CD-ROM Evaluation Project
Final Report
Jane Beaumont

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CD-ROM EVALUATION PROJECT

Final Report

Jane Beaumont

Library and Information Systems Consultant

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Appendices

I. Participants in the IDRC project

II. IDRC evaluation form

III. Select bibliography
Abstract

The International Development Research Centre, Information Sciences Division sponsored an 8 month evaluation of CD-ROM technology as a medium for information delivery in developing countries. A prototype product, containing 14 months of bibliographic information and abstracts on agricultural topics, was installed in 6 developing country sites, and the Centre's own library in Ottawa. The evaluation process was subjective, rather than scientific, but resulted in uniform acceptance of the CD-ROM product and the potential for the technology to support wide distribution of bibliographic databases that have been previously unavailable or difficult to access.

Acknowledgment

The author wishes to thank the IDRC for the opportunity to participate in this project, and the participants for their hospitality during the site visits and their enthusiastic cooperation in the evaluation process.

The views represented in this report and those of the evaluation participants and/or the consultant. They do not necessarily represent the views of the International Development Research Centre, Information Sciences Division.
Executive summary

This report is the result of an 18 month project to assess CD-ROM technology as a medium for information delivery in developing countries. In cooperation with CAB International who had produced a prototype CD-ROM disc containing CAB Abstracts from 1984 to 1985, IDRC has been able to place this technology in 6 developing country sites and the Centre's Library in Ottawa.

The general objectives of the project were to evaluate the technical aspects of CD-ROM technology, explore its impact on information delivery in developing countries, and provide hands-on exposure to six Information Sciences' supported projects and the Centre's Library.

In order to achieve these objectives it was decided that compact disc players and the CABI prototype CD-ROM disc would be provided to seven test sites to allow them to use the technology. A consultant was hired to develop a training and evaluation strategy for the test, to train the system users in the use of the technology and in the evaluation strategy, and to carry out the evaluation of the use of CD-ROM technology for the delivery of information.

After six months of hands-on use of the systems the participants were asked to submit completed evaluation forms to the consultant as input to this report. The evaluation forms and the responses from the sites focussed on five issues:

1. The users of the CD-ROM system

There were a wide range of users - librarians, information specialists, and subject specialists. More importantly, for the first time researchers and end users of bibliographic information had easy access to online searching. The accessibility of CD-ROM in stand-alone microcomputer workstations, and with potentially powerful online retrieval capabilities, encourages wide use of information by researchers and end users who have not traditionally had access to online searching. The technology fits easily into existing organizations and is one way to allow libraries and information centres to become more pro-active rather than re-active in providing new services.

2. How the CD-ROM system was used

The system was used primarily as a source of references. Most users searched for references to known items or subjects. The availability of abstracts allowed searchers to assess the value of individual articles more effectively. Contrary to expectations, researchers did not express great interest in browsing the database. This may have been because MicroBASIS,
the retrieval software used with the CABI prototype, did not support effective browsing.

The participants saw the opportunity for new or improved services based on CD-ROM products. These included: extending SDI services; end user searching; creation of regional subsets of bibliographic information; economical support for demonstrations and hands-on training; and access to a wider variety of full-text and bibliographic databases.

3. How much on-site support was required for CD-ROM

Another positive result of this field test has been the discovery that the requirements for on-site help are minimal. Comprehensive documentation on installation and operations, coupled with extensive online tutorials and help messages would allow most users in remote areas to be self-sufficient in their use of CD-ROM systems. It will be the responsibility of the vendors of these systems to develop improved and more complete documentation to support this new market.

4. The comparison of CD-ROM with other media for information retrieval

CD-ROM was seen as a complementary technology that supplements the existing online systems, print products (bibliographic indexes and full-text), and microforms. The primary benefit of CD-ROM is the access it provides to online searching without incurring telecommunications and connect charges. It provides the capacity to bring large bibliographic databases in-house and provide sophisticated online access to them. Respondents felt that there was still a place for remote online systems, but that it would be for access to very recent items and infrequently used databases. The importance of document delivery services to support this improved access to bibliographic references was also emphasized. The opportunity exists to use full-text CD-ROM publishing in document delivery.

5. The potential for CD-ROM technology in developing countries

The participants in the project and the consultant unanimously concluded that CD-ROM technology has a place in information services complementing other technologies. The technology has the potential to support IDRC Information Sciences Division's guiding concepts that any attempt to address Third World information needs must be based on resource sharing and cooperation; that for any country, the most important information is that which has been generated within the country; and that cooperation between libraries and documentation centres can lead to a more rational use of resources and the avoidance of duplication. The recommendations below advance these concepts.
and through this project there is a potential for CD-ROM and other optical technologies to support them.

There are three groups to be considered in assessing the use of CD-ROM technology in the Third World: the donor agencies, the information providers and electronic publishers who produce the products, and the users of the products. The recommendations have been grouped to focus on each of these players, but it is only through cooperation, and each group being aware of the others’ needs and constraints, that progress can be made.

1. Donor agencies

The recommendations to donor agencies focus: on the need for further study on the effect of the availability of CD-ROM on services; the need to provide adequate equipment to support information services; and on encouraging regional resource sharing.

2. Information providers and electronic publishers

These players need to work with donor agencies and potential subscribers to understand the new market opportunities that developing countries offer, and their special needs in terms of documentation and 'self-help' tools.

3. Potential users of CD-ROM

Potential users in developing countries can support the use of CD-ROM by working at resource sharing mechanisms appropriate to their needs and resources, and making their needs and expectations known to the donor agencies and producers.

This has been a valuable learning experience for the participants. The participants have come to understand the potential, and limitations, of CD-ROM for information delivery in developing countries. In spite of the limitations, and the fact that this was a very subjective study, there was a uniform acceptance of the products and appreciation of its potential. Among the participants there is a strong belief in the value of information, but a sense of isolation from the mainstream of information and library technologies. CD-ROM, in conjunction with microcomputer technology, has the potential to support the distribution of many bibliographic and reference tools that until now have been unavailable or beyond the budget of developing-country organizations.
1. Introduction

The Information Tools and Methods Program of the Information Sciences Division at IDRC monitors and assesses new technologies for the distribution of information. In 1984 IDRC began investigating the application of CD-ROM in developing countries. At the same time CAB International (CABI), along with many other electronic publishers, also began to investigate CD-ROM. It was immediately apparent that the medium had potential to distribute large bibliographic databases to users without the use of telecommunications or mainframe computers. By 1985 CABI had commissioned Digital Equipment Company (DEC) to produce a prototype CD-ROM disc containing 187,000 abstract records covering the period November 1983 to March 1985 and MicroBASIS retrieval software. Forty-six discs were prepared and an assessment programme was developed. CABI invited IDRC to participate in their assessment by testing the technology with the CABI prototype compact discs at sites of interest to IDRC and using evaluation criteria relevant to the Information Sciences Division’s interests. Thus the participants of the IDRC project were asked to consider two aspects of the system:

- For IDRC: is there a potential for CD-ROM technology in the delivery of information to developing countries; and
- For CABI: is the availability of CAB Abstracts on CD-ROM a viable and useful product?

This report is focussed on the assessment of the technology as IDRC’s prime interest in this project. The general objectives of the project were:

- 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; and
- to provide some hands-on exposure to this technology to six Information Sciences supported projects and the Centre’s Library.

In order to achieve these objectives it was decided that compact disc players and the CABI prototype CD-ROM disc would be provided to seven test sites to allow them to use the technology. A consultant would be hired to develop a training and evaluation strategy for the test, to train the system users in the use of the technology and in the evaluation strategy, and to carry out the evaluation of the use of CD-ROM technology for the delivery of information.
The anticipated results and benefits of the project were that:

- six IDRC-supported institutions and the Centre's Library would have the necessary hardware to access information on CD-ROMs, and gain exposure to a new technology through hands-on experience;

- the reactions of some developing-country institutions to the appropriateness of this technology in the delivery of information would be gathered;

- CABI would have additional input to its assessment, based on criteria that provided another perspective on the technology; and

- the Information Sciences Division would have gathered information useful for informed judgments in its program planning.
2. CD-ROM technology

CD-ROM, compact disc, read-only memory, is one of a family of optical storage technologies that includes compact audio discs, interactive and digital video disks, and optical data discs. The attraction of CD-ROM in information provision is as a high-density, compact, portable and easy-to-use computer storage device. Optical storage technologies use lasers to store and retrieve massive amounts of data in a very compact area.

The essential characteristics of CD-ROM are as follows:

| Size of the disc | 12 cm diameter, 1.2 mm thick. |
| Capacity         | Approximately 550 Megabytes which is equivalent to: |
|                 | - 15,000 5.25" floppies |
|                 | - 28 20Mb hard disks |
|                 | - 275,000 typed pages |
|                 | - 5,500 pictures |
|                 | - 60-75 minutes of music |
|                 | - 5 to 6 minutes of video motion pictures. |

Physical format

Identical to the consumer audio compact discs, the data is laid out in a series of digitally encoded microscopic pits on a recording surface between layers of protective covering.

In this IDRC project the interest in CD-ROM focuses on the capacity of the medium to store large amounts of bibliographic and other textual data on a disc and allow remote information centres to deliver this data using a microcomputer-based workstation.

2.1. Production process

After data entry through use of a keyboard or image scanning, the data has to be pre-mastered for the CD-ROM. This first step involves all the data preparation necessary to build the database in a format that is appropriate to a CD-ROM product. This includes building the indexes and laying out the data to fit the CD-ROM system and adding sophisticated error-correcting codes. A pre-master magnetic tape containing the data is created for the mastering facility. The pre-mastering may be done by the organization which publishes the CD-ROM or an intermediary. The
data used for creating bibliographic products on CD-ROM is frequently a by-product of the printing process and may also be available online through one of the online vendors such as DIALOG, BRS, ORBIT, CAN/OLE, or the European Space Agency (ESA).

Production of the CD-ROM master disc and its replication is an expensive process that requires specialised, technical expertise and equipment. Companies that provide this service include Sony, and Hitachi in Japan, 3M in North America, and N.V. Phillips in the Netherlands.

Once the pre-master tape is received at the mastering facility, the data is transferred to magnetic disks and then recorded on the photoresist coating of a glass master disc using a short-wavelength laser beam. The data is digitally recorded on the master disc surface in a series of microscopic pits and flat areas which spiral out from the centre to the edge of the disc. The commercial CD-ROM discs are replicated from the glass master disc and then coated with reflective aluminum coating which allows the data to be read with a lower power laser beam. Finally the upper side of the disc is labeled and the whole disc is coated with a protective lacquer to protect the disc from minor scratches, dust and fingerprints.

