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ACTION OF IDRC IN THE FIELD OF INDUSTRIAL INFORMATION FOR DEVELOPING COUNTRIES*

by

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The International Development Research Centre (IDRC) is a corporation created by the Parliament of Canada to stimulate and support scientific and technical research by developing countries. The Information Sciences Division which is one of the major four program divisions with IDRC supports developing countries to establish national information systems, to participate to international information networks, to create specialized information centres, to strengthen sectoral information programs and to develop information tools and methods.

The Division program is subdivided into four major programs and the Library and a major component of its Scientific and Technological Information program is Industrial and Technological Information.

This paper describes some of the activities of the Division in the field of industrial information as well as other activities of the Division which are relevant to the Industrial and Technological Information Bank (INTIB) of UNIDO. This includes assistance to national and regional institutions to develop industrial and technological information services and the evaluation of new information technologies such as CD-ROM, optical disk technology as document storage media and communication satellite systems.
Introduction

1. If one accepts the concept of an "information chain", with the links representing the many elements or functions within the transfer process, then the program of the Information Sciences (IS) Division of the International Development Research Centre (IDRC) focuses on each one of the links. The division supports projects that are concerned with developing indigenous capacity to: identify and rank information needs; locate and select information sources; manipulate and process acquired information; and retrieve, repackage and disseminate information to a clearly defined target audience. The information chain is crucial so decision-makers at every level can make timely, well-founded and accurate development policies.

2. The International Development Research Centre (IDRC) is a corporation created by the Parliament of Canada in 1970 to stimulate and support scientific and technical research by developing countries for their own benefit. The fields of investigation to which IDRC gives its financial and professional support include: farming, food storage, processing, and distribution; forestry; fisheries; animal sciences; energy; tropical diseases; water supplies; maternal and child health; education; population studies; economics; communications; urban policies; science and technology policy; and information systems.

3. Although IDRC is funded entirely by the Canadian Parliament, to which it reports annually, its operations are guided by an international 21-member Board of Governors. Under the IDRC Act, the chairman, the vice-chairman, and nine other governors must be Canadian citizens; in practice, 6 of the remaining 10 governors are from developing countries.

4. The Centre's programs help developing countries to build the scientific competence of their institutions and their researchers so that these countries can work to solve their own problems. Opportunities are given to researchers to broaden their experience through further specialized study or on-the-job training.

5. IDRC emphasizes the role of the scientist in international development and encourages Third World countries to draw on the talent of their own scientific communities. Building a strong local base for future research is an important objective of most IDRC-supported work. Research projects are identified, designed, conducted, and managed by developing-country researchers in their own countries, to meet their own priorities and IDRC helps to create and supports international research networks through which developing countries can learn from each other, share common experiences, and conduct similarly designed studies in areas of mutual concern. It also promotes cooperation between developing-country researchers and their counterparts in Canada.

6. The IS Division is one of four program divisions with IDRC. The other three are Agriculture, Food and Nutrition Sciences, which supports projects on farming systems, forestry in arid and semi-arid lands, and aquaculture; Health Sciences, which divides its support among water supply and sanitation, maternal and child health, tropical and infectious diseases, occupational and environmental health, and health services research; and
Social Sciences, which supports research into international social and economic development issues.

7. IDRC is unique among development and aid agencies because it stressed information sciences from the outset. However, the IS Division recognizes that its funding is insufficient to support all demands made on its program. Project selection criteria are critical so the most urgent needs can be matched with the division's capability to support information activities. During the last 15 years, the division's program was guided by the following concepts:

- The volume of scientific literature is so enormous that no developing country has the resources to build an independent and comprehensive national information system. Thus, any attempts to address Third World information needs must be based upon resource sharing and cooperation.

- For any country, the most important information is that which has been generated within the country.

- A developing country needs to have the skills to acquire from the rest of the world those pieces of information that it has identified as important to its development process; it cannot rely upon foreign sources to make the selections on its behalf.

- Interconnection of libraries and documentation centres and co-operation can lead to a more rational use of resources and the avoidance of waste.

8. The industrial information activities of IDRC are concentrated under the Scientific and Technological Information Group of the Information Sciences Division but several other activities of the Division are related to the development of information systems and apply to industrial information systems.

