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Library Automation : Tasks Ahead

With the launching of the Calcutta Library Network (CALIBNET) programme, and the Biotechnology Information Network (BTISNET), 1989 marks the beginning of a new era in library and information centre management. The movement would attain criticality once the magnum concepts like INFLIBNET and DESINET are implemented.

The technology of library networking is now common. The concept of resource sharing among information professionals is gaining ground (perhaps an indirect benefit of the budget crunch). Even when the basic requirements are satisfied, the CALIBNET implementors are a little apprehensive about the immediate success of the venture. To be successful, library operations in participating institutions would have to be automated. Retrospective conversion is the major problem in this exercise.

Some may choose to re-do the entire exercise of data capture, preparation and entry for machineloading. The third element is a mechanical activity and could be farmed out easily or could be managed through the use of the student community or existing employees of participating institutions on some incentive payment scheme. The first two elements require intellectual inputs which ought to be managed inhouse. It is, however, too much to expect of existing library staff to complete retrospective conversion within a reasonable time frame. The other alternative of contracting would be expensive; skilled contractors may also be difficult to find.

Then how best to handle the problem? CALIBNET proposes to experiment with two alternatives. One is the use of OCR technology; even great optimists would find that this experiment would not succeed as the material to be scanned (say catalogue cards) is not always good enough. The other possibility is to use LC MARC or OCLC records selectively. This may work well for S & T libraries because as much as 70% of documents are of foreign origin and occur in the databases. For Indian material, there are two problems. Firstly, this may not occur in the databases, precious little could be done to overcome the situation. The second problem relates to Indian documents not having ISBN or LC numbers which could provide the easiest access to records in the said databases.

If you, dear reader, have any other suggestions for retrospective conversion, do share them with us.

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Bibliographic Databases and Networks : Indian Scenario*

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The authors present a comprehensive review of bibliographic database and network development activities in India. New ventures on indigenous databases and problems of their development like technology and compatibility, vocabulary control, software standardization, software marketing, etc. have been discussed. The demand for import of international S & T databases in hard copy form, on magnetic media, on CD-ROM etc. is considered taking into account issues on utilization of commercial databases. The

The national investment on research and development (R & D) and related science and technology (S & T) activities during 1986-87 has been of the order of Rs. 28,656 million or about 1.10 per cent of GNP. The stock of personnel employed in R & D institutions in the country including in-house R & D units of public and private industries is equally impressive : 241,000 in 1986 of which 35 per cent are actual R & D performers. Precise statistics are not available to support this conjecture, yet it may be stated that the 'information support' for the stock of personnel and activities (as a result of the order of investment mentioned) has not been commensurate. In quantitative terms, the investment could be significant but most of it was perhaps utilized to build up library resources. Generation of information services and creation of databases so far has not attracted adequate attention.

1. DEVELOPMENT OF INDIAN DATABASES

Indian efforts made in the past or those planned for immediate future, had one or more of the following objectives :

To organize national or nationally produced information;

To create databases in narrow subject areas relevant to national socio-economic situation; and

To develop endogenous capabilities for database creation and utilization.

focus then moves on to India's participation in international database development activities and the benefits that have so accrued.

In regard to establishment of online services for access to computerized databases, the authors present the main findings of a concept test-cum-feasibility study conducted recently at the instance of NISSAT by the Society for Development Alternatives, New Delhi.

1.1 Organization of National Information

The aims of the endeavours had been that (a) the databases would complement and supplement international databases, and (b) the databases would serve archival/recording functions of information generated indigenously.

Though these aims are generally the primemovers and starters of database development in all countries, unfortunately, here such efforts are not sustained. The Indian situation has also been fraught with slackening of interests and piling up of backlogs. The universal explanations for the situation are :

*The user community finds it more convenient and useful to utilize global sources;

*The users tend to depend more on their personal knowledge than take resort to use of databases;

*Such databases seldom use the state-of-the-art concepts and technology, and users find it difficult to locate and to make use of these; and

*These being government sponsored efforts, the flow of financial support levels down with the passage of time. The environment also does not nurture aggressive marketing of products and services.

* Paper presented at the International Conference on Bibliographic Databases and Networks, New Delhi, Feb. 1989.

The validity of such explanations can be sought from the brief descriptions of a few such databases given below :

1.1.1 Indian Science Abstracts

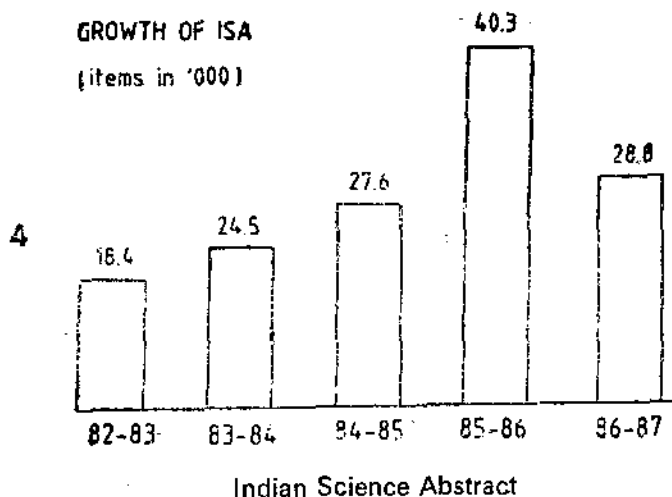
Generation of an abstracting service on the papers published in Indian Science & Technology journals was taken up by the Indian National Scientific Documentation Centre (INSDOC), New Delhi way back in 1965. The coverage of journals in Indian Science Abstracts (ISA) has increased from 294 in 1983-84 to 750 in 1986-87. Besides journal articles, ISA has been covering patents, standards, theses and conference proceedings. The records generally provide modified author abstracts. The number of items getting into ISA has been fluctuating mainly because of extra efforts made in particular years to clear the backlog (Table 1). On an average, about 1000 entries are recorded in a fortnightly publication. An attempt is now being made to also cover a few foreign periodicals in which Indian Scientists usually publish their work.

Table 1. Growth of Indian Science Abstracts

| Year | No. of items | No. of journals covered |
|-------|--------------|-------------------------|
| 82-83 | 18,400 | 430 |
| 83-84 | 24,519 | 294 |
| 84-85 | 27,600 | 310 |
| 85-86 | 40,306 | NA |
| 85-87 | 28,800 | 600 |

Coverage of Journals 294 (83 - 84)
 750 (86 - 87)

GROWTH OF ISA
(items in '000)



In spite of its good size and potential to complement international databases for information on outputs of Indian S & T efforts, the ISA activity has stagnated over the years. ISA still employs manual methods so much so that the output is type-composed. Therefore, if a computer-based database is to be generated, the entire collection of 0.4 million records would have to be keyed in afresh. This being a mammoth task, at least for current information, an effort may be made to generate a computer-readable database with an internationally acceptable input format.

1.1.2 Indian National Bibliography

The Indian National Bibliography (INB) is compiled by the Central Reference Library on the basis of publications received in the National Library, Calcutta, under the Delivery of Books (Public Libraries) Act (DB Act) of 1954/1956. The bibliography covers publications in 14 major languages of India. The entries are transliterated into Roman script with appropriate diacritical marks. Initially INB started as a quarterly and since January, 1984 it has changed into a monthly publication.

Table 2 shows a declining trend in the total number of publications received under the DB Act. While there is no reason to believe that the number of publications being brought out in India has indeed been going down; perhaps, lack of seriousness in implementing the DB Act would explain the situation. In any case, it may be presumed that coverage of INB is of the order of 15,000 per year.

Table 2 Publications Received under DB Act at National Library*

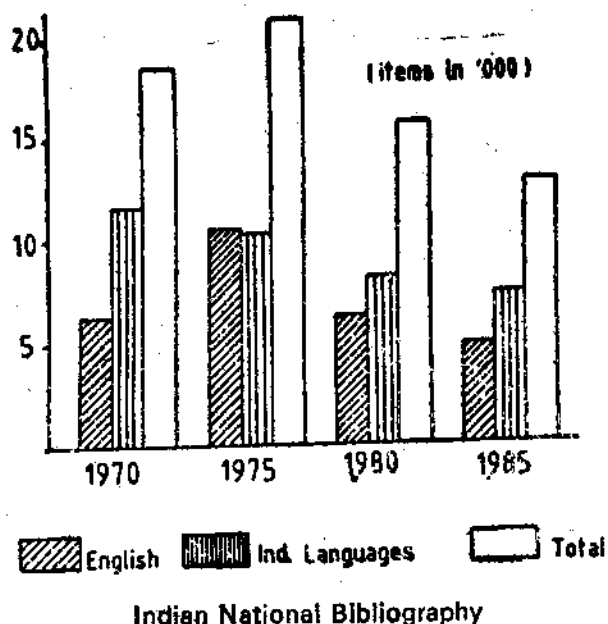
| Year | English | Indian languages | Total |
|-------|---------|------------------|--------|
| 70-71 | 6,210 | 12,095 | 18,305 |
| 75-76 | 11,020 | 10,937 | 21,957 |
| 80-81 | 7,655 | 9,513 | 17,168 |
| 84-85 | 5,560 | 8,642 | 14,202 |

* Presumably also covered by INB.

