Planning in Latin America and the Caribbean

INFOTERRA	International Referral System for Sources of Environmental Information
INIBAP	International Network for the Improvement of Bananas and Plantains
INNORPI	Institut National de la Normalisation et de la Propriété Industrielle
INSTRAW	UN International Research and Training Institute for the Advancement of Women/Institut international de recherche et de formation des Nations Unies pour la promotion de la femme
INTIB	Industrial and Technological Information Bank
IOC	Intergovernmental Oceanographic Commission
IRTIS	Inter-Regional Training Information Systems
ISD	Information Sciences Division
ISE	Information socio-économique
ISESCO	Organisation Islamique pour l'Education, les Sciences et la Culture
ISIS	Integrated Set of Information Systems
IST	Information scientifique et technologique
ISTIC	Institute of Scientific and Technical Information of China
IT&M	Information Tools and Methods
ITC	International Trade Centre
IUC	Inter-University Council for Higher Education Overseas
KIET	Korea Institute for Industrial Economics and Technology
LARO	Latin American Regional Office
LATINAH	Latin American Settlements Information Network
MARA	Majlis Amanah Ra'ayat
MEDLARS	Medical Literature Analysis and Retrieval Service
MERO	Middle East Regional Office

MINISIS	Interactive Minicomputer System for Information Retrieval and Library Management
MIS	Management Information Systems/Service des systèmes de gestion intégrés
MOSTE	Ministry of Science, Technology and Energy
MRRDB	Malaysian Rubber Research and Development Board
MSU-IIT	Mindanao State University - Iligan Institute of Technology
MULBUD	Multiperiod Budgeting Perennial Crops
NACA-RLCP	Network of Aquaculture Centres in Asia - Regional Lead Centre in the Philippines
NACA-RLCT	Network of Aquaculture Centres in Asia - Regional Lead Centre in Thailand
NCAER	National Council of Applied Economic Research
NEA	National Energy Administration
NGO	Non-Governmental Organization
NOS	Nederlandse Omroepstichting
NSTA	National Science and Technology Authority
NTIS	National Technical Information Service
NU	Nations Unies
NUFFIC	Netherlands Universities Foundation for International Cooperation/Fondation des universités néerlandaires pour le coopération internationale
OAS	Organization of American States
OAU	Organization of African Unity
ODA	Overseas Development Aid
OEA	Organisation des Etats Américains
OECA	Ontario Education Communications Authority

OECD	Organization for Economic Cooperation and Development/ Organisation de coopération et de développement économiques
OMI	Outils et méthodes d'information
OMPI	Organisation mondiale de la proprieté intellectuelle
OMS	Organisation mondiale de la santé
ONG	Organisations non gouvernementales
ONUDI	Organisation des Nations Unies pour le développement industriel
OUA	Organisation de l'Unité Africaine
PADIS	Pan-African Documentation and Information System
PCIERD	Philippine Council for Industry and Energy Research and Development
PDIN	Pusat Dokumentasi Ilmiah Nasional
PETRONAS	Petroliam Nasional Berhad
PNUD	Programme des Nations Unies pour le Développement
PNUE	Programme des Nations Unies pour l'environnement
POPIN	Population Information Network
PORIM	Palm Oil Research Institute of Malaysia
PPR	Program and Policy Review
PTB	Programme des travaux et budget
PWB	Program of Work and Budget
RCTT	Regional Centre for Technology Transfer of the Economic and Social Commission for Asia and the Pacific
REDUC	Red Latinoamericana de Documentacion en Educacion
REPIDISCA	Red Panamericana de Informacion y Documentacion Técnica en Ingenieria Sanitaria y Ciencias del Ambiente/Réseau panaméricain d'information et de documentation en technique sanitarie et sciences de l'environnement

RIPS	Regional Institute for Population Studies/Institut régional d'études démographiques
SAAN	Division des sciences de l'agriculture, de l'alimentation et de la nutrition
SADCC	Southern African Development Coordination Committee/ Comité de l'Afrique australe pour la coordination au développement
SALUS	Information Service on Low-Cost Rural Health Care and Health Manpower Training/Service d'information sur les services de santé publics et sur la formation de travailleurs de la santé
SAREC	Swedish Agency for Research Cooperation with Developing Countries/Agence suédoise de coopération en recherche avec les pays en développement
SARO	South Asian Regional Office
SASKCOMP	Saskatchewan Computer Utility Corporation
SDI	Secrétariat pour le développement international
SDI	Selective Dissemination of Information
SEAFDEC	Southeast Asian Fisheries Development Centre/Centre de développement des pêches de l'Asie du sud-est
SEAMEO	Southeast Asian Ministers of Education Organization/ Organisation des ministres de l'éducation des pays du sud-est asiatique
SEARCA	Southeast Asian Regional Centre for Graduate Study and Research in Agriculture/Centre d'études supérieures et de recherche agricole de l'Asie du sud-est
SEI	Socio-Economic Information
SIAC	Specialized Information Analysis Centre
SIC	Specialized Information Centre
SIDA	Swedish International Development Authority/Office central suédois pour l'aide au développement international
SIIE	Service international d'information sur l'enseignement
SOEI	State Organization for Engineering Industry

STI	Science and Technology Information
STIC	Science and Technology Information Centre
TECHNONET	Netowrk for Industrial Technology Information and Extension/Réseau d'information et de promotion de la technologie industrielle
TROPMED	Tropical Medicine and Public Health Project
UDC	Universal Decimal Classification
UN	United Nations
UNBIS	United Nations Bibliographic System
UNCSTD	United Nations Centre for Science and Technology for Development
UNCTAD	United Nations Conference on Trade and Development
UNCTC	United Nations Centre on Transactional Corporations/ Centres des Nations Unies sur les sociétés transnationales
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization/Organisation des Nations Unies pour l'éducation, la science et la culture
UNHCR	United Nations High Commission for Refugees
UNIDO	United Nations Industrial Development Organization
UNISIST	United Nations Intergovernmental Programme for Cooperation in the Field of Scientific and Technological Information/Système mondial d'information scientifique et technologique
UNITAR	United Nations Institute for Training and Research/ Institut des Nations Unies pour la formation et la recherche
USAID	United States Agency for International Development

VINITI	All-Union Institute of Scientific and Technical Information of the State Committee of the Council of Ministers, USSR, for Science and Technology of the Academy of Sciences, USSR
WARO	West African Regional Office
WFEO	World Federation of Engineering Organizations
WHO	World Health Organization
WIPO	World Intellectual Property Organization
ZEE	Zone économique exclusive