The cost of pre-mastering and mastering a CD-ROM in 1987 was approximately US$10,000. Copies of the master disc cost approximately $2.00 to produce. Write-once optical technology is now being used to pre-master many of the CD-ROM products because this allows the electronic publisher to thoroughly test it before committing the data to the CD-ROM.

2.2. Operational requirements

A typical CD-ROM workstation in an information centre or library will consist of the following:

- A microcomputer using MS-DOS with at least 512K memory and one 5.25" floppy diskette drive, a display unit and keyboard (for example, an IBM-PC/XT, AT or compatible).

- A hard disk is required for some CD-ROM products. For example, the CABI product required at least 1MB of hard disk space to install the software and ancillary files. Additional disk space was used during the search sessions to store interim search files and print files.

- A CD-ROM disc drive with a controller card that can be inserted into an expansion slot in the PC, and a connecting cable. Many CD-ROM drives have their own controllers which communicate with standard, high-level interfaces such as the SCSI (Small Computer System Interface - pronounced 'Scuzzy'). A single SCSI can deal with as many as eight
devices including CD-ROM drives, Winchester drives, printers and other peripherals. Interface control software is usually supplied with the controller card.

- Retrieval software is packaged with each CD-ROM product. This is the essential component, once the hardware is installed, which allows the user to retrieve and manipulate the data on the disc. Retrieval software is either supplied on a separate floppy diskette or is 'bundled' with the data on the CD-ROM disc.

- A modem may be included in the workstation for the purposes of combining CD-ROM searches with supplementary searching on the latest version of the database at a service bureau, or for transmitting information retrieved from the disc to another vendor or agency. For example, in North America, book orders or requests for full cataloguing records can be transmitted electronically after retrieving information from a CD-ROM. Other products require a modem to facilitate connection to the latest information on a centralised online system. For example, H.W. Wilson products, with subscriptions of approximately US$1000 per year, include unlimited access to the online system through a modem for the most recent references. The online connection is virtually transparent to the user who selects the communications option from the main menu of the CD-ROM product.

2.3. Related optical technologies

While CD-ROM is the best known of the optical storage technologies at present, there are a number of related technologies which may have applications in libraries and information services. These are:

- Optical read-only memory (OROM)

A close relative of CD-ROM, OROM is slightly larger (13 centimeters vs. 12 for CD-ROM) and, for faster access, its recording track is laid out in the pattern of a magnetic floppy disc, not the continuous spiral of CD-ROM. This is the optical technology that has been adopted by IBM for its Personal System/2 computers. An OROM drive can be slipped into the space in a personal computer now occupied by the familiar 5.25" drives. Like CD-ROM, OROM is thought of as a distribution medium, especially for software.

- Write-Once-Read-Many (WORM)

As the name implies this technology puts the power of optical recording in the hands of the end user. The disc
drive has both a record and playback laser head. Information sent to the laser record head is permanently inscribed on the optical disc. The laser read head is used to retrieve that information for display. Once information is inscribed on the disc it cannot be changed, though updates can be managed by having the software keep track of where the latest information is located. Write-once systems are more complex and costly than read-only systems, because they have to be able to both read and write data. The primary application for these discs at present is as a development tool for CD-ROM publishers. Their future also lies in office automation or wherever a transaction audit trail is required.

Erasable Optical Media

This media is still in the laboratory, but an intensive effort is being made to make it practical and marketable products may be available within the next 2 to 5 years. Unless and until optical media can offer this erasable feature they can never be a complete substitute for magnetic media.

Optical and magnetic media will probably always play complementary rather than competitive roles. Nevertheless, optical discs have great value for many purposes, if their price and performance can be made competitive. Optical media are finding their niche in products that are particularly suited to their characteristics.

2.4. The good news and the bad news about CD-ROM

The good news that is always mentioned when discussing CD-ROM in the context of libraries and information services is the elimination of costly online connect charges. Use of the major service bureaux for online searching involves communications charges and connect charges ranging from a few dollars to over a hundred dollars per hour. This limits access to the commercial online services for many organizations, particularly those with limited budgets or remote from the primary centres - Europe and North America. With the equivalent database on compact disc the subscriber is able to provide an online searching environment, based on a microcomputer, with access to the data on one or more discs, and retrieval software which usually embodies the latest features in software design. Connect charges are eliminated and researchers can have unlimited access to the data and begin to do their own searching with minimal training from the information specialist. Other benefits of CD-ROM are derived from the durability of the medium. It is difficult but not impossible to damage, data cannot be changed, and sophisticated error-checking routines in the preparation of the data are resulting in much
more reliable data. It is also inexpensive to copy and distribute. A disc can be sent around the world for a few dollars which is much less expensive than distributing the equivalent print or microform versions.

The bad news about CD-ROM is that the discs are expensive to prepare and master. In North America it costs from US$5000-10,000 to master a disc. At present the market is not large and most subscriptions to bibliographic indexes are in the range of US$500-2,000, with a number of them over US$5,000. A survey of the most recent 'Discography' (Tiampo, 1987) reveals the following distribution for subscriptions to bibliographic indexes:

<table>
<thead>
<tr>
<th>Range</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$1,000</td>
<td>32</td>
</tr>
<tr>
<td>$1,000-1,999</td>
<td>31</td>
</tr>
<tr>
<td>$2,000-2,999</td>
<td>9</td>
</tr>
<tr>
<td>$3,000-3,999</td>
<td>12</td>
</tr>
<tr>
<td>$4,000-4,999</td>
<td>3</td>
</tr>
<tr>
<td>$5,000</td>
<td>13</td>
</tr>
</tbody>
</table>

In contrast the single disc, popular, full-text titles, such as the Grolier Academic American Encyclopedia and the McGraw-Hill Science and Technology Reference Set, are priced at $299 and $300 respectively. This question of cost is discussed, in so far as it relates to using CD-ROM in developing countries, in the final chapter of the report.

The read-only nature of the medium is good news for some and bad for others. In fact, it places CD-ROM as a complement to current storage technologies instead of as a replacement. CD-ROM is ideal for large archival applications where the data will not change regularly and where secure, flexible access is required. It is not suitable for the storage of dynamic data which is constantly changing. An obvious example in libraries is circulation data which is never static.

CD-ROM workstations are still primarily single user. Although the CD-ROM drive may be established on a local area network to allow access through a CD-ROM file server, the slow access times do not facilitate efficient use of shared systems. This may be a limitation to some potential purchasers.

One of the limiting factors to the widespread use of CD-ROM has been the lack of established standards for hardware and logical file structures. The size and encoding techniques on the discs was defined some years ago in the Phillips/Sony World Standard. This allows for a degree of compatibility between different disc drives but because of the variations in operating system software and applications software there is still no absolute guarantee that discs are fully transportable and interchangeable on different workstations. Current efforts at
standardization are focussing on the computer/CD-ROM interface, operating systems software, and drivers to create their own super-sets of commands. The High Sierra standard, named after the meeting place of the ad hoc group working on this standard, established specifications for data formats. This includes the placement of multiple bootstrap information so that a variety of operating systems can locate appropriate code information, as well as the physical location of file information. This standard is presently being assessed by the International Standards Organization and the National Information Standards Organization (U.S.). It has already been adopted by a number of electronic publishers and is becoming the de facto standard.

2.5. The potential for CD-ROM

This brief introduction to CD-ROM technology was intended to provide background information to the evaluation project and indicate the potential for this technology. Its greatest potential is in the storage of large amounts of static, archival data. For data that is infrequently updated (e.g. less than 4 times per year), but could be widely distributed if it were economical to do so, CD-ROM has great potential. The data becomes locally available, eliminating online connect and communications charges and its usefulness is greatly enhanced by sophisticated online retrieval software. It is to evaluate this potential, which is very relevant to information services in remote and developing countries, that the IDRC project was launched.
3. CD-ROM evaluation project

3.1. Project scope and methodology

The IDRC selected 6 sites for the project in addition to its own library in Ottawa. The sites were all centres at which there were already Information Sciences Division projects underway. It was a requirement of participation that the site provide an IBM/PC-XT or close compatible with a minimum of 1.5Mb hard disk available, 512K of random access memory, MS-DOS 2.1 or 3.0, and an available expansion slot for the CD-ROM drive controller. IDRC provided each site with a Phillips CM100 player and CM155 interface card.

The sites selected for the project were:

1. Universiti Pertanian Malaysia (UPM), Serdang, Selangor, Malaysia
   Contact: Mr. Syed Salim Agha, Chief Librarian

2. University of the West Indies (UWI), St. Augustine, Trinidad
   Contact: Ms. Shirley Evelyn, Head, Readers' Services, The Library

3. Agricultural Information Bank for Asia (AIBA), Southeast Asian Regional Centre for Graduate Study and Research in Agriculture (SEARCA), Laguna, Philippines
   Contacts: Ms. Josephine Sison, Project Officer and Ms. Alice Rillo.

4. International Development Research Centre (IDRC), Ottawa, Canada
   Contact: Ms. Bev Chataway, Head, Users' Services, Library

5. Southern African Centre for Cooperation in Agricultural Research (SACCAR), Gabarone, Botswana
   Contact: Mr. Peter Boyle, Information Specialist

6. Sorghum and Millets Information Centre, International Crop Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India
   Contact: Mr. L.J. Havaru, Manager, Library and Documentation Services

7. Instituto de Documentacion el Informacion Cientifica y Tecnica (IDICT), Havana, Cuba
   Contacts: Mr. Oscar Visiedo, Vice-Director and Mr. Eduardo Orozco Silva, Head, CD-ROM Project Group

The International Centre for Living Aquatic Resource Management (ICLARM), Manila, Philippines (Contact: Ms. Rosalinda Temprosa, Chief Librarian), did not receive a CABI disc but
responded to the IDRC evaluation form on the basis of their experience with the Cambridge Scientific Abstracts CD-ROM product, *Aquatic Science and Fisheries Abstracts* (ASFA).

Details of the participants other projects with IDRC Information Sciences Division are in Appendix I.

Initial preparation for the project included:

- preparing an evaluation form for the participants which reflected the particular interests of IDRC in the appropriateness of CD-ROM for developing countries and remote information centres (Appendix II);
- preparing training materials and log sheets for the participants;
- assembling a selection of articles and background materials on CD-ROM for each site; and
- installing the IDRC Library system in Ottawa and adjusting procedures and training methods based on the feedback received from IDRC staff.