On top of the incomplete coverage, printing problems have resulted in accumulation of backlog (monthly issues upto June 1987 have been published and the cumulated annual volume 1980-81 is in press). The most disappointing feature is that computer application is nowhere in sight for a major national activity like the INB.

1.1.3 National Union Catalogue of Scientific Serials in India

The National Union Catalogue of Scientific Serials in India (NUCSSI) produced by the INSDOC contains holdings data relating to 35,000 titles of which 18,000 are current (and 2,300 are of Indian origin). The catalogue also brings out the fact



that 70 per cent of total serials acquisition is in English which indirectly indicates that Indian S & T community cannot derive benefits from the knowledge contained in non-English literature.

This massive data though computer processed, is still not in a database form. In collaboration with the National Information System for Science & Technology (NISSAT), INSDOC would convert the files into a database for custom search, and preparation of sectoral, subject or city-wise catalogues. The current list would also be reduced to PC level. Besides, the project envisages annual updation of information in respect of about 100 selected resource institutions, with a five year cycle for the baseline adjustment (the present database is updated upto the year 1983). Experiments are currently underway to install the NUCSSI database on Indian networks for online search as a part of the larger concept of as S & T Referral System.

Efforts are also being made to prepare catalogues on specific type of materials for example, cover-to-cover translated periodicals (Indian Scientific Translator's Association, INSDOC and NISSAT) and indexing and abstracting periodicals (NISSAT).

1.1.4 National Citation Index

Bibliometric studies for evaluating research outputs have generated considerable interests in S & T community in India and the Science Citation Index (SCI) is now widely used for such studies. However as SCI covers only 18 Indian periodicals and cross-citations among Indian literature get totally overlooked, such exercises may lead to

under-evaluation of the Indian S & T contributions. In order to supplement the SCI database, preparation of a National Citation Index (a project of NISSAT at INSDOC) has been conceived of at the National Centre on Bibliometrics (NCB). The NCB, possibly in collaboration with Defence Scientific Information & Documentation Centre (DESIDOC) and Indian Council of Medical Research (ICMR), would now prepare the database initially with a set of about 300 Indian journal titles.

1.1.5 Union Catalogue of Social Science Periodicals

The National Social Science Documentation Centre (NASSDOC) of the Indian Council of Social Science Research (ICSSR) has prepared a union catalogue for Delhi which lists about 7,000 periodicals in about 68 libraries. NASSDOC plans to cover the country through a series of such city-wise, state-wise or geographic region-wise catalogues. Catalogues of serial titles other than periodicals would also follow.

1.2 Indigenous Databases on Narrow Subject Areas

1.2.1 Secondary Publications in India

A search conducted on Ulrich on CD-ROM (courtesy American Centre Library, New Delhi) for Indian Indexing and Abstracting periodicals and bibliographies resulted in 172 hits out of which 147 were identified as 'active'. S & T materials (59), social sciences (45), and general bibliographic materials, trade catalogues, and newspaper indexes (32) constitute the bulk of the total. However, only 45 of these could be termed as pure abstracting and 19 as indexing periodicals.

Curiously, only 31 of these are commercial efforts. This is largely due to the fact that most of the information activities in India are government-aided and conform to State's welfare objectives. Another interesting point to note is that Delhi (71) and Calcutta (29) are the major places of origin of these publications, though clustering of learned institutions is equally prominent in other A-class cities.

1.2.2 New Ventures on Indigenous Databases

Under the NISSAT programme, a major thrust was given to development of indigenous databases by the sectoral information centres set up on machine tools at the Central Machine Tools Institute (CMTI), Bangalore, leather at Central Leather Research Institute (CLRI), Madras, food at Central Food Technological Research Institute (CFTRI), Mysore, drugs and pharmaceuticals at Central Drug Research Institute (CDRI), Lucknow, textiles at Ahmedabad Textiles Industry Research Association (ATIRA), Ahmedabad, chemicals at National Chemical Laboratory (NCL), Pune and advanced ceramics at Central Glass and Ceramics

Research Institute (CGCRI), Calcutta. The objectives have been :

- to dwell on areas for which in-depth treatment is lacking in global databases. For example, realizing that the COMPENDEX does not adequately cover machine tools information, CMTI has started the creation of a bibliographical database covering periodical articles, books, reports, etc. It has now about 50,000 records, and the database is steadily growing.
- to cull out information from the existing databases, supplement these with Indian information, and create a product-specific database. For example, a product like 'leather' demands handling from multidisciplinary angles. A comprehensive database is also not available internationally. It is in this context that the Leather Science. Abstracts (LESA) endeavour in CLRI assumes greater importance.
- to create databases for areas in which local information has greater importance over the international information. For example, there is no dearth of databases on textiles. However, these are heavily oriented towards machine handling of cotton, its derivatives and synthetics. Whereas, in the Indian context, the handloom sector has overwhelming importance. Besides, natural fibres like jute tend to get overlooked in international databases. The rationale behind the initiative on textiles database at ATIRA is, therefore, obvious.

Apart from the database efforts promoted by NISSAT, several institutions have made independent efforts to organize databases in their respective areas of interest. For example, the National Institute of Science, Technology and Development Studies (NISTADS) has developed a significant database named CLOSS (Current Literature on Science of Science) which covers Indian literature on S & T policy studies including foundation aspects, S & T resources and practices, implementation and monitoring aspects. As on date, this database has about 10,000 records dating back from 1972. Another NISTADS database covers science policy literature appearing in Indian journals, by Indians in foreign journals and foreigners on India; so far 4,000 abstracts have been collated. Similarly, about 14,000 records have been organized as a part of Science and Technology Archival Resources (STAR) project of NISTADS.

6 The Medicinal and Aromatic Plants Abstracts (MAPA) was started by the Publications and Information Directorate (PID) of the Council of Scientific and Industrial Research (CSIR) in 1979 as the co-product of information collected for the compilation of the Wealth of India series. Most of the papers were abstracted from journals (272 in 1979 increasing to 600 in 1988) and Conference Proceedings. Similarly, the Data and Information Centre at the National Institute of Oceanography (NIO), Goa has been generating a

bibliographic database OCEANLINE with its Tandy TRS-80. The database has over 15,000 items and is steadily growing at the rate of 4,500 records per year. SUCHAK is a computerised database on MINISIS software, covering over 400 Indian and foreign journals in English, Hindi, Marathi and Gujarati. Generated at the Shreemati Nathibai Damodar Thackersey (SNDT) Women's University Library and Information Centre, Bombay, SUCHAK covers journals, theses, dissertations, conference papers, books, etc.

1.2.3 Survey Databases

India has gone a long way in preparing directory or registry type of databases. In most cases, the initiatives were taken by individual institutions. The INSDOC, for example, has brought out directories of scientific institutions and directories of data centres. Professional associations of library and information sciences have been collating national and regional directories of libraries and library professionals. The Environmental Information System (ENVIS) published a compilation of non-governmental organizations active in the field of environment. Similarly, NISSAT made a compilation of testing facilities in India.

One area which has attracted a lot of interest is the preparation of registry type databases on on-going research. INSDOC has been compiling such information for projects in CSIR. NISSAT once collaborated with INSDOC for an all India coverage. However, such compilations were brought out in printed form. Only now, under the new scheme of National Management Information System for Science and Technology (NMIS), an attempt would be made to organize a continually updated computerized databases of research projects with inputs provided by agencies responsible for supporting such activities. Equipment, S & T manpower and externally supported projects, etc. would be the other areas of concentration of NMIS. Similarly, expert manpower registers have been created by organizations like the CSIR, and Biotechnology Information System (BTIS).

With all such ready-made databases available, it is now time to visualize development of an online information referral system linking databases on institutions, experts, equipment, facilities, research projects, library specializations, union catalogues and the like.

1.3 Problems of Database Development

The growth path of development of the data bases mentioned by way of examples above and the problems faced by these are similar. These are:

1.3.1 Technology and Compatibility

The databases initially employed manual methods. After several years of operation, the activities adopted computer-based methods. A

few graduated through word processing files. Often, such change-overs have been mechanical amounting to literal translation of manual methods. As a result, the power that computer application could offer was not realized. Besides in all cases, computerized activities started with a huge legacy of manual data files the physical transfer of which could not be easily accomplished.

1.3.2 Standardization

The institutions evolved their own record formats without consulting their counterparts in this country or abroad. International Standards were not used and therefore, all these databases may need conversion. Though belatedly the Bureau of Indian Standards came up with a standard specification IS : 11370-1985 : Guidelines for Data Elements and Record Format for Computer Based Bibliographical Databases for Bibliographic Description of Different Kinds of Documents. This standard, however, requires immediate revision. In fact, a NISSAT exercise is currently underway to develop the INDIMARC, based on the framework prescribed in the Common Communication Format of UNESCO.

1.3.3 Vocabulary Control

In most cases, the development of database did not utilize controlled vocabulary. The use of SPINES thesaurus by CLOSS is an exception. In many cases, standard thesaurii did not exist for use in narrow subject areas. It is in this context, that the efforts made by CLRI and CMTI in constructing specialized thesaurii on leather and machine tools respectively, should be specially recognized. In other cases, like the one on food sciences, CFTRI had to supplement the international thesaurus with locally used or locally recognized terms.