9. The Division program is subdivided into four (4) major programs and the Library.

- Scientific and Technological Information
- Socio-economic Information
- Information Tools and Methods
- Computer Systems
- Library and Bibliographic Services

10. The Scientific and Technological Information Program includes Agricultural Information, Industrial and Technological Information and Earth and Marine Sciences.

11. Of most interest to INTIB is the Industrial and Technological Information program which aims at assisting developing countries in establishing information services of relevance to industrial development. However, many of the activities conducted by the Information Tools and Methods (ITM) and by the Information Sciences Computer Systems (ISCS) as well as the
Bibliographic Services of the Library are relevant to INTIB activities and some of them will be described later.

**Industrial and Technological Information Program**

12. The Information Sciences Division involvement in the field of industrial information has been limited for several years to a single but well known activity: Technonet Asia. Technonet started as an IDRC project in 1972 and became an independent legal entity, acquiring international NGO status in 1980 at the end of IDRC financial support. This network is now regarded as model in industrial information and industrial cooperation to improve the quality and efficiency of production of small and medium manufacturing industries and several countries are interested to establish such a service.

13. IDRC does not currently support Technonet but in 1983, financial assistance was granted by IDRC to Technonet to undertake the preparation of the "Industrial Extension Manual for small and medium industries in developing countries". This manual, published in 1985, was produced as a field companion for the industrial extension officer, as a desk handbook for the industrial extension manager, and as a reference book for the industrial extension trainer. Two thousand copies of the 2 volume manual were published and distributed mainly in the Asia and Pacific Region. Discussions are underway to consider the translation of this manual into Spanish and French as well as in other languages.

14. The industrial and technological information program of IDRC began its real development in 1984 and this activity was officially included in the program of work and budget of the Information Sciences Division with the fiscal year 1985/86. This program is still at its orientation phase with limited budget but a significant increase in funding is anticipated in future gears. Already several projects received IDRC support under this program and the variety of these projects is illustrated with the following examples.

- Development of Information Systems and Services

15. In Africa, IDRC recently approved a grant to the African Regional Centre for Technology (ARCT) in Dakar. Since information is a key in reaching the objectives of ARCT, this project will strengthen the resources of the information and documentation centre at ARCT. Databases will be established and documentation technology appropriate to Africa will be published to facilitate an information exchange, especially about food production and energy. This project will also lay the groundwork for future networks for information dissemination and exchange about new technologies. This project of a duration of 2 years will be completed in 1988. ARCT is a focal point of INTIB and IDRC's support to ARCT should enhance INTIB's activities in that region.

16. Small-scale entrepreneurs in Caribbean countries are in need of information, advice and assistance concerning the choice and application of technology, as obtaining expatriate skills to deal with technological questions. IDRC currently supports a project in the region with the objective of increasing the capacity of Caribbean countries to meet their own requirements for technological expertise. The project will enable the Caribbean Development Bank (CDB) to strengthen and extend its Caribbean
Technological Consultancy Services (CTCS) network. CTCS will provide advice and information to local entrepreneurs in order to improve productivity, quality, pricing and marketing. This project is based on the Technonet concept but adapted for the specific needs of the region.

17. In Asia, the Asian Institute of Technology (AIT) is a leading institution in the field of technology and information handling and through the Asian Information Centre for Geotechnical Engineering (AGE) and the International Ferrocement Information Centre (IFIC), AIT delivers information crucial to engineers, scientists and technicians. An IDRC-supported project will enable the Library and Regional Documentation Centre (LRDC) of AIT to enhance its program so that the services and outputs of AGE and IFIC can serve the greatest possible number of users in the region. Specifically, LRDC will conduct user surveys; publish information products (e.g. manuals, do-it-yourself booklets, etc.) in formats that can be easily understood by the clientele; and actively promote the activities of AGE and IFIC. This project is an example of IDRC's support to specialized information systems.

18. The protection of the environment is a complex task with global implications requiring technical cooperation that is multidisciplinary and interdisciplinary and engineers employing new technologies need information on the impact of their work on the environment. In a project, the World Federation of Engineering Organizations (WFEO) in Paris, France, with financial support from IDRC, will prepare a guide for engineers on problems related to environmental protection. The guide will contain a methodology for gaining access to information on the environment and a directory of national, regional and international information resources. UNEP is also contributing to this project. WFEO groups engineering organizations around the world and a cooperation was established between WFEO and the Information Sciences Division to identify projects in engineering information.