Having completed the preparatory work the consultant visited each site, except SACCAR, to set up the systems. These visits were made after each site had received its equipment. Due to delays in shipping the drives the site visits were not made until February and April 1987. At each site the consultant installed the CD-ROM drive, if this had not already been done, installed the CABI software on the hard disk, provided training on the use of *MicroBASIS* and the CABI database, made presentations to local librarians about CD-ROM technology, and where requested, provided additional microcomputer and DOS training to project participants. The evaluation criteria and forms were discussed with each group and a schedule was agreed upon which required the sites to submit log sheets at the midpoint of the project and then more log-sheets and the evaluation forms after 6 months use of the system. Each site was asked to submit one response to the CABI evaluation form and as many IDRC forms as they were willing to complete. In particular we wanted to receive forms from different types of users, e.g. information professionals, researchers and end users, external users and computer professionals. The consultant agreed to keep in touch with the sites through telex and telephone. At least one call was made to each site, except ICRISAT and SACCAR, during the project but there were very few problems to be discussed during these calls. Telex and CoSy, a computer conferencing system, were also used to monitor progress.
3.2. Analysis of the participants' responses

This section of the report summarizes the responses from each of the sites to the IDRC evaluation form. Twenty-two forms were received from the 8 participating sites, and, as shown below, represented a wide variety of users and views. This excellent response has enabled us to gain a very useful picture of the concerns and requirements of libraries and information centres in developing countries.

The questions on the evaluation form were broken down into 4 groups relating to the users of the system, how the system was used, requirements for support for the users, and comparison of CD-ROM with other media. Respondents were also asked to comment directly on the potential for CD-ROM in the provision of information in developing countries. This report and the conclusions drawn by the author about the appropriateness of CD-ROM for information provision in developing countries is based largely on the responses to the evaluation forms and our discussions and observations during the site visits. The evaluation forms were specifically designed to elicit participants' opinions and experiences based on the use of a CD-ROM system in the working environment. No attempt was made to gather scientific data about the value of the searches performed or the availability of the full text for citations retrieved. This was beyond the scope of this project but it is relevant to the usefulness of individual databases on CD-ROM.

Among the issues that participants were asked to consider were the following:

- most useful and appropriate content for the databases;
- update frequencies;
- information types: references, abstracts, full text, statistics, catalogues, union lists;
- effect on document delivery;
- how does CD-ROM compare with other technologies for developing countries: print, microform, online, etc.;
- the economics of the technology, are there economies of scale to be found;
- the effect on print and online media;
- the impact on traditional information services; and
- the effect on special problems of information services in
developing countries: costs, distance, poor communications and services, training needs, lack of equipment.

Responses represented personal rather than institutional views but were generally found to be quite consistent among colleagues from the same region or institute. The responses are summarized below for each question. Conclusions are drawn in the final chapter of this report.

3.2.1. Users

1. Approximately how many different people used the system during the trial period?

Respondents were not asked to specifically identify the types of users on the system but from the responses given it is obvious that a wide range of people used the system and benefitted from the availability of this new technology. Table 1 summarizes system use.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Librarians</th>
<th>Information specialists</th>
<th>Researchers, end users</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>UWI</td>
<td>15</td>
<td>1</td>
<td>?</td>
<td>16+</td>
</tr>
<tr>
<td>SEARCA</td>
<td>22</td>
<td>8</td>
<td>115</td>
<td>145</td>
</tr>
<tr>
<td>UPM</td>
<td>15</td>
<td>5</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>ICRISAT</td>
<td></td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>IDRC</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
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<td>IDICT</td>
<td></td>
<td>158</td>
<td>152</td>
<td>310</td>
</tr>
<tr>
<td>SACCAR</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ICLARM</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Approx.</td>
<td>55</td>
<td>177</td>
<td>273</td>
<td>505</td>
</tr>
</tbody>
</table>

Table 1: Summary of system use by institution

2. In general, for what purpose did they search the abstracts?

In addition to the expected use, identifying references to specific subjects for researchers, the CD-ROM system was also used for a number of other purposes:
- designing SDI profiles prior to submitting requests to CABI for ongoing services;
- estimating the number of references that could be expected on an annual basis from the CABI SDI services;
- demonstrating the technology to colleagues and clients;
- comparing the CABI database and MicroBASIS with other CD-ROM products (ASFA and Dissertation Abstracts on Disc);
- preparing online searches prior to using the CABI database on DIALOG; and
- citation verification.

3. What expertise did the users have? (e.g. microcomputer experts, information scientists, subject specialists)

The more than 500 users of the system were a mixture of information specialists, librarians and subject specialists. Most of the end users who had an opportunity to use the system did not have prior experience in online searching but were specialists in the subjects they were searching for. Approximately 54% of the users of the system were end users, i.e. researchers who were searching for references and citations specific to their current research interests.

4. Which ones, if any, have previous online searching experience?

As mentioned above, only the information specialists and librarians had any online searching experience. Approximately 188 persons, i.e. 37% of the total users in the evaluation project. All other users were trained in the concepts of online searching using the CABI system during this project.

5. Do you see CD-ROM making online search capabilities available to a different type of user?

From the numbers of people with no previous experience in online searching who were able to use the system, it is obvious that end users can easily be trained to do their own searching with a CD-ROM system. The participants all responded 'yes' and made the following comments:

- the elimination of telecommunications fees and online charges means that searching is no longer time dependent and so long as CD-ROM subscription costs are 'reasonable' this is an ideal medium to support end user searching;
- it will extend the availability of online searching to all, whereas at the moment limited staff resources often mean that services have to be limited to researchers with the greatest need;
availability of equipment and funds for subscriptions will be essential elements of a successful service; several of the respondents commented that their existing PCs were in heavy use for other purposes and could not be devoted to online searching at present; the need for intermediaries for online searching will be eliminated, though information centre staff will have responsibility for training and advising users.

The question of 'reasonable' cost was mentioned several times by different respondents. Since it is key to the acceptance of CD-ROM in developing countries this question is discussed further in the consultant's conclusion.

6. How much microcomputer experience did your users have? (e.g. other application software, programming, hardware)

Most users had little microcomputer experience. With the exception of a few computer professionals at IDICT and one at UWI, the only experience most users had was with other application software such as CDS/ISIS (UWI), word processing, and DBase III. The consultant worked only with the information professionals and librarians and among these groups took the opportunity to supplement the MicroBASIS training with additional MS-DOS training when requested. The supplemental training was not necessary to use the CABI system but proved useful for other applications of the microcomputer. The participants' experience showed that little or no microcomputer experience was necessary to operate the CABI system. Most sites established the database as a menu choice on their system and the user had only to select that choice and wait for the software to be loaded.

An understanding of hardware installation, hard disk organization and MS-DOS was necessary in order to install the system initially. Those sites which did their own installation used the services of a computer professional other than the consultant.

7. Would the availability of databases on CD-ROM prompt you to change your practices in:

Online searching

Those sites which already do some searching on DIALOG, or other similar services, recognized that the availability of databases on CD-ROM would reduce their use of remote online systems. The remote systems would only be used for searching very recent materials and for search capabilities that were not available on the CD-ROM system. For example,
the abstract could not be searched on the CABI system, but can be searched on DIALOG.

The CD-ROM system could also be used as a training tool prior to doing remote online searches, and for the preparation and refinement of search strategies and SDI profiles.

Most respondents saw CD-ROM and remote online searching as complementary products, with CD-ROM providing the best capabilities for end user searching and browsing of retrospective files. The availability of CD-ROM databases would increase the use of online bibliographic databases by bringing those resources in-house and making them accessible to a much wider range of users and researchers.

Information provision in general

Availability of bibliographic databases on CD-ROM could permit the libraries and information centres to expand their services in terms of the number of people they could serve and the products they could deliver. Among the improvements and enhancements that respondents thought would be possible were:

- SDI and current awareness services based on the disc updates;
- faster, more responsive information delivery to users;
- more comprehensive searches, supplemented by printed abstracts which the user could take away for consideration;
- printouts would be available immediately instead of waiting for off-line prints to be delivered by mail;
- time saved in not having to search a printed index would allow information professionals to serve a wider variety of users including some who were not currently served by their organization.

Document delivery

The respondents had difficulty assessing how increased access to large bibliographic databases would affect their document delivery services. Those who did respond to this question recognised that providing users with more comprehensive bibliographies would inevitably result in increased demands for the actual documents, especially for photocopies of journal articles. In order to follow through on the online information services being provided to users there has to be a support infrastructure in the region or country that allows libraries and information centres to locate documents and obtain those which are not in its own collection. One respondent also suggested that the
availability of abstracts might result in more careful selection of documents by the researchers and less effort wasted on obtaining irrelevant documents.

8. Comment on the quality of:

Training in the use of the CD-ROM system

The on-site training by the consultant was judged to be adequate and well organized. Several respondents commented that while the basic operations were easy to learn it was important and beneficial to spend the training period refining search strategies and learning advanced techniques. The combination of hands-on training with theoretical information about CD-ROM technology was important to the success of the project. Several people also commented that they had no problem training other information personnel and end users. SACCAR and ICLARM staff received no training but were able to learn to use their respective systems (CABI, ASFA) with the help of the user manuals.

Software

Responses to this question depended on the respondents' previous experience with online systems. Most people felt that MicroBASIS was easy to learn but lacked many of the features of a good information retrieval system. Those who were familiar with DIALOG felt that MicroBASIS provided a very limited subset of the DIALOG capabilities. For example, there is no free-text searching of the abstracts or combined fields; adjacency searching was not available and truncated searches, unless defined very carefully, were unacceptably slow. There is no capability to save searches and re-run them periodically. The user cannot print selected references while browsing, or even browse on a record-by-record basis.

Those users who had seen other CD-ROM products, such as Dissertation Abstracts, Silver Platter or ASFA realized that MicroBASIS does not take advantage of microcomputer technology and developments in information retrieval systems. For example, there are no 'pop-up' help screens; system start-up is very slow and cumbersome; there is little flexibility in display and print formats; online tutorials are not available; error messages are not well explained; and recovery often involves re-booting the system resulting in loss of retrieved references.

Every site commented that response time was very slow and most people assumed that this was a problem of the software and data organization of this particular product.
While the suitability of MicroBASIS was not the issue in the IDRC evaluation, the responses to this question are a useful indication of what is expected in information retrieval systems that are to be used by people with a wide range of skills and requirements. Several people commented that a common command language for CD-ROM products would be an advantage but realized that this is unlikely to happen at present because each vendor feels they have some unique features to offer.