1.3.4 Software Standardization

The software for database development and for subsequent information retrieval needs to be standardized. The early starters, like the CFTRI, have based their operation on higher level languages running on an obsolete 16-bit machine and non-standard Operating System. A few organizations, like the PID, have a package like MINISIS.

The situation, however, has changed with the advent of CDS/ISIS Mini/Micro version. The package has been put to a variety of applications. NISSAT which is the official distributor of the package in India has organized about 35 training courses in various parts of the country thereby exposing about 700 information professionals to this package. The success (if the transfer of the package to 250 institutions till date is any indication) is primarily attributable to the fact that it runs on any IBM compatible PC XT/AT in MS-DOS environment which is within the reach of many information centres. It is also available to

all non-commercial applications free of charge. This *de facto* software standard for bibliographic applications, despite all its limitations, would gain further strength once the Version 2 (with the facility of window for use of programming languages like PASCAL) is released, the VAX version is fully tested, and new versions for UNIX and local area network (LAN) environment are developed

1.3.5 Software Marketing

Most of the database activities were initiated by the institutions through impulses primarily with the objective of organizing their own information set up and to cater to their own captive clientele. A vision that these could have international users as well did not exist. If it did, we would not have got into an imbroglio typified by non-standard formats, vocabulary and software.

The need of the hour is to generate confidence among the information professionals that a developing country like India could also contribute to the database world on terms equal to those prevalent in the database market of the developed countries. This would be easy through demonstration of a success. Recognizing this, NISSAT intends to adopt areas like machine tools, leather and tea and nurture these to the level of commercialization at international level in the form of hard copies, magnetic media and CD-ROM, and installation of these databases on online search systems operated by major database vendors.

2. USE OF COMMERCIALY AVAILABLE INTERNATIONAL DATABASES

The demand for import of international S & T databases has grown commensurate with enormous efforts that India is making in various fields of science and technology. The dimensions of the situation would be clear from following :

2.1 Databases in Hard Copy Form

Precise statistics may not be necessary to establish the fact that India would rank high among the third world countries in the use of S & T databases in hard copy form. Table 3 gives some extracts from NUCSSI in respect of distribution of selected secondary serials in India. Though the numbers are high, the situation is far from comfortable. Historically, the growth of S & T institutions in India clustered in a few cities like Delhi, Bombay, Madras, Calcutta, Bangalore and Hyderabad. No wonder subscriptions to IA serials also show concentrations in pockets. However, there is sufficient scope for rationalizing such acquisitions. For example, three institutions, namely, Publications and Information Directorate (PID) and National Physical Laboratory (both belong to CSIR family) and Indian Agriculture Research Institute (IARI), which share common boundary walls, subscribe to Chemical Abstracts. Howsoever important this might be for the users in the three institutions,

Table 3 Description of Selected Secondary Serials in Libraries in India*

| S. No. | Titles | North | West | South | East | Central | North-East | Total |
|--------|---|------------|------------|------------|------------|-----------|------------|------------|
| 1. | Agrindex | 8 | 3 | 6 | 3 | 0 | 1 | 21 |
| 2. | Bibliography of Agriculture | 4 | 2 | 4 | 1 | 0 | 0 | 11 |
| 3. | Biological Abstracts | 26 | 20 | 27 | 18 | 3 | 2 | 96 |
| 4. | Chemical Abstracts | 25 | 30 | 29 | 18 | 3 | 2 | 107 |
| 5. | Current Contents : Agriculture, Biology and Environmental Sciences | 15 | 9 | 21 | 5 | 0 | 1 | 51 |
| | Current Contents : Engineering Technology and Applied Sciences | 13 | 16 | 19 | 3 | 0 | 0 | 41 |
| | Current Contents : Life Sciences | 20 | 25 | 23 | 12 | 1 | 2 | 83 |
| | Current Contents : Physical, Chemical and Earth Sciences | 16 | 7 | 21 | 5 | 0 | 1 | 50 |
| 6. | Engineering Index | 16 | 6 | 12 | 8 | 1 | 0 | 43 |
| 7. | Index Medicus | 22 | 16 | 8 | 10 | 0 | 0 | 56 |
| 8. | Science Abstracts Sec. A : Physics | 14 | 17 | 22 | 13 | 3 | 0 | 69 |
| | Science Abstracts Sec. B : Electrical & Electronics | 16 | 12 | 19 | 6 | 0 | 1 | 54 |
| | TOTAL | 195 | 153 | 211 | 102 | 11 | 10 | 682 |

* Covered by NUCSSI-INSDOC.

Source : Arora, Ramesh, Study on Coverage and Distribution of Important Abstracting and Indexing Serials in India, NUCSSI analytical study series No. 1 (INSDOC, New Delhi), 1988. (Unpublished report)

expenditure to the tune of US\$ 11,000 for each subscription defies all logic, the more so because the libraries are finding it difficult to maintain even the current level of subscription due to diminishing budget provisions and galloping prices.

The user scientists ought to be a little pragmatic and should restrain avoidable demands. Looking from the other side, the libraries should closely monitor (which they do not do now) the use rate or use habits of expensive materials and take bold decisions. A consultative mechanism like the one being initiated by NISSAT this year, may be set up in each S & T cluster to facilitate the exchange of notes by library operatives, thereby, promoting resource sharing.

2.2 Databases on Magnetic Media

India started handling databases on magnetic media way back in 1978, but the technology is yet to take roots. At that time, INSDOC initiated SDI services as a NISSAT project on Chemical Abstracts (CA) and INSPEC databases using CAN/SDI software and the IBM 370 system of IIT, Madras. About 300 profiles were being served at no cost to users. Once a token price was introduced, the demand for services slumped. It is difficult to imagine that individual scientists

or their host institutions did not have the capacity-to-pay for the services. Apart from commonly cited financial reasons (from users point of view), other problems could be :

- * The services might not have been good enough both in terms of quality and timelines for the price a user was to pay;
- * The control population served might not have been truly representative, though the databases utilized in the experiment probably have the broadest user base; and
- * The services might not have been marketed aggressively.

The last factor would perhaps explain the poor usage of SDI.

In 1983, the University Grants Commission (UGC) set up the National Centre for Science Information (NCSI) at the Indian Institute of Science, Bangalore. The NCSI provides SDI services based on CA, INSPEC, BIOSIS, GEOREF and MATHFILE primarily to users in universities. Table 4 summarises the status of NCSI activities. The services have not been priced so far.

**Table 4 Status of SDI Services
Rendered by NCSI**

| Database | Commencement of service | No. of users (1988) |
|----------|-------------------------|---------------------|
| INSPEC | 1984 | 822 |
| BIOSIS | 1985 | 2325 |
| GEOREF | 1985 | 369 |
| MATHFILE | 1986 | 391 |
| CA | 1987 | 438 |

Similarly the R & D Centre on Iron & Steel (RDCIS) of Steel Authority of India Limited (SAIL) has been running an information retrieval service based on METADEX and MATERIALS BUSINESS FILE databases since 1980 and 1986 respectively, using indigenous software. This includes about 300 SDI users' profiles mainly from SAIL units.

In pursuance of a Memorandum of Understanding signed between the National Informatics Centre (NIC) and National Library of Medicine, USA in 1987, the NIC-ICMR Centre on Biomedicals was set up for implementation of the MEDLARS database programme in India. Subsequently, POPLINE service was also established. The centre provides SDI as well as custom search services free of charge. The growth in demand for these services has been encouraging.

2.3 Databases on CD-ROM

In spite of certain inherent limitations like single user environment, non-availability of juke box type facility and retrievals constrained by throughput of personal computers, databases on CD-ROM have very significant use potential in a developing country like India for the following considerations:

- * The telecommunication system is far from reliable. This constrains the development of online systems involving huge databases and query retrieval traffic. CD-ROM offers the possibility of installation of databases at user sites obviating the need for communication over long distances.
- * The CD-ROM databases come with retrieval package.
- * Use of CD-ROM requires inexpensive hardware such as CD-drive. PC as a processor is also within the reach of many information centres.

Besides, the usual advantages of CD-ROM also apply to Indian environment.

The technology is yet to be widely used. One reason for this could be the lack of appreciation of its power or it might be the hesitation to invest in a technological option which is yet to stabilize in

the world market. Further, the drive and databases which need to be imported involve payment of exorbitant customs duty. The most important reason could perhaps be that, apart from a few databases like MEDLARS and NTIS, those presently available on CD-ROM do not have definite user clientele in the country.

The situation may change substantially in the near future. INSDOC has started subscribing to Science Citation Index (SCI) on CD-ROM since 1988. The National Institute of Oceanography (NIO) has received AQUATIC SCIENCES AND FISHERIES ABSTRACTS database on CD-ROM under a UNESCO project. NIC-ICMR Centre on Biomedicals is getting MEDLARS, Cancer CD, OSHROM, CHEMBANK, COMPUINFO and POPLINE on CD-ROM. More will follow. In order to support the trend, NISSAT established a CD-ROM Information Centre at the National Aeronautical Laboratory (NAL), Bangalore in 1988. The Centre would provide information on hardware and their suppliers, reference tools and databases available on CD-ROM and technology trends, and guide Indian users in adopting the technology. This Centre will also be getting LISA on CD-ROM.