19. Patent documents are a very important source of technological information which is under-used but which could be of significant benefit to small-scale enterprises and industrial research institutions. In 1985, IDRC granted its support to the "Organisation Africaine de la Propriété Intellectuelle" to enable strengthening of its documentation centre as well of OAPI's national antennas in the region. This project will enable the development of a technological information program from patent literature.

20. Appropriate technology groups are very active in most countries and have their importance in the development of small industries, therefore contributing to overall industrial development. Many of these institutions are members of the Socially Appropriate Technology International Information Services (SATIS) which was developed a few years ago and are using the SATIS classification. However, with new information technology being developed as well as new needs of the SATIS members and users of the SATIS methodology, the system now in place has to be re-evaluated and reviewed to meet the expectation of the members and serve them in a more efficient manner. SATIS has approached IDRC's Information Sciences Division for support in the evaluation of its program and its request is currently under consideration and is likely to be approved by the end of 1986.
21. Recently, IDRC provided assistance to the "Centre d'Assistance aux Petites et MoyennesEntreprises" (CAPME) in Cameroun, to organize a national seminar on industrial information for small and medium scale enterprises with the view of establishing a program in industrial information. The final report of this meeting is forthcoming and it will likely lead to a request for assistance to IDRC and other donors to develop an industrial information program in Cameroun. CAPME is an INTIB focal point and cooperation between INTIB and IDRC could be envisaged in the framework of the development of CAPME's program.

22. Another project is also under consideration with the Botswana Technology Centre in Gaborone to evaluate new forms of technology dissemination at the rural level in Botswana. Audio-visual methods are being considered as an alternative to conventional dissemination with publications and a three-year program is being prepared.

23. Energy information services and systems were also considered under this program and a few important projects were recently approved or are under discussion and consideration. The Information Network on New and Renewable Energy Resources and Technologies for Asia and the Pacific (INERTAP) initiated by UNESCO and conducted by the Philippines Oil Company in Manilla currently receives IDRC/UNESCO support.

24. IDRC assistance to establish a "Caribbean Energy Information System" to be coordinated by the Scientific Research Council of Jamaica is currently being considered jointly with the Commonwealth Science Council and UNESCO. Another project concerns the establishment of a Sahel Energy Information Network at the Centre Régional d'Énergie Solaire in Mali.

25. The above listed projects give an idea of the wide variety of support given to regional and national institutions dealing at different levels with industrial information and covering different subject scopes. As indicated earlier, the industrial information program was initiated in the last two years and the forthcoming few years will allow a better assessment of the regions and institutions needs for support. Future consideration will also include regional priorities such as those of the Southern Africa Development Community Conference (SADACC).

Information Tools and Methods

26. Information Tools and Methods (ITM) is concerned with information methodologies and their appropriateness in the development process. This section provides technical advice and assistance in telecommunications, remote sensing and cartography, computer systems and training. Information Sciences projects that require appropriate tools, methods and technologies are assisted by the group. Three of the activities of ITM are particularly relevant to INTIB.

- CD-ROM Technology Evaluation

27. A revolution is taking place in the world of information storage. The ways in which information is stored, retrieved, distributed, and duplicated are changing and evolving. Some recent developments in information-storage technology have their beginnings in the introduction of
commercial videodisks. These were first used in industrial training applications and soon made their way into consumer channels as an alternative to videocassette players. Although they have not become as popular as videocassette, since no consumer units capable of recording are available yet, they have, however, caught on as the compact disk (CD) audio medium. These compact disk units offer excellent quality stereo sound reproduction, ease of use, acceptable cost, and will soon offer still-frame visuals. A derivative technology is Compact Disk – Read Only Memory (CD-ROM), which uses technology similar to that of the CD audio disk to store information that can be read by a computer.

28. CD-ROMs have several advantages over other methods of storage. The storage media is expected to be very durable. Magnetic fields will not accidently erase data, nor will accidental formatting occur, since one cannot write to it. Unlike hard disks, CD-ROMs are very stable and are not sensitive to vibration or rough handling. The storage capacity is in excess of 500 Mb, or the equivalent of up to 1600 floppy disks. Powerful search and retrieval capabilities are available through the use of rapid, direct access to extensive indexes also stored on the disk. CD-ROM is particularly well suited for the distribution and use of large quantities of unchanged information without the usual costs of on-line access to databases.