This question also resulted in some comments about the database, which again are relevant to the design of future systems. The inconsistency of field labels for 'FIND' and 'DISPLAY/PRINT' was particularly irritating to users. Some users would have liked online access to the thesaurus structure and the capability to browse broader, narrower and related terms.

System support

With the exception of IDICT, whose drive failed, none of the sites required hardware support. The failed drive had to be sent to the United States for repair and was unavailable for approximately 6 months.

All the drives were installed without problems on standard IBM-PCs or compatibles. The comment about standard PCs is relevant because the consultant’s experience at other sites since returning from the field trips has been somewhat different. Installation does not appear to be so straightforward when the PC already had other expansion features such as graphics cards, colour/graphics monitors, etc. Problems have been encountered in installing the device driver and obtaining complete displays on the screen.

Documentation

The CAB! manual was felt to be adequate and generally satisfactory for this test but that it would have to be expanded and improved for a commercial product. The background information about the database contents and organization was judged to be essential in order to exploit the database to its fullest extent. Additional features which users would like to see included are sample sessions, more and better examples (some examples did not work as described), and examples of search strategy short cuts.

Few respondents commented on the hardware documentation but it was adequate for installation purposes. One site would have liked more information on the internal workings of the drive, such as electronic diagrams.
9. Is currency relevant to your use of online databases?

Currency is relevant and important to these users, especially for the verification of references. However, most sites suggested that the real value of CD-ROM lay in the capability to provide extensive retrospective databases for in-house searching and browsing. This response is consistent with the answers to the following question.

10. How often would you like to see the database updated? (e.g. every 3 months, 6 months or annually)

Monthly: 1
3 months: 10
Comments: "6 months would be acceptable if quarterly is 'too expensive'"
"Ideal would be monthly, but quarterly likely to be more practical"

6 months: 4
Comments: "6 months is adequate, more frequent would be preferred"

Annually: 1

It appears that most users would be satisfied with quarterly updates and feel that this is also a practical limitation of the CD-ROM subscriptions.

11. How would this technology enhance your ability to provide information to users not currently served by you?

This question was similar to the ones about making online searching available to different types of users (#5), and what changes in services might result from having CD-ROM (#7). In response to this question most respondents emphasized their expectation of providing service to more users with existing staff, not only in their own institution, but also having the capability to offer services on a regional or national basis.

12. In your centre or library, would it be practical to let 'end users' and researchers do their own searching on a CD-ROM database? If not, why not?

All respondents, except one, felt that end users could do their own searching. Constraints on providing that service were the lack of equipment to dedicate to online searching, lack of funds for CD-ROM subscriptions, the need for appropriate, brief, documentation, and the fact that CD-ROM is basically a single user technology at present. The
information professionals suggested that they would be required to provide basic training, consultation for complex searches, and document delivery.

The alternate view was that it was not practical or economical to let researchers search online unless they were well versed in online techniques, the formulation of search strategies, and vocabulary control devices. This was not an unreasonable viewpoint based on the MicroBASIS software.

3.2.2. Use of the CD-ROM system

1. How far did people come to use the system? (e.g. same floor, another floor in the same building, another building, or did you serve users remotely)

Several sites provided service to remote users during the test period and also invited people to visit the site and use the system. The extent to which this was done depended on how much they advertised the service, the availability of the hardware, and of staff available to demonstrate the system.

IDICT sent the CD-ROM drive to four other institutions for 1-2 week trials. In addition, they were able to establish remote dial-up access to the database by linking the host microcomputer to their mini-computer communications node. On the microcomputer, Multilink was used to run a communications package and MicroBASIS simultaneously to support the remote searching.

2. What was the system used for? As a source of references or a source of primary information?

The database was primarily used as a source of references. Only one example was given of an abstract which provided the primary information required by the researcher.

3. How adequate are abstracts if the full text is not available?

The respondents did not find that abstracts were an adequate substitute for the full text. However, the abstract was adequate for judging whether the full text was worth obtaining. It was felt that abstracts provide researchers with an essential guide to the content of the articles and therefore greatly enhanced the usefulness of the database.

They were also useful to one researcher in evaluating how and where work in his field is evolving.
4. Did researchers use the system to retrieve information specific to their current work or to browse/graze for additional and peripheral information?

The majority of users used the system to retrieve specific references. Some browsing was done by end users but generally the limitations of MicroBASIS did not encourage such activities.

5. The CABI disc combines many separate publications. Was there an advantage to having access to some of the related materials that you would not normally subscribe to?

For most of the test sites the CABI disc provided access to more journals that they normally receive in hard copy. Access to the extra journals gave users added confidence that all relevant references were being retrieved. The combination of publications also made the database useful to a wider range of users.

6. How do you rate the major functions that were available - find, look, display, and print?

An understanding of these four functions and their syntax was all that was necessary to perform basic searches. Users varied in their reliance on LOOK to review the index terms before actually retrieving references with FIND.

Respondents generally felt that DISPLAY and PRINT were not well implemented: the syntax was complicated, scrolling or browsing retrieved references was very difficult, individual references could not be printed as viewed, and the requirement to exit the system in order to print was particularly irritating.

The SET command, which enables the user to pre-select portions of the database before searching, was found to be frustrating and very slow. This is because the system searches the entire database and then filters the results before the user receives any response.

7. Were there any new uses to which you could put the information because of this particular medium, i.e. CD-ROM and all data online?

Suggested new services included:

- SDI and current awareness services;
- preparation of regional subsets of databases such as AGRIS;
- free (i.e. no online charges) demonstrations,
 provision of the system for online practice and training sessions; and
- access to the database throughout the organization via a local area network.

8. **Was there any attempt to share this product with other organizations who would have an interest in the subject matter. If yes, how was this achieved?**

Five of the sites shared the system with other organizations. This sharing was either by direct access (11 institutes), searches performed on behalf of other organizations, or demonstrations to colleagues. The sites which did not share the system lacked a dedicated microcomputer for information retrieval purposes and had to compete with other departments for access to the computer.

9. **Were there occasions when availability of this product led you to information that had been generated within your country? Please give examples.**

ICLARM, using the ASFA database, reported that they had found references to previously unknown, local materials. IDICT reported that some Cuban materials had been located in the CABI database. Other respondents stated that the CABI database contained no references to materials that they did not already know about.

### 3.2.3. Support

1. **How did this system (CD-ROM, and the database) fit into the information centre’s administration and procedures?**

With the exception of one centre which used the system only for testing, all the respondents reported that the CD-ROM system fitted very well and easily into their existing services and procedures. As such, it enhanced services and the image of the library, and could be treated as 'just another source of information'. One respondent commented that it fitted 'like a glove fits the hand'.

2. **How did you monitor users’ information and support requirements in order to act upon them?**

Most centres monitored use of the system by maintaining the log sheets that were provided in the evaluation package. This was supplemented with interviews with researchers to establish search strategies and follow up on how relevant search results had been.
3. Was support for this pilot project adequate? Did you actually need help from CABI or IDRC or could you solve problems locally? Give examples of help required and how problems were solved.

Software and database

The initial training and set-up support by the consultant appears to have been adequate. The centres that were not visited by the IDRC consultant arranged other support for the installation of the system and then learned how to use the CABI system based on the user manual. Some respondents felt that the primary benefit of having the IDRC consultant was for installation of the hardware, and the supplementary and background information that was provided. The opportunity to have hands-on training and to learn more advanced searching techniques was also appreciated.

Two of the 6 discs received by IDRC were damaged. These were actually installed at UPM and IDRC. As a result these sites experienced difficulties in printing search results. The system aborted while trying to retrieve a damaged reference. In order to finish printing or displaying the set it was necessary to re-do the search and then continue from the record after the one that caused the failure. This was very time-consuming and frustrating and would not be acceptable in a commercial product. We were unable to obtain replacement discs from CABI.

Hardware

Only one site had a serious hardware problem. The IDICT drive failed and had to be sent to the United States for repair. Repair facilities are due to be opened in Canada in 1988 but we can expect that it will be sometime before these facilities are readily available outside Europe and North America.

4. Did you have adequate computer skills in house to manage the system? If not what was lacking?

All respondents answered yes to this question. One person pointed out that this was so in spite of only very 'modest' skills being available.

5. What was the effect of having this system on your document delivery practices and requirements?

Most respondents felt that it was difficult to answer this question based on the CABI prototype disc. The trial period did not appear to have significantly increased the demand for document delivery. The expectation is that quick
and easy access to bibliographic references will increase demand for documents and result in having to obtain more items on inter-library loan.

3.2.4. Comparison with other media

1. In your experience, how does CD-ROM compare with other media for accessibility and organization of information:

   Magnetic hard disks (e.g. in-house databases on a mainframe, mini or microcomputer)

   Everyone commented that CD-ROM was slow and had not lived up to their expectations of performance. Apart from the performance question, respondents saw CD-ROM databases as complementing and supplementing in-house databases by providing a convenient, durable media with very high capacity. This is particularly relevant for the distribution of large, retrospective databases. In-house files on magnetic media will generally be more up to date and specific to local needs.

   The disadvantages of CD-ROM in comparison with databases on a mainframe or minicomputer were that it is basically a single user medium and databases sometimes have to be spread over several discs. This can result in constant disc swapping to retrieve the desired information.

   Remote mainframe systems (e.g. DIALOG, ORBIT)

   The major advantage of CD-ROM is that it makes large databases more accessible and eliminates telecommunications and online connect charges. There were differences of opinion about whether DIALOG was more user friendly than MicroBASIS, which was being used on the CABI prototype. This was not really a fair comparison because MicroBASIS is based on a mainframe retrieval system and therefore does not take advantage of new microcomputer based capabilities. In comparison with many CD-ROM products DIALOG appears very 'unfriendly' and certainly is not designed for casual, end user searching. The higher user accessibility of CD-ROM was judged to be its major advantage.

   DIALOG was also judged to provide more flexibility, greater indexing and searching capabilities, and the capability to save searches and repeat them on other databases using a common command language.

   Microforms

   CD-ROM appears to offer the advantages of microforms - compact storage on a relatively durable media - but it also
has many other advantages. For example, access is greatly improved by online searching, information can be manipulated and combined for other uses, the information is more compact and can be more easily browsed and displayed.

Because of its read-only nature CD-ROM, is seen as a complementary medium to microform. Both are ideal for storing large archives in a compact form. Full text documents or indexes can be stored on CD-ROM or microform but the ability to provide online searching gives CD-ROM a clear advantage in access to the information.

Print, hard copy

Like microforms, online access to CD-ROM databases provides an advantage over printed documents. This results in speedier, more accurate retrieval for users. Storage of information is also much more compact. Excessive use of a CD-ROM disc does not usually cause deterioration of the medium in the way that paper deteriorates.