2.4 Hard Databases

This account will not be complete without reference to the generation of services based on hard databases. Under NISSAT programme, the Madras University is subscribing to the Cambridge Crystallographic Databank on magnetic tape and operating search services in batch mode. The centre is likely to add databases on inorganic crystals, powder diffraction infrared and nuclear magnetic resonance (NMR) spectroscopy.

Under the Biotechnology Information System (BTIS), the Centre for Cellular and Molecular Biology (CCMB), Hyderabad is getting nucleic acid sequence data from EMBL, Heidelberg, protein sequence data from NBRF, USA and from EMBL, and protein crystal structure data from Brookhaven National Laboratory, USA. The National Institute of Immunology (NII), New Delhi is a node of Hybridoma databank and the Institute of Microbial Technology (IMT), Chandigarh is a collection Centre for MSDN of CODATA. Several other hard databases on culture collection of microorganisms, enzymes and enzyme engineering, amino acid sequences, immunocloning, vectors, etc. are being acquired under BTIS.

2.5 Issues on Utilization of Commercial Databases

It may be noted that the computer based database services provided by NCSI, RDCIS or NIC-ICMR have all been free of cost. Their success can only be judged when the users continue to subscribe to the services on payment basis.

The use of databases on magnetic media is constrained by the Indian customs regulations.

First of all, import of recorded magnetic media attracts about 200 per cent duty. Even if one is prepared to pay customs duty, getting each update tape cleared is difficult and the delay involved defeats the very purpose for which the databases are being brought in. As payment in hard currency is time consuming, it is desirable that the database producers/vendors set up local supply outlets as a promotional measure.

The contribution of India to international science and technology has been significant, yet periodical publications in India have not improved either qualitatively or quantitatively. Indian literature is also not adequately covered by the international database producers. For example, SCI covers only 18 Indian journals. Such low recognition of publications in Indian journals forces the Indian scientists to publish in foreign journals, whereas India then needs to subscribe to the primary and secondary journals also to bring back the information generated within the country. While India may indeed strive to improve upon its publications, the international database producers may be urged to take an objective view of the coverage of material published in a third world country like India.

3. INDIA'S PARTICIPATION IN INTERNATIONAL DATABASE DEVELOPMENT ACTIVITIES

India has all along been a keen participant in international initiatives, especially those promoted by the UN System. Besides being active in promoting the UNISIST/ASTINFO concepts in the information area, India's role has been significant in INFOTERRA/UNEP, AGRIS/FAO, INIS/IAEA and APINMAP/UNESCO. India has also been active in networks like TIPS and database ventures like FSTA. In all such cases, India gets the international compilation free in lieu of inputs provided by the country. Before the implications of such participation are discussed, it would be in order to dwell briefly on three international activities by way of samples.

3.1 AGRIS

The Agricultural Research Information Centre (ARIC) of Indian Council of Agricultural Research (ICAR) has been the national input centre for AGRIS. During 1975-84, ARIC contributed about 30,000 items from about 100 core periodicals to an international total of 1.1 million items, i.e., 2.7 per cent (cp 20 per cent from all developing countries put together). ARIC has been using B 4700 for more than 200 SDI profiles (free of cost) and also providing retrospective search services on request. A separate compilation of Indian inputs for 1975-84 period has been published as Indian National Agricultural Bibliography.

3.2 INIS

In 1970, the Bhabha Atomic Research Centre (BARC), Bombay started INIS operations in India. Initially the inputs were sent in worksheets, and now these are being sent in optical character recognition mode. Though about 1,500-1,800 documents per year on nuclear science and related areas originate from India, as much as 65 per cent is published abroad. Therefore, in terms of numbers, the items provided by the Indian Centre will continue to be of a low order. During the period 1970-82, India provided about 11,000 items out of a world total of 7,15,000. The size of user community is limited, yet about 250 SDI profiles and about 500 queries are being served through IRIS-80 and MISTRAL software.

3.3 FSTA

The collaboration between the International Food Information Service (IFIS), U.K. and the Central Food Technological and Research Institute (CFTRI), Mysore is one of the success stories of participation of an Indian institution in an international venture namely, compilation of the FSTA database. As per the agreement, CFTRI scans about 50 Indian periodicals and transmits twice a month (about 400 items annually) to the database. The numbers may appear to be small compared to the coverage of about 1,500 periodicals and 18,000 items by FSTA. However, the collaboration resulted in an increase of FSTA coverage of Indian materials from 35 periodicals to 50. The time lag between publication of the primary material and its appearance in the abstract form in FSTA was reduced from 4-28 months in pre-collaboration period to 5-14 months in the post-collaboration period.

3.4 Implications of Participation in International Ventures

International collaborations help both the database generators and input providers in the following way :

3.4.1 Benefits Accrued to Database Generators

- * Decentralization of input preparation reduces the lead time between primary publications and production of IA materials (for example, FSTA).
- * It helps in overcoming the local language barriers and also in understanding the concepts which may be local in nature (for example, AGRIS, INIS, etc.).
- * It obviates the need to build up primary collections and required infrastructure for abstracting, indexing and computer handling at the central processing unit (for example, INIS, AGRIS, etc.).
- * It promotes better dissemination of information at the local level (for example, INIS).

3.4.2 Benefits Accrued to Input Suppliers

- * The involvement in international ventures helps in standardizing the data compilation efforts at the local level (for example, AGRIS).
- * Such collaborations may also involve transfer of software for input preparation, local processing and information retrieval and related information technology (for example, INFOTERRA and INIS).
- * Acquisition of international compilation in lieu of inputs implies savings of cash expenditure more often in terms of hard currency (for example, FSTA).
- * Association with international activities may eventually lead to development of comprehensive information system at the local level (for example, the Indian National Focal point for INFOTERRA piloted the establishment of ENVIS).

It is therefore, desirable, that potential Indian database producers seek involvement in international activities more actively. From the few samples of collaboration so far, one could conclude that adequate skills exist in India to undertake such tasks in terms equal to their counterparts in the developed countries.

4. ONLINE ACCESS TO REMOTE DATA CENTRES

It would not be economically viable and operationally feasible to get all required databases on magnetic or optical media in the country. At the same time, it is necessary to bring up information support services to scientists and technologists in India at par with those available to their country counterparts in developed countries. Therefore, the user community in India would need facilities on permanent basis to access datacentres like DIALOG, ESA and ORBIT.

4.1 ESA Experiments

In Bombay (1976) and once again in New Delhi and Bangalore in 1981, NISSAT arranged short-time demonstration of access to the databases of ESA system at Frascati.

Another experiment was conducted by NAL-NISSAT in 1979-80 to make use of the ESA/IRS facilities offline from Bangalore to Paris and online from Paris to Frascati. The search results were received at Bangalore offline. NAL had worked out a similar arrangement with IRS DIALTECH for offline searches during 1982-86. Besides NAL, several other institutions like NCL, Pune, Regional Research Laboratory, Trivandrum, DESIDOC, Delhi had been using normal telex lines to access systems like DIALOG and STN. A private enterprise in Bangalore, Informatics (India) Pvt. Ltd. has also been providing search services based on DIALOG.

Subsequently, in June 1986, NAL with support from a host of agencies like NISSAT, Defence Research and Development Organization (DRDO), CSIR, Aeronautical Development Agency (ADA) and UNESCO had set up a 2400 bps dedicated communication link from NAL to Bombay over the national microwave circuit and from Bombay to Rome via INTELSAT. The average connect time per day was 2.25 hours under conditions of no line breaks. About 520 queries from about 40 organizations were handled against payment. Out of 36 databases used one time or the other, demand on NTIS (315), COMPENDEX (313), INSPEC (105), CHEMABS (80) and METADEX (32) ranked the highest. The facility was discontinued in March 1988.

4.2 Concept Test-cum-Feasibility Study on Online Services

At the instance of NISSAT, the Society for Development Alternatives, New Delhi conducted a study on market for online services in Delhi region. Some of the findings were revealing. Only 25 per cent of controlled population were aware of databases (unaided response). Senior academics who had used such facilities abroad had some knowledge of the subject. However, the concept of computerized databases when explained evoked significant interest to the extent that as many as 70 per cent of respondents intended to use such facilities atleast once in 1-2 weeks.

Similarly, only a few had had any exposure to online services. About 40 per cent indicated that they would utilize such facilities once a month; the curious point to note was that as many as 35 per cent were non-committal. The population was also non-committal about the order of payment they could make for such services. On the other hand, professionals like lawyers were receptive to the idea but they wanted services based on Indian databases.

The study recommended that initially the costs to users are to be kept very low and the services are to be targetted to academic and R & D community only.

4.3 NISSAT's Regional Access Centres : NACID

Since the cost of a dedicated international telecommunication line is exorbitantly high (about Rs. 2.5 million per annum), NISSAT decided to adopt dial-up mode. As per the scheme, five NISSAT Access Centres to International Datacentres (NACID) are being set up at INSDOC, New Delhi; NCL, Pune; NAL, Bangalore; CLRI, Madras; and Indian Association for Cultivation of Science (IACS), Calcutta. The NACIDs would use normal PSTN lines with ISD facility or go through INDONET of Computer Maintenance Corporation Limited (CMC), Hyderabad and the international gateway set up by Videsh Sanchar

Nigam Limited at Bombay thereby availing of the packet-switching facility. The centres would have telex lines with message communication terminals (MCT) as standby.