29. The information industry is currently exploring the potential of CD-ROM for the delivery of information to end-users. Applications for CD-ROM storage include software programs, large databases, books, journals, encyclopedias, dictionaries, and atlases. Specific examples include: Grolier Inc. has published its 21-volume, 9 million word Academic American Encyclopedia on one compact disk; databases such as Library and Information Service Abstracts (LISA), the National Information Centre for Educational Media (NICEM), Compact Disclosure, Aquatic Sciences and Fisheries Abstracts (ASFA), University Microfilms Dissertation Abstracts, and Chemical Abstracts: Health and Safety in Chemistry, are or will soon be available on CD-ROM.

30. The Commonwealth Agricultural Bureaux International (CABI) recently identified the potential of CD-ROM for satisfying the information needs of agricultural research workers in both developing and developed countries. CABI has developed a multi-media information delivery facility to provide timely information in a selective and convenient format. It envisages CD-ROM functioning as both an information delivery and an access medium for micro- and mini-computer users, as part of its electronic publishing service. It expects that CD-ROM may have particular relevance in many developing countries where the lack of telecommunication facilities prevents the use of on-line information delivery.

31. In 1985, CABI began an experimental CD-ROM trial. A prototype disk including 180,000 CAD Abstract records (1984 and part of 1985) and the MICROBASIS search software was commissioned. A second disk, including 240,000 records, the CAB thesaurus, and the MICROBASIS software, is in production. CABI is embarking on a 9-month User Assessment Phase in which 30 CD-ROM copies will be distributed to approximately 30 assessment sites, mostly in developing countries. The broad assessment criteria are: CD-ROM service value, search software efficiency, hardware durability, and possible improvements. The hardware required is an IBM PC/XT or a DEC Micro Vax and a CD-player with interface. The cost of the CD-player and interface is only approximately $1,700 USD.
32. Recognizing the potential impact of this technology on developing countries, CABI invited IDRC to participate in this assessment by testing the technology with the CABI prototype compact disks at sites of interest to IDRC, using evaluation criteria relevant to the Information Sciences Divisions' interests.

33. IDRC has approved twelve-month project will allow the Information Sciences Division of IDRC to coordinate the testing and evaluation of CD-ROM technology for the delivery of bibliographic references within five IDRC-supported projects and the Centre Library.

34. The general objectives of this project are to evaluate the technical aspects of the delivery of bibliographic information via CD-ROM technology; to explore what impact this technology may have on the delivery of information to developing countries and hence on the programs of the Information Sciences Division of IDRC; and to provide some hands-on exposure to this technology to five IDRC Information Sciences Division supported projects and to the IDRC Library.

35. Five Information Sciences Divisions agricultural information projects have been selected as test sites. Selection was based on a combination of criteria including: access to the necessary microcomputer equipment, availability of personnel familiar with database searching and automated information services, existence of an appropriate user clientele on which to base test services, and familiarity with CABI information products. Following the test period, the consultant will collate the results, perform the evaluation analysis, produce a report, and present the results to the Information Sciences Division. The results of the study will also be shared with CABI.

36. The result of this study should be of interest to INTIB as CD-ROM technology could represent a means, among others, of disseminating the database of UNIDO documents as well as of other information of interest to developing countries.

- Optical Disk Technology as Document Storage Media

37. Recently, it has become evident that optical storage media for text and images will probably be available during the next year, although the technology is still so new that costs, technical specifications, and standards are not yet stable. Initial indications are that while costs for producing master copies are higher for optical disks than microfiche, the incremental cost of creating copies is much lower for optical disks. While microfiche require much less physical storage space that paper publications, optical disks require less space than microfiche. There are other advantages and disadvantages of each medium.

38. An optical storage-based product could potentially be of value to a large user community. Locations without good telecommunications capabilities could have access to an entire collection of materials on-site through enhanced microcomputers. Optical disks could be searched quickly by researchers who need to assemble materials about specific topics. Search results could be viewed on a display screen, printed out on paper, or transmitted electronically. Bibliographic records on the disk could be copied into a local system for use in local cataloguing and indexing systems.
39. In 1984, a proposal for a project to collect, catalogue, film and distribute "portable libraries" of CGIAR (Consultative Group on International Agricultural Research) scientific and technical literature was made. The "portable libraries" would be distributed free-of-charge to developing country institutions, which would in turn provide national and/or regional distribution. CGIAR Centres expressed considerable enthusiasm, which led the Secretariat to carry out an initial feasibility study in 1985. The result was a proposal for a two-year project with two objectives: to produce "portable libraries" covering literature published through 1985, in the form of microfiche collections accompanied by book catalogues; and to establish a continuing program to include materials published from 1986 onwards, funded in part by revenue from sales of the "portable libraries".