Printed indexes were seen to have advantages only in the fact that several people could access multi-volume works at once, and that no special equipment is required to use them. For this reason print is a more portable medium than any of the others. One respondent felt that researchers who are served well by one or two specific print indexes will still find the printed version more convenient and probably no less current than CD-ROM.

2. What other products would you like to see on CD-ROM? Where possible, please give actual examples of publications and products that you consider suitable for CD-ROM and comment on how you would like to use these databases.

In this section all the titles and products suggested by the respondents have been listed. If more than one person suggested the same title this has been noted.

Indexes and abstracts

AGRIS and regional sub-sets of the index (6)
Agricola (5)
ASFA
Biological Abstracts (4)
CABI indexes (2)
Chemical Abstracts
COMPENDEX (Engineering index)
Dissertation Abstracts International
Food Science and Technology Abstracts
Index Medicus / Excerpta Medica
Science Citation Index (2)
Social Sciences Citation Index (2)
Tate and Lyle Sugar Industry Abstracts
United Nations UNDOC (2)

Full text publications, e.g. directories, encyclopedias, reference materials.

Directories of products, chemical formulae, current research, and specific titles such as:
Books in Print
National Faculty Directory
OECD registers of research institutes and projects
Ulrich's periodicals directories,
World of Learning

Encyclopedia Britannica, also special purpose scientific, technical and medical encyclopedias.

Handbooks of physics, chemistry and mathematics.

Scientific, technical and medical dictionaries.

Reference materials such as theses, national and international standards, yearbooks, taxonomic registries, and equipment catalogues.

Key journals in the subject field and proceedings of scientific and technical conferences.

Source documents, cataloguing information

For cataloguing information, respondents suggested Library of Congress MARC records, Canadian MARC, National Union Catalogue (U.S.), the IDRC BIBLIOL and acronyms databases, and the catalogues of major libraries.

Public domain software for personal computers

Three sites gave an unqualified 'yes' to this question. Other sites suggested applications packages such as DBase III, BASIC and PASCAL compilers, CDS/ISIS etc. With the exception of CDS/ISIS these are commercial packages which are not in the public domain. It is unlikely that bundled commercial software will become available on CD-ROM because of the high cost of the total package and the unwillingness of competitive vendors to combine products.

It was also suggested that these discs could contain reviews, announcements and technical information about microcomputer hardware and software.
Mixed media, i.e. text, graphics, video, audio.

While no one had any experience of mixed-media CD-ROM they were interested in its application in training, computer-aided instruction, and for reference materials containing graphics and text.

3.2.5. Potential for CD-ROM in developing countries

The final question on the evaluation form was 'What do you and your colleagues view as the potential for CD-ROM in the provision of information in developing countries?'. Every respondent commented positively about the potential for CD-ROM in developing countries and the responses from each site are briefly summarized below:

Instituto de Documentacion el Informacion Cientifica y Tecnica

IDICT considers that the potential for CD-ROM databases is great. As a complement to remote online systems the Institute was able to expand its information services and make better use of bibliographic data. The medium is seen as expensive, but the information service problems that are resolved may justify the cost of equipment and subscriptions. Sharing the initial cost of equipment would reduce the cost, and the test period showed that the system could be shared effectively and also accessed remotely.

The institute presented a paper at the Third Conference on Automated Information Services, Bourgass, Bulgaria, September 1987 entitled "Databases in CD-ROM technology; evaluation and Cuban experience" in which they concluded that:

- Almost all types of information are appropriate for CD-ROM, including full-text, numeric information, catalogues, graphics, language teaching systems and systems for online training.

- CD-ROM technology is a possible alternative to other media, such as print, microforms, remote online searching, especially for developing countries, but it will not necessarily be a universal substitute for any of these forms.

- The true impact of CD-ROM on traditional information services in developing countries will have to be measured by examining services both before and after the application of the technology.
International Centre for Crop Research in the Semi-Arid Tropics

There is a great potential for CD-ROM providing the cost is reduced so that libraries and information centres can afford to buy or subscribe to the titles they require. This potential is in providing unlimited access to large quantities of data at relatively low cost. Elimination of the dependence on telecommunications to reach the remote online systems such as DIALOG and ESA is also a major factor in its potential.

In India most libraries do not have microcomputers so help will be required to acquire the necessary hardware. This help could be provided by agencies such as IDRC, FAO, UNESCO, CGIAR etc.

As a final comment, the librarian noted that participation in this project and having such a new technology at its disposal enhanced the status of the library at ICRISAT.

International Development Research Centre

The potential for CD-ROM, in reducing costs and providing faster access to information is dramatic in remote areas where telecommunications are poor or the costs are exorbitant. The success of the technology will depend on many factors: user support and training, user friendly software, response time, and availability of local hardware support. User acceptance is crucial. The utility of the technology will improve as the number, variety and availability of CD-ROM databases grows. Improvements, refinements and standardization to both the hardware and software are required to ensure maximum utility and portability.

The librarian compared the MicroBASIS software and the organization of the CABI database unfavourably with DIALOG capabilities, other CD-ROM products, and other agricultural databases available on DIALOG. She said that software that accommodated two levels of users - neophyte and experienced - was essential for these products.

Finally, it was pointed out that although CD-ROM is considered indestructible, the IDRC disc was scratched and consequently some data was unavailable.
Southeast Asian Regional Centre for Graduate Study and Research in Agriculture

CD-ROM is seen as having the potential to answer the longstanding problem of slow and inadequate information provision to users in the Southeast Asian region. As a regional centre of agricultural information, the availability of agricultural databases on CD-ROM would improve tremendously the information delivery capability of AIBA. The centre is not in a position, nor is capable of, maintaining a large collection of agricultural documents. This task can be better handled by the national nodes. However, AIBA should be able to provide access to bibliographic references through indexes and other tools. The availability of bibliographic references and abstracts on CD-ROM will be an economical alternative. It does not require large storage space as compared with printed indexes; it is easy to maintain as contrasted with maintaining in-house databases; it does not require expensive telecommunications facilities as are needed in searching remote online databases.

The main achievement during the test period was the introduction and creation of awareness of CD-ROM technology. Its implications for future applications have not yet been fully realized.

Southern Africa Centre for Cooperation in Agricultural Research

The potential for CD-ROM is substantial if the costs can be kept within bounds and if SDI services can be combined with effective document delivery.

The prototype disc appears to very raw (especially the print commands) and needs tidying up and streamlining to achieve maximum user friendliness. Additional features, such as free text searching, are required.

The SACCAR staff were impressed by the relative ease with which they could educate researchers to do their own searching.

Universiti Pertanian Malaysia

If the cost of discs and hardware is not prohibitive then CD-ROM based databases have great potential, especially for countries with undeveloped communications infrastructures. Remote access to online searching is too expensive and can only be used for retrieving very recent items. Compact disc technology provides access to huge stores of information at a comparatively low price.
In order to fully exploit the potential it is necessary to establish a national network of journal subscriptions based on prior agreement. From this network the needs of users from all over the country could be served.

University of the West Indies

This a useful and exciting tool. Availability of a CD-ROM based database made online searching accessible to a wide variety of users. Large, in-house bibliographic databases will provide a browsing capability to end users and, with additional discs, broad subject areas would become more available with minimal equipment. In the longer term it would relieve librarians of some of the bibliographic searching that they currently do for their clientele. CD-ROM should be particularly useful in developing countries where information management tends to be poorly developed.
4. The consultant's perspective

This chapter of the report brings together the points made by the participants in their evaluation forms. Comments by the author were only added in the previous section to provide clarification. At this point it is appropriate to evaluate the results and provide analysis on which to base recommendations for the future.

4.1. Conclusions and comments

There is no doubt, from reading the evaluation forms and talking to the participants, that they consider CD-ROM to be an exciting development in the technology of information retrieval. The potential is there to greatly improve the capability of remote information centres to deliver a wider range of information and services. However, the theme that recurred frequently was 'if the price is reasonable'. This issue is addressed below.

Who were the users of the system?

There were a wide range of users, librarians, information specialists, and subject specialists. More importantly, for the first time researchers and end users of the bibliographic information were able to do their own online searching. Freed of the communications and online connect charges, the information professionals were able to invite researchers to search and browse the database for their own purposes. Although browsing was not facilitated by the software provided in this product, this would be a valid application with most other CD-ROM products. Other organizations were also invited to participate, either by staff visiting the CD-ROM installation or in response to phone and mail requests.

With the exception of IDICT, who had experience in the use of some other application programs such as word processing, DBase III, and spreadsheets, very few users had any previous microcomputer experience. Only the information professionals had any experience in online searching. This group represented 37% of the users during the test period.

The conclusion to be drawn from this profile is that the accessibility of the medium encourages wide use of information on the CD-ROM by researchers and end users who have not traditionally had access to online searching. It can be made available to many different types of users and the information professionals become trainers rather than intermediaries for many users. Although CD-ROM is seen as one of many information tools, it will allow information centres to expand their services, respond in a more timely manner, and serve more people with the same number of staff. This new technology, which appears to fit
easily into existing organizations, will allow libraries and information services to be even more pro-active in providing dynamic and interactive services.

Bringing large bibliographic databases in-house will change the use that centres make of remote online searching. Most users based their response on their use of DIALOG, but the comments are relevant to any remote system. Remote online searching would only be used for very recent materials and databases on peripheral subjects that are not available on site. CD-ROM is seen as particularly appropriate for large retrospective files and reference tools.

How was the CD-ROM system used?

Primarily, the system was used as a source of references. The responses and the log sheets indicated that most users were searching for references on a known item or subject. Contrary to expectations, researchers did not express great interest in browsing. There may be several reasons for this: the MicroBASIS software was not conducive to browsing large amounts of data because Boolean searching was often very slow, and it was not easy to view individual references once a set of references had been created. The author's experience, browsing the Wilsondisc Library Literature and Silver Platter's LISA, is quite different. With retrieval software that is designed for efficient CD-ROM searching, eclectic browsing is encouraged. Having created a set of references it is easy to view these, and print all or individual items, or save the search results to a diskette and continue browsing.

Regular updates to CD-ROM databases will allow information centres to provide new services, such as current awareness or selective dissemination of information based on the interest profiles of their clientele. In order to provide this service efficiently the CD-ROM software must provide the capability to store and edit individual interest profiles so that they can be searched against each new update of the database. This service, on a wide variety of databases, has been available to users of North American online services for many years but until now has had only limited application in remote areas and most developing countries.