The NACIDs are expected to serve the regional community of users. These centres would have appropriately trained intermediaries to assist the users at site or to conduct searches for absentee users. During the initial stages, NACID will recover only the database and computer costs (about one third of total cost of a search) from users; NISSAT would absorb costs of communication and hits. To start with, NACIDs may access DIALOG, but eventually passwords from other services will be taken. Besides retrospective custom searches, the centres would be expected to provide SDI services also on such databases for which the demand is not sufficient to justify their installation on Indian networks

5. NETWORKS AND THEIR DEVELOPMENTS

The telecommunications scene in India is expected to change radically in the near future. Exercises have been undertaken to evolve systems that would offer voice, data and video services through a mix of satellite links, microwave links and fibre optic cables in high capacity range, and satellite links, coaxial cables, radio links and wire lines in low capacity range.

5.1 National Telecom Mission

To stimulate the change, a National Telecom Mission has been conceived with following objectives :

- * To improve overall telecom availability, reliability and services of the present network using existing resources, marginal investments, improved productivity and improved customer interface;
- * To provide basic satisfactory telecom (voice and non-voice) services nationwide to government, business institutions, urban, sub-urban and rural areas;
- * To integrate overall telecom development with other national modernisation programmes;
- * To build necessary infrastructure for a single national telematics network to incorporate needs for voice/data of all other sectors of the economy;
- * To digitalise India's telecom network for future ISDN services with digital switching, digital transmission, voice/data/ISDN, CCITT 7 Signalling;
- * To automate and offer new enhanced voice and data services nationwide like: call waiting, automatic ring back, voice mail, teleconferencing, data communications, electronic mail/

facsimile, videotex/teletext and mobile telephones;

- * To reduce lost/mishandled/cross-connect calls;
- * To improve international telecom equipment and services;
- * To provide direct dialling to all major cities and other countries from villages; and
- * To increase public education participation and awareness related to telecom developments and its role in the national building process.

Given that the future telecom scenario will be dominated by computers and microprocessors, several long-range initiatives have been taken by various organizations. These may be classified into three categories :

General network service facilities : NICNET, INDONET, VIKRAM

Specialized networks : CALIBNET, DELNET, INFLIBNET, ERNET, VIDYANET, BTISNET

Specialized networks carrying by : SAILNET, BANKNET, COALNET, and large business data/information RAILNET, TOURNET, etc.

Keeping in view the thrust of this paper on bibliographic and S & T information, the last category of networks will not be discussed.

5.2 General Data/Information Network Services

5.2.1 NICNET

The development of the network was piloted by the National Informatics Centre, Planning Commission, Government of India. The primary objective of the network is to provide computing and communication infrastructure to aid planning and monitoring of schemes and decision-making activities in the government.

In the first phase, NICNET comprised intra city network connecting computers and interactive terminals with a Cyber 170/730 system. The facilities that such a network could offer were demonstrated during the Asian Games 1982, and the Non-Aligned Meet (NAM), New Delhi, 1984.

In the second phase, NICNET acquired four NEC-1000 systems for its Headquarters at New Delhi, and regional centres at Pune, Hyderabad and Bhubaneswar. Super mini ND-550, minis, super micros and LAN clusters are being installed in state capitals (about 25 have been installed so far). The state capitals will be connected with the IBM PC/AT compatible systems of respective district headquarters (so far equipment have been put in place at about 350 locations).

The network would apply spread spectrum multiple access technique and use C-200 series micro earth stations installed in all state and district centres (model C-201 transmitting at 9600 bps and receiving at 1200 bps and model C-250 transmitting at 9600 bps and receiving upto 9600 bps) with master earth station equatorial MC-200 located in New Delhi.

Presently, one satellite channel links the master and micro earth stations. Low cost and high speed terrestrial links are used for local distribution. A distributed Database Management System (DBMS) is being implemented on the network to provide a uniform DBMS environment for the network users.

Eventually the network would facilitate flow of information among the four national/regional nodes, 32 state/union territory nodes and 439 district nodes.

5.2.2 INDONET

INDONET is the first commercial computer network being evolved by the CMC Limited, Hyderabad. In its first phase, the network consists of three IBM 4361 computers at Calcutta, Bombay and Madras, PDP 11/44 at Delhi and ROB 1055 at Hyderabad with access points in the cities of Bangalore, Ahmedabad and Pune. The network has adopted IBM's Systems Network Architecture and uses dedicated lines of 2400/4800 bps. For intra-city communication, data transmission speed of 1200 bps is possible.

In its second phase, the number of INDONET centres is expected to grow to 100 by the year 1990. It would operate as a STAR Network with control point at Delhi, using rooftop 3 m earth stations and packet-switching technology for routing of data from central station to other INDONET centres. At this stage, the transmission speed would be 84 k bps. Besides the IBM protocol, the network will also utilize X. 25. For intra-city transmission, a novel cost-effective, reliable and faster (9600 bps) digital packet radio scheme has been innovated. The Bombay node of INDONET has been connected to the international gateway of Videsh Sanchar Nigam Limited, thereby facilitating entry to Public Data Networks of other countries.

5.2.3 VIKRAM

VIKRAM is the packet-switched public data network under development by the Department of Telecommunications. Initially, the network would consist of 8 switching nodes and 12 remote access points with its Network Management Centre at Delhi. While nodes in the four metros, namely, Calcutta, Bombay, Delhi and Madras will mesh at 64,000 bps, the other nodes and access points will be connected in 9600 bps. The interface standards of the network will be based on X. 3, X. 25, X. 28, X. 29, X. 32 and X. 75 CCITT

recommendations. Some experiments have already been undertaken in the cities/towns where VIKRAM centres are located.

5.3 Bibliographic Applications on General Data Networks

All the three general data networks have taken interest in bibliographic applications. As mentioned earlier, NIC has tied up with ICMR to offer services on MEDLARS databases and several others on CD-ROM. NISSAT is working with NICNET to mount Chemical Abstracts database on NICNET.

Both NICNET and INDONET have undertaken exercises to put the NUCSSI database online. In yet another venture, INDONET is collaborating with INSDOC and the NISSAT centre at CMTI, Bangalore to create facilities for SDI and retrospective search services on COMPENDEX. Besides providing communication facilities for the NACIDs INDONET may eventually acquire one large enough computer system to run a few oft-used commercial databases. In comparison, though VIKRAM is yet to make a beginning, it has already offered its infrastructure to NISSAT for pilot experimentation on library networking.

However, the basic differences in the utilization pattern envisaged for the three networks—NICNET, INDONET and VIKRAM—need to be understood.

- While NICNET is a network being evolved solely for government users, the other two would be open for use by the public (including government users).
- The statement made above, needs to be clarified a little further. In India, R & D in science and technology is largely supported by government Rs. 25,475 million out of a total Rs. 28,656 million). So if the concept is stretched a little, most of the active S & T workers (231,000 out of total 241,000) would qualify to participate in NICNET. Thus preferences for terminal locations are presently given to 'pure' governmental bodies barring a few exceptional cases of CSRI institutions. Therefore, bibliographic databases, if created on NICNET, will not be accessible by users in private enterprises and a majority of public enterprises.
- NICNET has been created specially to cater to management information systems required by government. That means, it will primarily carry numeric/hard information. Introduction of textual/bibliographic information traffic on the network will constrain network functions. In the beginning, when management information traffic is yet to grow, bibliographic applications may be welcome, but the situation would eventually be reversed.
- A significant proportion of NICNET traffic and residents would be of sensitive nature, whereas

by and large bibliographic information is in public domain.

- Since user institutions in India occur in clusters in major cities/towns, provision of access by any of the three networks will not pose a problem.
- 'Cost' would essentially be the major factor in network utilization. In NICNET the entire lot of equipment is owned by NIC and placed at customers premises at NIC's cost. The costs of connect time is also subsidized. In comparison, the INDONET costs are likely to be higher.

5.4 Specialised Information Networks

5.4.1 BTISNET

The Department of Biotechnology, Government of India, is setting up 10 specialized information centres in genetic engineering-cell culture and virology, plant tissue culture, photosynthesis and plant molecular biology, oncogenes, reproduction physiology, cell transformation, nucleic acid and protein sequences, immunology and bio-process engineering. The Micro VAX-II computers of these 10 centres will be linked through micro earth stations using X.25 protocol. So far, 23 user centres have been identified. These would have PC/AT systems linked to the principal nodes. The entire system would piggy-back on NICNET to take advantage of its communication facilities and computing power.

5.4.2 CALIBNET and DELNET

NISSAT took the initiative for the development of these networks to ensure better utilisation of S & T information resources through resource sharing, to moderate functional load of information centre management and to take care of motivational factors to a large extent by better means of communication. The CMC Limited has completed the feasibility study for the CALIBNET.