40. During the initial feasibility study and at the CGIAR Centre Directors' meeting in October 1985, a very real concern was raised as to whether microfiche sets delivered in 1988 would be obsolete, perhaps replaced by a better technology. At the time of the study, bibliographical databases were beginning to be put onto optical disks. However, no production systems existed for storing text and images on the same disk as the bibliographic data and the software to search for and retrieve the stored materials.

41. Even though optical disk technology appears to offer significant potential for improving the availability of CGIAR scientific information, the Secretariat did not feel in a position to select optical storage media without a careful evaluation of its costs and potential uses, carried out in concert with centres and donors. However, the Secretariat also did not wish to lose momentum in capturing the publications which will need to be acquired and processed before conversion to any storage medium can proceed. The Secretariat therefore proposed that two activities begin in 1986 and be carried out in parallel: the acquisition and initial processing of the publications, and an analytical study of the use of appropriate storage media for the project.

42. A sixteen-month project with contributions from IDRC will allow the CGIAR Secretariat to prepare for the effective preservation and dissemination of CGIAR publications, including an analysis of the technological feasibility and market acceptability of using optical disk technology versus micrographics technology for storing and delivering this information.

43. The general objective of this project is to assist the CGIAR in preparing for the permanent preservation of CGIAR publications, as well as for increasing international awareness about and improving availability of these publications, particularly in developing countries.

44. At the end of this project, there will be a completely processed collection of approximately 5,000 items of CGIAR literature ready for conversion into optical disk or microfiche storage media; and a report on the technological feasibility and market acceptability of using optical disk technology for preserving and disseminating CGIAR publications, with recommendations for a course of action.

45. The result of this investigation should also be useful to INTIB in considering this optical disk technology as a means to disseminate its publication to the INTIB focal points.
Communication Satellite Systems

46. PACSAT is a proposed low-cost communication satellite system which was designed to improve the quality, speed and reliability of information transfer to and within developing countries at comparatively low investments and costs. It is a low orbiting satellite which requires simple and inexpensive ground stations which can be made portable and be operated by battery or introduce solar power. The pilot operation of the UOSAT II data communication experiment which was started two years ago gave better results than expected and is now available for further testing.

47. As part of this research effort, in March 1984, UOSAT-B, a satellite built by the University of Surrey in the United Kingdom, was launched carrying an experimental Digital Communications Experiment (DCE) which is a scaled-down version of PACSAT's "brains". In order to test the PACSAT concept in field conditions and to expose this technology to a wider audience, IDRC funded a Canadian non-governmental organization interested in this technology, InterPares, to manage a PACSAT experiment using the DCE at the Pacific Telecommunications Council's Conference (PTC '85) in Honolulu in January 1985.

48. Two-way communications exchanges has taken place in advance of this conference between stable environments at the University of Surrey and the home of the PACSAT project manager in Los Angeles. This was to be the first true field experiment. There were, of course, a number of technical difficulties and unanticipated problems. Furthermore, UOSAT-2 had not been originally designed for PACSAT-like applications, and certain accomodations had to be made for this. In the end, however, the demonstration was successful: messages were loaded into the computer on UOSAT-2 and others were received from both California and the University of Surrey, including one in response to a question loaded from Hawaii on the first orbit over Honolulu 100 minutes earlier.

49. PACSAT represents a new information technology in the making. It is still at a very tenuous stage in its development, especially since much of the work is being done by volunteer labour. It is not even certain that all of the conditions will fall into place for its operation. But it does seem clear that it holds great potential for remote developing-country applications, and it is important to ensure that their needs are considered from the start.

50. In addition, there are certain problems associated with PACSAT: how to avoid legislative hurdles against its use over various countries; in what manner will particular user groups be able to avail themselves of this service; how can unauthorized use be prevented, and so on. These questions are being considered and solutions are being defined. On the other hand, with current studies showing the importance of telecommunications to development, the benefits to be gained from having access to alternative communications services appear to outweigh the difficulties involved.