Other new uses and services that would be possible include: the creation of regional subsets of large bibliographic databases, e.g. CAGRIS, the Caribbean subset of AGRIS; online access to a wide variety of full text reference materials; and support for demonstrations and hands-on training without incurring connect charges.
The opportunity exists to support the creation of regional online databases using optical technology. It may be some time before CD-ROM technology is economical for these subsets however, even one or two copies of a database using WORM technology and efficient online retrieval software would increase the access to local materials. Use of WORM technology would allow centres to develop local database building capability whereas use of CD-ROM requires a dependence on North American or other mastering facilities. Limited copies of the database would still permit centres to provide additional service by mail, or telephone to support remote searching. All of these services were proven feasible during the CABI field test.

Users concluded that abstracts are not a substitute for the full text, however, they do appear to improve the selection process. Having read an abstract the researcher is less likely to ask the library to obtain items that subsequently turn out to be irrelevant to the topic being researched. This is important because of the strain that may be placed on document delivery services by the increased access to bibliographic references. In some fields of research the abstract may occasionally provide the essential information for a user, e.g. chemical and mathematical formulae, but should not be considered the prime purpose of abstracts. A number of users suggested that free text searching of abstracts was essential. Its absence on the CABI CD-ROM was a function of the space available.

A review of other CD-ROM products and comparison with MicroBASIS indicates that users of microcomputer based online retrieval systems should expect the following as a minimum set of 'user friendly' capabilities:

- Use of screen windows to display related information concurrently during the search session, e.g. a portion of the current index being searched, a menu of options available at this point in the session, and the users' last input.

- Lotus 1-2-3 established a standard in command menus and users now expect to have the main menu of options available on the screen or displayed with a single key stroke. The user should be able to select these options by keying in the initial letter or moving the cursor block and pressing return. Sub-menus should be available through 'pop-up' windows, and then actions are selected in the same way as from the main menu.

- Expert users require the capability to chain commands by entering a string of characters and pressing the 'enter' key. The user needs to be able to define frequently used command sets and search strategies as macros associated with combined keys such as ALTernate and ConTrol 'A-Z'.

35
Novice users need online tutorials and self-instruction available as an integrated part of the retrieval system.

At any point in the search the user needs to be able to display help messages that are relevant to the context of the current activity or next step. This includes instructions on what to do next, how to exit from error conditions, as well as the ability to display help on a particular command or option.

In addition to storing searches as macros, the user should be able to store more complex searches to diskette for SDI profiles and edit these files using a wordprocessor.

Print and display capabilities are very important and the limitations of MicroBASIS in this area were particularly noticeable. The user needs to be able to display and print selectively while browsing a set of hits, be provided with a variety of formats, and also create custom print and display formats. The ability to send search results to the printer or write references to an online file for subsequent editing or inclusion in another document is also necessary.

In the process of searching the database, the user needs to be able to select an index to search, or specify a free-text search of all indexes, display the index, select and combine terms, and display or print the results. Previous search statements and hits should remain available for further qualification or combining with other search terms. These capabilities, along with truncation, wildcards and adjacency searching are standard features of the remote online systems and users expect to find these on CD-ROM databases. The CD-ROM publisher may have to compromise on some features, because of the indexing overhead involved, in order to accommodate a database on one disc. In these cases the field test respondents indicated that the priorities for search features were: browsing the indexes, free text searching of combined or selected indexes, truncation, boolean searching, limiting by language and date, and flexibility in the display and print commands. Storing searches and use of function keys to reduce typing were also given high priority.

A comparison of MicroBASIS and other software designed specifically for CD-ROM applications suggests that the latter approach is essential to providing efficient access to the data. New and special techniques are necessary to overcome the inherent slow access of CD-ROM drives in comparison with Winchester hard disks and other magnetic media. MicroBASIS, as a derivative of BASIS, a mainframe text database management system, is not adequate for CD-ROM online retrieval.
How much on-site support is required for CD-ROM?

The experience of the field test indicated that on-site support requirements are minimal. The systems fitted well into existing administrative procedures and were seen as simply another tool for use in providing information services. Technical expertise is really only necessary to install and maintain the electronic components. With adequate hardware documentation and instructions a lay person should be able to install the CD-ROM and controller. In practice the documentation, particularly from the hardware suppliers, is inadequate and when problems arise it is very difficult to diagnose the cause without some knowledge of microcomputer hardware and technology. Developing countries have to be better supplied with documentation because they often do not have access to local support and vendor technical assistance. In the author's experience most problems arise because of incompatibilities between expansion cards in the microcomputer, machine speeds, and inadequate instructions about how to install the CD-ROM device drivers. Having local technical expertise can make the entire experience much less traumatic but should not be necessary if the documentation is adequate.

Similarly, use of the online help features suggested above can eliminate the need for on-site training. Software documentation must be accurate and include many examples. The best microcomputer documentation is usually arranged so that the user can install the software, gain an overview of the system, and get started quickly. A reference section, describing every command and option, should also be provided for use when the searcher has a specific question or problem. From the comments of the participants in this project it appears that a chapter on advanced searching techniques would also be appreciated. As an example, from a different application, the manual for the word processor WordPerfect is arranged in this way and results in a very comprehensive and usable manual. The reference section of the WordPerfect manual is also available online through a single function key.

In order to make CD-ROM users self-sufficient, it is necessary to provide adequate descriptions of the contents of the database. Information on the thesaurus, the titles and types of publications indexed, and the scope of the database are essential to the efficient use of the system.

Although the consultant kept in touch with the participants, the discussions were not about how to use the system or for providing assistance. The problems that were encountered were in the failure of a drive which made it unavailable for several months, and defective discs which in a commercial situation could have been replaced. Distance affects both of these types of problems and they do need to be resolved. However, it appears
that the requirement for on-site support for CD-ROM systems is minimal and as such makes them ideal for developing countries and remote areas.

How does CD-ROM compare with other media for information retrieval?

The participants were asked to compare CD-ROM for bibliographic information with magnetic storage media, remote online search services, microforms and printed products. Each medium has its advantages and disadvantages and the general conclusion was that CD-ROM would not completely replace any one of them. Instead bibliographic and full-text products on CD-ROM will complement and supplement the existing technologies. For example, magnetic media (in the absence of erasable optical discs) will remain the storage technology for local, in-house databases. These files can be smaller and more specialised if the availability of the larger, more general databases on CD-ROM means that the information centre no longer has to rely on its own resources for most indexing and online searching. The slowness of CD-ROM was very evident in the CABI prototype but this was not typical of many other existing products. Within the limits of reasonable searches (i.e. do not search the term 'education' in the ERIC database, or 'agriculture' on CABI) all the other products tested by the author have produced results within acceptable response times. In view of the fact that online connect charges are not a factor, one can afford to be a little more relaxed about searching, in which case 5 to 10 second response times are quite acceptable.

The most dramatic effect of CD-ROM is its capacity to bring large, bibliographic databases in-house, eliminating the telecommunications and connect charges of the remote online bibliographic services. All respondents, except IDICT, based their responses on their use of DIALOG, however, the conclusions drawn are relevant to any commercial online service. In comparison with the remote online services, MicroBASIS was seen to be less user friendly and flexible. This is not a fair comparison because MicroBASIS lacked most of the features that are listed above as essential components of a microcomputer based retrieval system. However, the large, online services are able at present to provide greater access and indexing capacity than many CD-ROM services. For example, abstracts often cannot be searched in a single disc CD-ROM product, even though the abstract is indexed and searchable through the remote service bureau. Another advantage of the remote system is that knowledge of a single command language is sufficient to access all the databases provided by a vendor. The existing CD-ROM market is scattered among a number of publishers and users are having to learn different search strategies and commands for each vendor. In view of the improved user interfaces on the CD-ROM products it
is debatable whether this is a significant factor in the acceptance of CD-ROM.

In conclusion, most respondents felt that there was still a place for the remote online services for access to very recent materials and databases that were infrequently required at their institutions. The question of relative costs and what is a 'reasonable' subscription cost for CD-ROM products is discussed below in section 4.2.

The advantage of CD-ROM over both print and microform products is the availability of online retrieval, and therefore improved access to the data. The compactness of CD-ROM as a storage medium is also a significant advantage in comparison to print and microform. For developing countries this means that it is less expensive to duplicate and distribute to remote areas. CD-ROM will never totally replace print or microform. It is particularly appropriate for archival purposes as microform is now used. However, one should beware of blanket statements that CD-ROM will completely replace microforms. Use of CD-ROM requires that the information already be available in a machine readable form. This is not the case for vast quantities of serials, newspapers, monographs and indexes currently in microform. Back issues of indexes that are presently available in print only, not only have to be read by an optical scanner to convert them but the information must also be labelled for loading into the correct data fields and building indexes. It is hoped that the move to CD-ROM will be based on selection of titles where the researcher has the most to gain by online access.

Every respondent provided examples of publications that they would like to see on CD-ROM. As expected, these included the major and well established indexing and abstracting services in their areas of interest. Full text publications, such as specialised directories, encyclopedias, catalogues, national and international standards, and reference tools, were also high priority for CD-ROM. In both cases the availability of the information through online searching was seen as providing improved service and a greater capability to exploit and retrieve information. While most titles suggested for full-text were reference tools and source materials, there is also the option to provide key journals, report literature and proceedings of conferences. It is possible that the provision on CD-ROM of this kind of information will prove to be an economical way to distribute it and support document delivery requirements in areas which do not have well established resource collections.

Support for document delivery is critical to an integrated approach to information services. There is no benefit to be gained by knowing about research or an article if it cannot be obtained by the person who needs it. The trial period was not
sufficient to assess the effect of improved access to bibliographic information but increased demand for inter-library loans were anticipated. Resource sharing within geographical areas is one aspect of information delivery that information centres and libraries can develop through coordination and organization. Efficient document delivery involves knowing who has what title, having procedures for coordination and processing of requests, and having cost-effective ways of transferring or loaning the information. This is an area in which groups of libraries and information centres can help themselves by organizing shared purchasing of expensive subscriptions and establishing mechanisms for sharing.

There was interest in distributing public domain software for personal computers through CD-ROM. This type of product already exists and is yet another example of where CD-ROM may support distribution of resources that are widely available in North America through telecommunications networks and informal sources but virtually inaccessible to the developing world.

4.2. The potential for CD-ROM technology in developing countries

In answering this final question on the evaluation forms, the respondents were overwhelmingly positive about the potential of CD-ROM technology for information delivery in developing countries. The constraints that most people identified were cost and the availability of equipment.