CALIBNET is envisaged as a metropolitan network linking some 38 libraries in Calcutta metropolitan area. The applications to be supported are: electronic mail, file transfer, remote log-on and database and documents access.

Within individual libraries, the functions to be automated are cataloguing, serials control, acquisition and fund accounting, circulation and local user services. The networking provides for global user services of current awareness, SDI, union catalogues, partial databases, and access to national and international networks.

Each participant would collect, process and hold information on local computers, connected with one another through X.25 packet-switched network. One of the network participants would host global user service and also act as the

network control centre. Standardization may be based on UNIX operating system.

Implementation is divided into two phases. In the first phase, all institutions within the Jadavpur University Cluster and some nodes of Razabazar Cluster such as the Department of Radio Physics, Bose Institute and Saha Institute of Nuclear Physics have been included. In the second phase, the other libraries, such as the Ballygunge Science College, Medical libraries, National Library and ISI would be brought in. March 1990 has been set as the target date for the full operation of first phase.

On similar lines, the establishment of DELNET has been conceived for about 30 libraries in Delhi. A feasibility study is currently underway.

5.4.3 CSIRNET

CSIR is planning to set up a computer communication network (CSIRNET) for exchange of information among its 40 odd laboratories. A feasibility study for the CSIRNET undertaken by the National Centre for Software Technology (NCST), Bombay would be completed by mid-1989 so that the project could be taken up in the Eighth Plan (1990-95).

CSIRNET would help in organising indigenous online database services on such subjects as leather technology, food technology, natural products, chemistry, radio physics and medicinal plants. It would provide bulletin board and set up teleconferencing facilities through the network apart from facilitating flow of routine administrative and financial information and exchange of library resources. Apart from accessing international databases through NACIDs, efforts are also under way to develop databases on the expertise and sophisticated instruments available in various CSIR units which would be of interest to users outside it also.

5.4.4 DESINET

DESISET is a proposed bibliographic information network for Defence, covering only unclassified and technical information. The users of DESISET would be scientific, research and defence personnel from the Department of Defence, Department of Defence R & D, and Department of Defence Production and Supplies.

The Defence bibliographic information network would also have close links with other similar networks like NICNET for exchange of information on mutually agreed terms.

DESIDOC would take the initiative in planning and implementing the DESISET as a partially distributed network.

5.4.5 ERNET

ERNET is a computer network for academic and research community in India. Starting with 8 leading institutions—the IITs (5), IISc, NCST and

DOE, ERNET aims to reach hundreds of academic/research institutions covering a number of scientific and engineering disciplines. Campus-wide LANs (conforming to IEEE 802.3 standards) are presently being set up and a backbone satellite-based wide area networks (WAN) is now to be implemented.

Communication services offered would include electronic mail, file transfer, remote log-on, database access and bulletin board. Access protocol for WAN would be X.25 and with other networks through X.75 protocol. It would be implemented in 4 years with UNDP support.

5.4.6 INFLIBNET

INFLIBNET is a major national effort to improve capability in information transfer and access, as support to scholarship, learning, research and academic pursuits. It would link up institutions of higher learning covering all disciplines, R & D institutions and national organisations like CSIR, ICAR, DRDO, ICMR, ICSSR, etc.

It would be a multiple function/service network in the sense that it will also offer catalogue-based services, database services, document supply services, collection development and communication-based services.

There will be a national centre for managing, overseeing and coordinating the network administration and four regional centres which will maintain regional union catalogues apart from databases on projects, institutions and specialists.

At the sectoral level, UGC's Information Centres and NISSAT Sectoral Centres or those performing national level functions/services in specific subjects/disciplines/missions would be included. End-users will be served locally through college/departmental/university or R & D institutional information centres. In all, there will be 150 University libraries, 50 post-graduate centres/autonomous colleges, and 200 libraries of R & D institutions/centres of national importance outside the University system.

INFLIBNET proposes a hybrid version of satellite and terrestrial network communication system with a STAR configuration for interconnectivity of the nodes. Inbound carrier to the central hub would be through satellite and use the 'slotted alcha' technique; while outbound carrier from the central hub to the nodes would use satellite and time division multiple access (TDMA). Interconnecting nodes in a city, if there are a number of them is through a LAN. The networking protocol for INFLIBNET would be similar to the HDLC protocols.

The INFLIBNET project is proposed to be taken up during the Eighth Five Year Plan (1990-95).

5.4.7 VIDYANET

VIDYANET is proposed as a dedicated communication/computer network to meet the needs of scientists and research workers in the laboratories/institutions of excellence in the

country. Expected to be fully operational in three years, the first phase of VIDYANET would link up about 10 institutions such as—All India Institute of Medical Sciences, Indian Agricultural Research Institute, Indian Institute of Technology (IIT), Indian Statistical Institute, and National Physical Laboratory in New Delhi and Bhaba Atomic Research Centre, Indian Institute of Geomagnetism IIT, National Centre for Software Technology, and Tata Institute of Fundamental Research in Bombay. Subsequent phases of networking would cover leading institutions in Ahmedabad, Bangalore, Bhopal, Calcutta and Madras.

It aims to link up institutional computers (Cyber, VAX, DEC, etc.) via telecommunication lines and provide its users facilities like transfer of files of any type—data, programs and documents, electronic mail, exchange of immediate messages, access to remote applications, databases and libraries.

A major VIDYANET objective is to stimulate cooperative research, day-to-day exchange of research information and the execution of joint projects and publications. It also intends to allow users to develop databases on specialized areas like biotechnology, superconductivity and supernova research.

Besides, VIDYANET aims at providing rapid means of communication by linking computers at various institutes in India with similar networks like EARN (European Academic Research Network, Geneva) and BITNET through a gateway.

5.5 Status of Specialized Networks

The network descriptions given above evidently deal with only their development plans; the potential for their successful implementation is a matter of conjecture. The one point which must be emphasized is that it is not the information specialists who have been involved in network planning and organization in selfish interests; it is the user community represented by the S & T workers, R & D managers and development planners who have taken active interest in conceiving these networks.)

CONCLUSION

Information infrastructure in India has not grown to the extent desirable. Several third world countries which not match evenly with India's efforts in knowledge pursuits, also realized the benefits of information technology revolution. Whereas Indian institutions have displayed a tendency to cling to conventional or traditional methods of dealing with 'information', even though the expertise to adapt, adopt and absorb modern information technology is not lacking. Only if the user institutions could agree on a common programme of action, the goals having been already well-defined, the scenario could change for the better. The information professionals may also need to break away from approaches given in the text books that rarely

undergo revision. Meanwhile, the few islands of excellence that exist may eventually set the pace for further advancement.)

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NISSAT in 1988-89 : Impressive Gains

The sectoral information centres of National Information System for Science and Technology (NISSAT) helped provide a variety of useful services for industry and R & D institutions during 1988-89. Nationwide programmes on online and SDI services, networking and manpower development, to mention a

Committed to the promotion and development of a compatible set of information systems on S & T and interlinking, these into a network, NISSAT has established the following eight sectoral centres :

- i) Leather Technology : Central Leather Research Institute, Madras. (NICLAI)
- ii) Food Technology : Central Food Technological Research Institute, Mysore (NICFOS)
- iii) Machine Tools : Central Machine Tools Institute, Bangalore (NICMAP)
- iv) Drugs and Pharmaceuticals : Central Drugs Research Institute, Lucknow (NICDAP)
- v) Textiles and Allied subjects (NICTAS) : Ahmedabad Textile Industry's Research Association, Ahmedabad
- vi) Chemicals : National Chemical Laboratory, Pune (NICHEM)
- vii) Bibliometrics (NCB) : Indian National Scientific Documentation Centre, New Delhi
- viii) Compact-Disk : National Aeronautical Laboratory, Bangalore (NIC OCD)

The sectoral centres were built around the existing information resources and facilities. They were, however, furnished with a wide range of documents, sophisticated equipment and manpower so that they could provide information services on a national scale. They maintain an extensive collection of published and unpublished documents in the form of books, periodicals, research reports, development and trade reports etc., pertaining to the relevant subject areas. Regular monthly technical publications from these centres include current Indian literature, patents highlights and industry highlights in respective sectors and also semitechnical and popular ones in the form of digests.

few, charted a course for new professional dynamism under the able leadership of the Chairman of the NISSAT Advisory Committee. Infused with a new vibrancy and vigour, the Organization is now poised to meet the challenges of the nineties - Highlights.

The sectoral centres have created and are maintaining several databases to cater to different information requirements of their clientele. For example, NICMAP maintains Bibliographical Database, Patent Database, World Machine Tool Statistics, Indian Machine Tool Production Statistics Database & Import/Export Statistics Database. NIC OCD has library and information Science Abstracts (LISA) database on CD-ROM.

Services being provided by these centres also include document supply, preparation of special bibliographies, patents search, reprography and micrography and industrial enquiry services.

New Sectoral Centres : NCB & NIC OCD

Bibliometric studies for evaluating research/ outputs have generated considerable interests in science and technology community in India and the Science Citation Index (SCI) is now widely used for such studies. However as SCI covers only 18 Indian periodicals and cross-citations in Indian literature get totally overlooked, such exercises may lead to undervaluation of the Indian S & T contributions. In order to supplement SCI database, preparation of a National Citation Index has been conceived at the National Centre on Bibliometrics, a project of NISSAT located at INSDOC. The NCB, possibly in collaboration with Defence Scientific Information and Documentation Centre (DESIDOC) and Indian Council of Medical Research (ICMR), would now prepare the database initially with a set of about 300 Indian journal titles.