51. IDRC is currently considering a pilot project to test the PACSAT concept with a number of institutions in developing countries using the DCE. The details of this experiment have not been finalized yet but would include 5-6 developing country institutions who have an on-going need for exchange of information. For this project, institutions dealing with industrial information could be selected for this pilot experiment. The UNIDO's INTIB
network could be appropriate to test this new communication technology, INTIB focal points could possibly be selected for the purpose of this test and this program could possibly be developed jointly between developing country institutions, IDRC and UNIDO.

Minisis and Micro Data Entry Package

52. The principal activity of the IS Computer System Group was the development of MINISIS. MINISIS is a generalized information management software package developed and supported by IDRC. The software operates only on the Hewlett Packard 3000 family of minicomputers. This includes the entry level machine called the Model 37 up to the newly announced Model 930 and 950. Although it was originally developed to address the specific problems related to bibliographic data, MINISIS is general enough to manage other types of information. The software package is currently installed in nearly 200 sites around the world, of which over 115 are located in developing countries. A partial list of a few of the non-bibliographic applications which some of these users have implemented includes project information systems, mailing lists, registries of correspondence, directories of consultants, management of land bank data, personnel systems and inventory systems.

53. MINISIS is available from IDRC under licence. The MINISIS licence includes the MINISIS software, all relevant user documentation, an initial three week training course in the use and operation of MINISIS and on-going support for the software including new releases of MINISIS incorporation problem repairs and new enhancements. MINISIS is available from IDRC free-of-charge to government and non-profit institutions in developing countries.

54. The INTIB database is operated on ISIS and can be easily mounted on the MINISIS system. Actually, in an agreement with UNIDO, IDRC, through its library is offering on-line access to the Industrial Development Abstract Database to over 100 Canadian Institutions as well as some international organizations in the USA, Japan, Switzerland, etc. The library has a complete set of UNIDO documents on microfiche. Such systems could be envisaged in developing countries to decentralize INTIB dissemination of information activities into different regions therefore enhancing developing countries capabilities to disseminate information.

55. For those institutions involved in cooperative information systems using ISIS or MINISIS but that don't have those softwares but have micro-computer capacities, IDRC, in collaboration with CENAGRI in Brazil developed the MICRO DATA ENTRY PACKAGE. This software permits these nodes in an information network to contribute references on diskette to the control site which are using ISIS or MINISIS.

56. The system permits the definition of database schemas, the entry and modification of records, and the displaying of records with user-defined print formats to the screen, to disk files or to the printer. It allows backup and garbage collection of databases, and the exchanging of database records in formats acceptable to MINISIS, ISIS and AGRIS installations.
57. A major constraint in most microcomputer configurations is the amount of data that can be stored on a floppy diskette. This micro system can accommodate databases that are split across several diskettes. The database manager can allocate the number of segments and the file space required for his database. The number of diskettes allocated may be increased at any time.

58. The system was designed for 16-bit microcomputers, with a minimum of two disk drives or a hard disk, and with 256K RAM memory. Currently, the system can be run on the IBM PC and IBM PC compatible microcomputers, including the CORONA, HP150 using MS DOS1.1 or later versions. The package is available free-of-charge to governmental and non-profit organizations in developing countries and could allow INTIB focal point to input into a database on ISIS or MINISIS. An alternative software is the Mini/Micro/CDS/ISI which is currently available from UNESCO.

Conclusions

59. This paper was prepared to give some idea on the industrial and technological information program of IDRC and of other activities which are of direct relevance to this INTIB advisory group meeting. It does not propose any guidance for the development of the INTIB programs but illustrates a number of common activities undertaken by both UNIDO and IDRC.

60. This paper also describes different types of approaches in industrial information programs developed by national or regional institutions and also described a number of new information and communication technologies which are being considered to improve the information flow within and between developing countries and between developed and developing countries. It is of the highest importance that these new technologies are known and used by developing countries but these technologies must be assessed carefully and applied in an appropriate manner. One cannot ignore these new technologies but a careful approach should be taken. There are several ways of communicating information ranging from mail, telephone and telex communication, to newly introduced optical disk, CD-ROM, and satellite telecommunication and a real assessment of a particular situation must be made to select the most appropriate mean or means of exchanging and communicating information.