In some locations, microcomputers are not widespread and there are competing demands for the equipment that is available, so few information centres have access to machines that they can dedicate to online searching. During the field test this caused problems for several sites in getting sufficient access to the machine for testing purposes. One site schedules the use of its few microcomputers 7 days a week, 20 hours a day in order to maintain a variety of applications. Therefore provision of CD-ROM products has to be in conjunction with adequate equipment, not just CD-ROM drives, but also the microcomputers to support them. The requirement for a microcomputer and the CD-ROM drive means that the cost of an individual workstation is considerably higher than one for online or microform access.

In order to clarify the question of 'reasonable' product prices the sites were surveyed at the end of the project to find out what they considered an appropriate price for a key reference tool, such as the CABI indexes, on CD-ROM.

It appears that publishers are pricing CD-ROM subscriptions above the print versions at present in order to test the market without eroding their current subscription base. Table 2 provides some comparisons of print and CD-ROM subscription prices.
Table 2: Costs for selected print and CD-ROM based titles (in US$)

<table>
<thead>
<tr>
<th>Title</th>
<th>Print</th>
<th>CD-ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indexes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricola (U.S. Dept. of Agriculture)</td>
<td>depends on library budget</td>
<td>$1750</td>
</tr>
<tr>
<td>ASFA</td>
<td>$899</td>
<td>$2250</td>
</tr>
<tr>
<td>Applied Science and Technology Index (CD-ROM includes unlimited online searching for recent materials)</td>
<td>depends on library budget</td>
<td>$1495</td>
</tr>
<tr>
<td>Biological Abstracts</td>
<td>$3288</td>
<td>-</td>
</tr>
<tr>
<td>Books in Print + related publications</td>
<td>approx. $870</td>
<td>$895</td>
</tr>
<tr>
<td>Chemical Abstracts</td>
<td>$6000</td>
<td>-</td>
</tr>
<tr>
<td>COMPENDEX (Engineering index)</td>
<td>$1530</td>
<td>-</td>
</tr>
<tr>
<td>Dissertation Abstracts International</td>
<td>$775</td>
<td>$995</td>
</tr>
<tr>
<td>Food Science and Technology Abstracts</td>
<td>$926</td>
<td>-</td>
</tr>
<tr>
<td>Science Citation Index</td>
<td>$6200</td>
<td>-</td>
</tr>
<tr>
<td>Ulrich’s International Periodicals Directory + Ulrich’s Irregular Serials and Annuals</td>
<td>$885</td>
<td>$395</td>
</tr>
<tr>
<td>United Nations UNDOC</td>
<td>$125</td>
<td>-</td>
</tr>
<tr>
<td><strong>Full-text publications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic American Encyclopedia</td>
<td>approx. $600</td>
<td>$299</td>
</tr>
<tr>
<td>Kirk-Othmer Encyclopedia of Chemical Technology</td>
<td>$4400</td>
<td>$895</td>
</tr>
<tr>
<td>McGraw-Hill Science and Technology Encyclopedia</td>
<td>$1100</td>
<td>$300</td>
</tr>
</tbody>
</table>
in 1987 and confirms this point. As noted in Chapter 2, 60% of the bibliographic subscriptions were in the US$500-2000 range. However, a trend is developing to sell archival files in one package for a lump sum and current subscriptions for a single disc product with quarterly updates as another package.

One of the field trial participants suggested the following pricing structure:

- For the archival file: a basic price for the accumulated data, plus the unit cost of production of the CD-ROM discs. Under these circumstances, where there has presumably been some return on investment already, the basic price should be nominal.

- For the current file: libraries expect it to be less than the print subscription cost. However, in view of the present uncertainty of the technology, costs for the CD-ROM version should be equal to or a little above the subscription for the printed copy. A downward slide in prices would be expected as the number of CD-ROM subscriptions increases. Unlike their North American counterparts, the developing countries have less interest in 'bundled' products which include remote online searching. The cost and uncertainty of telecommunications continues to make remote online searching uneconomical.

Only a few participants were willing to put an actual price on their potential for using CD-ROM based indexes. They felt that US$1500-2000 per annum was reasonable for an annual subscription. One person suggested US$7000 for the complete CAB Abstracts (49 sub-series). This would place the CABI product considerably higher than the majority of existing bibliographic databases on CD-ROM.

Because of the slow development of standards, a broadly based market for CD-ROM products has not emerged. To bring subscription prices down and establish this technology as a medium for in-house access to commercial databases a number of components must be brought together:

- established standards to reliably support interchangeable hardware, databases and retrieval software;

- a broad base of installed workstations in libraries and information centres;

- subscription prices that are not greater than the amounts already spent by libraries for print subscriptions and remote online searching, and an expectation that prices will come down as the technology becomes better established, production costs decrease, and markets expand;
development of the technology to overcome the limitations of 'one user, one disc' products. While single-user systems and disc swapping are merely inconvenient, the utility of the systems would be greatly increased by multi-user access and disc drives that swapped discs as required, or provided simultaneous access to several discs at one time.

At present it is difficult to predict how the market will develop. From the perspective of users in developing countries it seems that the publishers should be able to offer a pricing structure that expands their market to new areas without eroding their existing subscription base.

4.3. Comments on the CD-ROM evaluation project in general

This has been an exciting and satisfying project for everyone involved. The participants were given an early opportunity to evaluate a new technology. The site visits were necessary in this case to ensure that everyone started with the same base knowledge and understood the system and evaluation criteria. In sending a consultant on such a trip there is the opportunity to make greater use of that person. For example, every site wanted to give local librarians the opportunity to attend a general presentation on CD-ROM technology and this was difficult to arrange in the time frame that was allowed for the site visits. If a project involves the cost of sending experienced people to a site, then opportunities should be provided to make the best use of the visitor's skills and knowledge. The participants in this case would have benefited from more time to receive basic MS-DOS training, share background information with the local information community, and discuss CD-ROM in the context of overall library automation.

Follow-up with the sites was difficult and intermittent. On the whole we relied on occasional telephone calls and telex. As it turned out on-site support was not required after the initial visit and responses to the evaluation forms were comprehensive and very useful. If the written responses had not been so informative, it would have been difficult to draw conclusions on the appropriateness of CD-ROM technology. In this project a follow-up visit appears not to have been necessary though some participants did express initial fears about donor agencies 'tossing technology over the wall' to developing countries and not following up to ensure that it is appropriate and being maintained adequately. These comments were well taken for this project and emphasized the importance of the evaluation process.

The participants were widely dispersed in this project - Africa, Canada, Southeast Asia, India and the Caribbean. This provided an opportunity to try another mode of communicating for project management - computer conferencing. We felt that the
sites would benefit from communicating with each other in addition to the consultant. Four sites (University of the West Indies, Universiti Pertanian Malaysia, ICLARM and IDRC) joined the consultant on CoSy, a conferencing system maintained at the University of Guelph, Ontario. In addition to providing an electronic mail facility, a special CABI/CD-ROM conference was established. The results were disappointing. Very little use was made of the system except for transmitting electronic messages. A dynamic conference discussion never developed for a number of reasons:

- the participants did not know each other, only the consultant, and it has been shown frequently that computer conferences work best when the group has already had face-to-face contact and has an ongoing interest to talk about;
- some members could not join because of lack of access to the international data transmission networks, this meant we could not use the system exclusively for project management thereby encouraging conferencing use;
- the consultant was not experienced in moderating a computer conference; the involvement of the moderator is critical to keeping the conference alive and interesting;
- IDRC experts and the consultant could have provided regular bulletins and information to the conference in order to generate discussion and encourage participation from the other members of the group, but this did not happen;
- use of CoSy was not part of the daily routine of any of the participants and therefore access to the system was sporadic. This does not help to generate spontaneous discussion.

In spite of this group’s failure, there were other conferences on the system, particularly one on systems and networks between Indonesian and Guelph faculty members, that indicate that this idea should not be abandoned. With more careful planning, computer conferencing could provide an added dimension to group projects and an efficient way of managing and evaluating them.

4.4. Recommendations

CD-ROM technology has a place, complementing other technologies, and could play a role in supporting IDRC Information Sciences Division’s program delivery with respect to its guiding concepts (1): that any attempt to address Third World information needs must be based on resource sharing and cooperation; that for any country, the most important information
is that which has been generated within the country; and that cooperation between libraries and documentation centres can lead to a more rational use of resources and the avoidance of duplication. The recommendations below advance these concepts and through this project we see a potential for CD-ROM and other optical technologies to support them.

There are three groups to be considered in assessing the use of CD-ROM technology in the Third World: the donor agencies, the information providers and electronic publishers who produce the products, and the users of the products. The recommendations have been grouped to focus on each of these players, but it is only through cooperation, and each group being aware of the others' needs and constraints, that progress will be made.

**Donor agencies**

**RECOMMENDATIONS:**

That donor agencies:

1. Undertake further studies, including a more rigorous evaluation of the effect of CD-ROM databases on document delivery requirements, to assess how CD-ROM or other optical technologies can be used to improve document availability.

2. Support the acquisition of equipment since providing funds for subscriptions alone is not sufficient to establish CD-ROM as a medium for information delivery in developing countries.

3. Support the provision of training and regional seminars which are practically oriented to managing new technologies in libraries and information centres.

4. Encourage the appropriate mix of print, microforms, CD-ROM, in-house databases, and access to remote online services to allow libraries and information centres to provide appropriate services to their clientele.

5. Encourage and support resource sharing through shared subscriptions, the development of union catalogues, regional databases, and networks for transmitting requests. The infrastructure for document delivery, advertising and promoting the availability of services must be established in order to gain the greatest benefits from the CD-ROM databases and full-text products.
Information providers and electronic publishers

RECOMMENDATIONS:

That the information providers and electronic publishers:

1. Work with the donor agencies and potential subscribers in developing countries to package and price their products appropriately for centres with limited financial resources.

2. Develop an awareness of new market opportunities which will not necessarily erode the remote online or print subscription income, and will help under resourced areas build better collections through an appropriate technology.

3. Assess the potential for new products e.g. regional subsets of databases, full-text databases on CD-ROM as one medium for supporting document delivery, and subject oriented packages of full text journals and indexes, such as agriculture, medicine, biology, chemistry etc.

4. Provide adequate and complete documentation for hardware and software installation and use, and descriptions of database content. This is essential because installations in remote areas must be largely self-sufficient and able to diagnose their own installation and operational problems. Appropriate tools include high quality online tutorials, documentation, and context-sensitive help messages that aid the user in their current online operation.