In spite of certain inherent limitations like single user environment, non-availability of juke-box type facility and retrievals constrained by throughput of personal computers, databases on CD-ROM have very significant use potential in a developing country like India on following considerations :

- The telecommunication system is far from reliable. This constrains the development of online systems involving huge databases and query retrieval traffic. CD-ROM offers the

possibility of installation of databases at user sites obviating the need for communication over long distances.

- The CD-ROM databases come with retrieval package.
- Use of CD-ROM requires inexpensive hardware such as CD drive. PC as a processor is also within the reach of many information centres.

In order to support this trend, NISSAT established a CD-ROM Information Centre at the National Aeronautical Laboratory (NAL), Bangalore in 1988. The Centre would provide information on hardware and their suppliers, reference tools and databases coming on CD-ROM and technology trends, and guide Indian users in adopting the technology. This Centre will also be getting LISA on CD-ROM.

During the year, actions were taken to adopt one more subjects namely, an Information Centre on Tea which would be designed in the pattern of existing sectoral information centres.

Information Analysis and Data Centres

a) Existing Hard Data Centre

Information analysis centres and data centres have been planned under NISSAT scheme for undertaking the task of acquiring, evaluating, integrating, condensing analysing factual and numeric information in contrast to a sectoral centre which is expected to provide mainly bibliographic support in response to a query.

The first data centre on crystallography was established at the Madras University. This is formally known as National Information Centre for Crystallography (NICRYS). The centre obtains global information on organic and organometallic compounds compiled and collated at Cambridge on magnetic tapes and generates services for the national community of users.

Protein crystallographic structural data, Nucleic acid sequence data (Genbank) are also currently available at the centre.

18 For expanding activities of this centre, UGC also agreed to provide complementary support. NISSAT, UGC and Madras University would share the cost equally.

b) New Hard Data Centres: NICAC

A National Information Centre on Advanced Ceramics (NICAC) established in Central Glass and Ceramics Research Institute (CGCRI), Calcutta with the following main objectives:

- To prepare and maintain a computerised database on superconducting ceramics high-tech ceramics, optical materials, ceramic composites, etc.
- To establish linkages with data centres on ceramics and related subjects world wide.
- To generate and provide information services on the subject etc.

Efforts are being made to establish another data centre on Bio-Materials at Sri Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

National Union Catalogue of Scientific Serials in India (NUCSSI)

In view of the importance of the NUCSSI as an access tool to support various information programmes, NISSAT has incorporated a plan of action with regard to updating and maintenance of NUCSSI database. The NUCSSI data will be converted into a database form so as to make it appropriate for on-line search. Production of secondary databases, namely holdings of libraries in specific regions, institutions, subject area, etc. would be made available on floppies for use through PC/AT/XT. It is proposed to load NUCSSI database on INDONET, NICNET etc. for on-line search and retrieval. Efforts are also being made to prepare catalogues on specific type of materials such as cover to-cover translated periodicals and indexing and abstracting periodicals.

Online and SDI Services

In order to bring the information support services available to the scientists and technologists in India at par with those available to their counterparts in the developed countries, NISSAT has taken up the establishment of online search facilities on a regular basis in the country. The following five regional access centres (NACID) are engaged in establishing the facilities:

| | |
|-----------|--|
| New Delhi | Indian National Scientific Documentation Centre (INSDOC) |
| Pune | National Chemical Laboratory (NCL) |
| Bangalore | National Aeronautical Laboratory (NAL) |
| Madras | Central Leather Research Institute (CLRI) |
| Calcutta | Indian Association for Cultivation of Science (IACS) |

These centres will be linked with International Data Centres through INDONET and NICNET facilities. Since establishment of the International Gateway (IGF) in Bombay is delayed, an interim

arrangement has been made to start the activities. However, the infrastructure created for the purpose would allow smooth switch over to INDONET, NICNET and IGF when established. At a meeting of the experts of NACID Centres, alternative technologies were considered for interim arrangement. It was finally decided to use a normal telephone line with ISTD facilities (PSTN) with telex as standby. The hands-on practice and training for the operational staff of these NACIDs was held during October 7-15, 1988. The NACIDs are expected to serve the regional community of users.

The service will be expensive from user's point of view. In order to understand their capacity to pay for information and the demand for various databases NISSAT undertook in collaboration with the Society for Development Alternatives, a study on "Market Feasibility-cum-Concept Test on On line Data Base Services". The study was conducted in Delhi. Based on the experience, a more comprehensive will be launched in Bangalore around the NAL facility. During the initial stages, NACID will recover only the database and computer costs about one third of total cost of a search) from users; NISSAT would absorb costs of communication and hits. The Centres will also provide SDI services on such databases for which the demand is not sufficient to justify their installation on Indian Networks.

Efforts are underway also to install oft-used databases on Indian networks. One such experiment with Chem Abstracts (CA) has been taken up with NIC.

Library Networking

NISSAT has taken the initiative for the development of these networks to ensure better utilisation of S & T information resources through resource sharing, to moderate functional load of information centre management and to take care of motivational factors to a large extent by better means of communication. The CMC Limited, Calcutta has completed the feasibility study for the CALIBNET, NISSAT. In collaboration with INSDOC, Calcutta NISSAT provided computer familiarisation for the operational staff from 20 CALIBNET participants during 5-15 December, 1988. The CALIBNET Feasibility Report is also now being referred to experts.

On similar lines, the establishment of DELNET has been conceived for about 30 libraries in Delhi. NISSAT organized a computer familiarization course for the representatives of 15 participant organizations during December 15-28, 1988. On the recommendation of an expert committee, NISSAT is now requesting CMC Limited to carry out the DELNET feasibility study.

Computer Based Bibliographic Information

The objective of modernisation of library and information services is to provide access to the world of knowledge at a reasonable cost and lead time. The application of computers and communication technologies are means to achieve this objective.

The need for computerisation is felt at all levels and in all activities. The nature of activities which demand use of computers may vary from automation of routine management function in libraries to information retrieval or analysis of global databases. Unfortunately, application of this tool is still not significant in India.

Realising this, NISSAT has accorded high priority to all aspects of computer based bibliographic information processing.

NISSAT has acquired a proven software package "ISIS—Microversion" from UNESCO Official distribution rights in India were also obtained from UNESCO. This package has already been distributed to about 250 non-profit institutions in India. Twenty seven training courses on application of this package in Indian libraries and information centres were conducted in various regions during this year.

NISSAT secretariat has now acquired the VAX version of this package which has been tested and distributed to five institutions.

In order to get a feed-back on application of the package, a User's Group meeting was organised. In this meeting it was noted that many organisations had attempted various kinds of applications of the package. However, none had really taken a total approach to library automation. NISSAT therefore, took the initiative by adopting a library for conducting an experiment on a total automated system with turnkey concept (including data capture and entry, software development, documentation etc.). In this experiment CDS/ISIS mini-micro version is being used with PASCAL for interfacing programmes.

Manpower Development

With a view to improving and updating the skills of the information professionals on a continuing basis, NISSAT has been organising short term courses regularly.

NISSAT provided support to the Documentation Research and Training Centre (DRTC), Bangalore to conduct three 6-week courses per year for 5 years on subjects like Programming with library applications, Library automation, Computerised information retrieval and Computerised vocabulary control design. These courses provide a background knowledge in library systems analysis, computer science, computer programming and in the use of software of proven

capabilities. They have conducted three courses in 1988-89.

The Indian Library Association has been conducting NISSAT workshop on computer applications to library and information activities. These are designed to be introductory courses for inservice personnel and cater primarily to computerisation of library house keeping functions though some attention is also given to creation and maintenance of bibliographic database. The intention is to sensitize the library professionals and help them to make a beginning in computerisation. ILA will organise four such regional courses in a year. Three of these courses were conducted at Madras during 1988.

The University of Poona would conduct two 2-week NISSAT courses per year for 3 years on "Computer Applications to Library and Information Centres". The objects of the course is to give librarians an understanding of the principles of computer systems; the terminology and concepts embodied in the working of these principles; and give participants practical knowledge of appropriate applications. The course will consist of three modules, namely, Basics of Information Processing, Wordstar and dBase III and Specialised packages for libraries.

Besides, 16 exclusive courses on CDS/ISIS were organized in NEHU, Shillong AGLIS, Delhi; INSDOC Delhi, INFOTEK, Madras; NISTADS, Delhi, NCL, Pune, CLRI, Madras, CDRI, Lucknow, IIC, Delhi during 1988-89.

Recognising that the skills for computer application in the library and information science environment and seriously lacking in the country, NISSAT has taken initiatives to increase the output of students from INSDOC course by augmenting the infrastructural facilities for conducting the courses. The two-fold objectives of the project are :

- to enhance facilities so that the annual output of students could be raised from existing level of 15 to 25.
- to run eight short-term courses of 4 weeks duration during 1987-90 on subjects like Library automation, Information storage and retrieval, Management information systems in information institutions, DBMS, etc.