Potential users of CD-ROM

RECOMMENDATIONS:

That information centres and libraries in developing countries:

1. Organize the sharing of subscriptions in logical regional or geographic areas.

2. Work at developing resource sharing mechanisms appropriate to their needs and resources.

The infrastructure does not have to be supported by high technology. Much of the sharing of this product during the field test was very 'low tech', providing opportunities for mail and phone requests, and making the system available to staff and researchers from external organizations. The field test proved that sharing did not have to be costly and that it was possible for centres to take the initiative to share resources without incurring additional expenses. The
major investment in organizing cooperative ventures is in the human resources required to plan and manage the projects. These talents and resources are readily available in the developing countries.

3. Develop appropriate means of sending requests and receiving responses.

4. Make their needs and expectations for services directly known to the information providers and publishers.

5. Continue attempts to communicate and support cooperation through computer-based networking (electronic mail and conferences)

This has been a valuable learning experience for the participants. The participants and the consultant have come to understand the potential, and limitations, of CD-ROM for information delivery in developing countries. Although this was a very subjective and non-scientific evaluation, they were unanimous in their acceptance of CD-ROM as an exciting new medium for the delivery of information in developing countries. Among the participants there is a strong belief in the value of information, but a sense of isolation from the mainstream of information and library technologies. CD-ROM, in conjunction with microcomputer technology, has the potential to support the distribution of many bibliographic and reference tools that until now have been unavailable or beyond the budget of developing-country organizations.

Reference:

Appendix I: Participants in the IDRC project

1. Agricultural Information Bank for Asia, Southeast Asian Regional Centre for Graduate Study and Research in Agriculture (SEARCA), Lagun, Philippines
   Contacts: Ms. Josephine Sison, Project Officer and Ms. Alice Rillo.
   IDRC Project: Current Agricultural Research Information System (CARIS) Southeast Asia (3-P-81-0021)

2. Instituto de Documentacion e Informacion Cientifica y Tecnica (IDICT), Havana, Cuba
   Contacts: Mr. Oscar Visiedo, Vice-Director and Mr. Eduardo Orozco Silva, Head, CD-ROM Project Group
   IDRC Project: Decentralised Microcomputer-based Tools for a National Information System (3-P-85-0116)

3. International Centre for Living Aquatic Resource Management (ICLARM), Manila, Philippines
   Contact: Ms. Rosalinda Temprosa, Chief Librarian
   IDRC Project: Selective Fisheries Information Service (3-P-83-0242)

4. International Development Research Centre (IDRC), Ottawa, Canada
   Contact: Ms. Bev Chataway, Head, Readers’ Services, Library

5. Southern Africa Centre for Cooperation in Agricultural Research (SACCAR), Gabarone, Botswana
   Contact: Mr. Peter Boyle, Information Specialist
   IDRC Project: Information Services - SACCAR (3-P-85-0025)

6. Sorghum and Millets Information Centre, International Crop Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India
   Contact: Mr. L.J. Havaru, Manager, Library and Documentation Services
   IDRC Project: Semi-Arid Tropical Crops Information Service (SATCRIS) (3-P-86-0066)

7. Universiti Pertanian Malaysia (UPM), Serdang, Selangor, Malaysia
   Contact: Mr. Syed Salim Agha, Chief Librarian
   IDRC Project: Agricultural Waste Management Information - Malaysia (3-P-85-0239)
8. University of the West Indies (UWI), St. Augustine, Trinidad
Contact: Ms. Shirley Evelyn, Head, Readers' Services, The Library

IDRC Project: Caribbean Agricultural Information System
(CAGRIS, 3-P-84-0217)
Appendix II: IDRC evaluation form

International Development Research Centre
Information Sciences Division

CD-ROM Technology Evaluation Form 1986/87 (Revised 3 March 1987)

To supplement the CABI evaluation of CAB abstracts on CD-ROM IDRC wishes to focus specifically on the potential of this technology in information delivery for developing countries. The responses to the CABI questionnaire that we receive from participating centres will be consolidated into a single report. In addition we would appreciate your responses to the attached questionnaire. Please describe, in narrative form, how the CD-ROM system was used in your centre. In answering the 'futuristic' questions we would like you to do some 'crystal ball gazing' and speculate from a developing country perspective about how CD-ROM may be used in the future.

For your information the following centres are participating in this evaluation:

1. Universiti Pertanian Malaysia, Serdang, Selangor, Malaysia
   Mr. Syed Salim Agha, Chief Librarian

2. University of the West Indies, St. Augustine, Trinidad
   Ms. Shirley Evelyn, Head, Readers' Services, The Library

3. Agricultural Information Bank for Asia (AIBA), Southeast Asian Regional Centre for Graduate Study and Research in Agriculture, Laguna, Philippines

4. International Development Research Centre, Ottawa, Canada
   Ms. Bev Chataway, Head, Readers' Services, Library

5. Southern Africa Centre for Cooperation in Agricultural Research (SACCCAR), Gabarone, Botswana
   Mr. Peter Boyle

6. Sorghum and Millets Information Centre, International Crop Research Institute for the Semi-Arid Tropics, Hyderabad, India
   Mr. L.J. Havaru, Manager

7. Instituto de Documentacion el Informacion Cientifica y Tecnica (IDICT), Havana, Cuba
Mr. Oscar Visiedo, Vice-Director

The log sheets are provided to document your immediate impressions of how the system performed on a day-to-day basis. In answering the narrative questions we encourage you to think about what this technology may mean to information services in your organization and how we can best exploit it in the future. Please share your thoughts and ideas with us so that we can all benefit from the experience of hands-on exposure to a new and exciting technology.

Jane Beaumont
Consultant

David Balson
IDRC Programme Officer

Some of the issues to be considered are:

- most useful and appropriate content for the databases
- updating
- information types: references, abstracts, full text, statistics, catalogues, union lists
- effect on document delivery
- how does CD-ROM compare with other technologies for developing countries: print, microform, online, etc.
- what are the economics of the technology, are there economies of scale to be found?
- what will be the effect on print and online media?
- what will be the impact on traditional information services
- effect on special problems of information services in developing countries: costs, distance, poor communications and services, training needs, lack of equipment.
These issues break down into a number of groups which we would like you to consider:

**Users**

1. **Approximately how many different people used the system during the trial period?**

2. **In general, for what purpose did they search the abstracts?**
3. What expertise did the users have? (e.g. microcomputer experts, information scientists, subject specialists)

4. Which ones, if any, have previous online searching experience?

5. Do you see CD-ROM making online search capabilities available to a different type of user?
6. How much microcomputer experience did your users have? (e.g. other application software, programming, hardware)

7. Would the availability of databases on CD-ROM prompt your to change your practices in:
   - online searching
   - information provision in general
   - document delivery

8. Comment on the quality of:
   - the training,
8. Comment on the quality of: (continued)
   - software,

   - system support,

   - documentation

9. Is currency relevant to your use of online databases?
10. How often would you like to see the database updated? (e.g. every 3 months, 6 months or annually)

11. How would this technology enhance your ability to provide information to users not currently served by you?

12. In your centre or library, would it be practical to let 'end users' and researcher do their own searching on a CD-ROM database? If not, why not?
Use of the CD-ROM system

1. How far did people come to use the system? (e.g. same floor, another floor in the same building, another building, or did you serve users remotely)

2. What was the system used for? - as a source of references or a source of primary information?

3. How adequate are abstracts if the full text is not available?
4. Did researchers use the system to retrieve information specific to their current work or to browse / graze for additional and peripheral information?

5. The CABI disc combines many separate publications - was there an advantage to having access to some of the related materials that you would not normally subscribe to?

6. How do you rate the major functions that were available - find, look, display, and print?
7. Were there any new uses to which you could put the information because of this particular medium, i.e. CD-ROM and all data online?

8. Was there any attempt to share this product with other organisations who would have an interest in the subject matter. If yes, how was this achieved?

9. Were there occasions when availability of this product led you to information that had been generated within your country? Please give examples.
Support

1. How did this system (CD-ROM, and the database) fit into the information centre's administration and procedures?

2. How did you monitor users' information and support requirements in order to act upon them?

3. Was support for this pilot project adequate? Did you actually need help from CABI or IDRC or could you solve problems locally? Give examples of help required and how problems were solved.
   - software and database
3. Was support for the pilot project adequate? (continued)
   - hardware

4. Did you have adequate computer skills in-house to manage the system? If not what was lacking?

5. What was the effect of having this system on your document delivery practices and requirements?
Comparison with other media

1. In your experience, how does CD-ROM compare with other media for accessibility and organization of information:

   - magnetic hard disks (e.g. in-house databases on a mainframe, mini or microcomputer)

   - remote mainframe systems (e.g. DIALOG, ORBIT)

   - microforms
1. In your experience, how does CD-ROM compare ... (continued)
   - print, hard copy

2. What other products would you like to see on CD-ROM? Where possible, please give actual examples of publications and products that you consider suitable for CD-ROM and comment on how you would like to use these databases.
   - indexes and abstracts

   - full text publications, e.g. directories, encyclopedias, reference materials.
2. What other products would you like to see on CD-ROM? (continued)

- source documents, cataloguing information

- public domain software for personal computers

- mixed media, i.e. text, graphics, video, audio.
3. What do you and your colleagues view as the potential for CD-ROM in the provision of information in developing countries?

Please feel free to use the rest of this form and additional sheets to add any other comments and ideas you may wish to record.

Thank you.
Appendix III: Selected bibliography on CD-ROM in libraries


"CD products priced at 176% of print versions." INFORMATION INDUSTRY BULLETIN 3 (March 3, 1987) pp.1,3-5.


Connolly, B. The compact disc: library application of an audio revolution. INFORMATION TECHNOLOGY AND LIBRARIES 2 (September 1983) pp.279-84.

Connolly, B. Laserdisk directory, parts 1-4. DATABASE (June, August 1986) and ONLINE (July, September 1986)


Gale, John C. Use of optical disks for information storage and retrieval. INFORMATION TECHNOLOGY AND LIBRARIES 3 (December 1984) pp.379-82.


Lambert, Steve; Ropiequet, Suzanne. CD ROM: optical publishing, a practical approach to developing CD ROM applications. Redmond, WA: Microsoft Press (1987)


Miller, David C. Evaluating CDROMs: to buy or what to buy. DATABASE 10 (June 1987) pp.36-42.

Murphy, B. CD-ROM and libraries. LIBRARY HI TECH 3(2) (1985) pp.21-8.


Videodisc and CD ROM at ALA. LIBRARY SYSTEMS NEWSLETTER 5 (February 1985) pp.9-12.