During this year INSDOC would conduct two courses : 9th January—3rd February 1989 and 13th March—7th April 89.

NISSAT has also initiated action on the generation of "INDIMARC"—an implementation manual for Common Communication Format, UNESCO. This manual would aid the professionals to create machine readable bibliographic records. The manual would also help standardisation of

MARC records generated or proposed to be generated by several participant organisations in NISSAT's intra-city networks.

Studies, Directories

NISSAT in its Seventh plan projections, has a major programme of promoting and supporting basic and applied research in information science. It is to take up initiatives for conducting studies and evolving methodologies/tools/informations science as a subject for granting research fellowships and this is an incentive.

Consolidation and repackaging of information is being considered an important activity of information centres. This is especially so with the advent of on line information systems when traditional services based on indexing and abstracting may not be relevant and appropriate. Moreover the abundance of information now available through different channels needs to be repacked for practical application and problem solving functions. In view of this, information systems and services are being reorganized and reoriented to meet the challenges of information market in the developing countries. With a view to suggesting corrective measures and future actions for better management of information resources, and facilities, a study has been taken-up.

Languages using Devanagri (Sanskrit) script are increasingly being used for literary, scientific and technical and office communication. The need to adopt CDS/ISIS to handle Devanagri script therefore, arose. A project has been launched to adopt the CDS/ISIS micro version through a software and/or hardware route.

Marketing of information products and services is a burning topic of discussion in developing countries today. The volume of literature increases both in the printed and non-print media, but there is not much efforts to promote such products amongst the users effectively. A study on the "marketability" aspect of information is thus necessary to reveal certain aspects of special significance in the economics of information generation *vis-a-vis* their utilisation. NISSAT initiated a study : "The Marketability of Information Products in India". This study is expected to be completed soon.

Publications of NISSAT

- (i) *On line Services—A concept test-cum-Feasibility Study*

Online services which offer computerised access to databases are widely used in western countries. This type of services is yet to make a significant impact in developing countries. To determine the acceptability of this service by potential users, NISSAT commissioned the Society for Development Alternatives (SDA) to carry out a market

survey. The report has been printed for distribution and a summary has appeared in *NISSAT Newsletter*.

(ii) *Rationalising Serial Holdings in Special Libraries*

In the past two decades, the cost of maintaining a library has increased many fold. The cost of publications has been escalating steeply. This combined with the budget restrictions has resulted in the need to examine critically periodical collections in many libraries. NISSAT promoted this study to develop a methodology which can be used to rationalise periodical holdings in special libraries. This manual has also been published.

(iii) *Storage and Preservation of Microforms*

Advancing frontiers of knowledge and developments made in developing techniques, information storage and retrieval methods and mechanised automatic data processing systems have led to the introduction of a variety of microforms, such as microfilm microfiche etc. which are being used by the libraries and archives. The increasing volume and value of microfilm records in libraries, archives, information centres, govt. offices etc. has focused attention on the need for devising means for extending the life of such records to the maximum possible extent. Keeping this in view, NISSAT commissioned Micrographic Congress of India to prepare a manual on Storage and Preservation of Microforms. This manual has been published this year.

(iv) *Union Catalogue of Cover-to-Cover Translated Periodicals*

Cover-to-cover translation of non-English periodicals is an important tool to keep the English-dependent scientists abreast of the latest development in various areas of S & T in the non-English world. Keeping this in view, the task of compiling this catalogue was entrusted by NISSAT to Indian Scientific Translators in India. This catalogue would serve as an aid to Indian scientists to have first-hand information about the availability of cover-to-cover translated periodicals in India. It will help science libraries in formulating a well defined policy for rational acquisition distribution and maximised use of expensive periodicals. NISSAT has published this compilation for distribution.

(v) *Machine Translation : Systems, Methodologies and Industrial Strategies*

The demand for translation of S & T literature from foreign languages to English is growing rapidly. The growth of foreign

literature in non-English speaking world is also phenomenal. In India, translation among 15 languages has been increasing for national integration, cultural exchanges etc.

In the recent years, the technology of computer assisted translation has made considerable headway worldwide. For a start in India, NISSAT with the help of NISTADS completed a state-of-art report on the technology, multidisciplinary expertise required in computer science, linguistics, phonetics and translation.

International Activities

The activities of ASTINFO (Regional Network for the Exchange of Information and Experiences in Asia and the Pacific) of UNESCO are closely coordinated with those of NISSAT. The NISSAT Advisory Committee also functions as the National Advisory Committee of UNISIST and the National Advisory Group for ASTINFO. The activities under ASTINFO are as follows :

a) The Regional node as well as the national node of APINMAP have been located at Publication and Information Directorate, New Delhi. For preparation of a database on medicinal and aromatic plants, a HP 3000 system has been provided by ASTINFO. To coordinate the flow of input from various research laboratories in the country, a national committee has been constituted

b) The on-line access facility to ESA/IRS from National Aeronautical Laboratory, Bangalore, for which UNESCO provided terminal hardware and initial training of project staff by specialists from ESA, was formally closed on March 31, 1988.

c) The project on augmentation of capacities for computer applications in S & T information handling in INSDOC, New Delhi has finally materialised. A MICROVAX system has been received from UNESCO.

d) Considerable progress has been made on the project for the development of the bibliographic information system at National Institute of Oceanography, Goa. A micro computer has been delivered, two-years subscription to the ASPA database on CD-ROM including rental of CD-ROM reader has been taken and NIO staff trained.

e) The UNESCO project on information consolidation for Bio-gas at Tata Energy Research Institute (TERI), New Delhi was completed. A video presentation titled "Towards Progress" along with the biogas manual for plant owners and also a manual for extension were prepared.

f) A five day course on Information consolidation was held in Hyderabad in March, 1988. This was attended by 18 library and information professionals from Bangladesh, Indonesia, Malaysia, Philippines, Sri Lanka and India. The course was jointly sponsored by UNESCO and NISSAT. The topics included technical writing and editing, consolidation products, information analysis for decision support systems, packaging for mass media planning and management of IC units, IC products and services for small scale industries etc.

g) A UNESCO participation programme proposal for conducting training in India on VAX and mainframe versions of CDS/ISIS has been approved.

h) As part of the international programme on Chemical Information Network (ChIN), NCI Pune would prepare a chemical reactions database. In this context, a study team from India visited various facilities available in Europe.

i) Under a UNESCO programme NISSAT provided resource persons for the conduct of a sub-regional workshop on marketing of information products and services in the Research Centre on Applied Science and Technology, Tribhuvan

University, Kathmandu and also for the preparation of a project report on International system in Nepal.

NISSAT has now been approached by UNESCO to prepare a standard course material for training of information scientists on marketing concepts.

Newsletter

In cooperation with the Society for Information Science (SIS), NISSAT has taken up the publication of NISSAT Newsletter during this financial year. This collaboration is an expression of the sincerity behind NISSAT's intention to mobilize the technical expertise available with professional bodies for implementation of the programme. The *Newsletter* covers wide ranging issues relating to information and the development of information networks and centres. Individuals and professional bodies are invited to contribute features and news items on new concepts and services. Reports on events like seminars and training courses, new products like directories and status of information systems—at both national and international levels would be welcome. All the four issues of this quarterly were published in time in the calendar year 1988. The present circulation list includes over 3000 institutions and individuals.

Robots That Can See

British Aerospace Sowerby Research Centre, Bristol, is leading an eight-member European consortium whose objective is to construct a tool for developing advanced computer vision systems, or "robots that can see", to automate manufacturing and quality control processes.

The £12-million project has been granted EEC funding under the ESPRIT initiative, of which Sowerby Research Centre is receiving £800,000 to cover work over the next five years to develop prototype inspection systems for applications such as integrated circuit inspection or three-dimensional component assembly. The funding will provide the consortium with 128 man-years of effort on the project known as VIDIMUS (Vision System Development Environment for Industrial Applications).

In recent years interest has been growing in the use of advanced computer vision systems for industrial inspection; however, current systems have to be specially built for each particular manufacturing process or product, and changes in their operating environment seriously affect their efficiency.

In operation the consortiums system will take pictures of the object to be inspected using a TV camera, then analyse the picture using a method known as image processing and identify features such as the edges of the object, its colour and surface quality. When the edges have been found, the dimensions of the object can be calculated and checked against the dimensions of a reference object stored in the memory of the computer controlling the robot. Similarly the surface quality and colour can be checked and faulty objects can be rejected and sent for detailed and more time-consuming human inspection.

APINMAP Management Board Urges Need for Information Products

The Network Centre for APINMAP located at AIBA, Laguna (Philippines) was the venue of the second meeting of the Management Board of Asia and Pacific Information Network on Medicinal and Aromatic Plants held during 3-7 April, 1989. The Board's first meeting was held two years ago (July 1987) at Bangkok, the Secretariat of the Network.

Eleven member countries including India participated in the Laguna meeting which emphasised the need for producing information products for different user groups, creation of factual and numerical databases and decision support systems. India was represented by Shri H.C. Jain, Head, Technical Information Services Division, PID (CSIR) and Editor, MAPA.

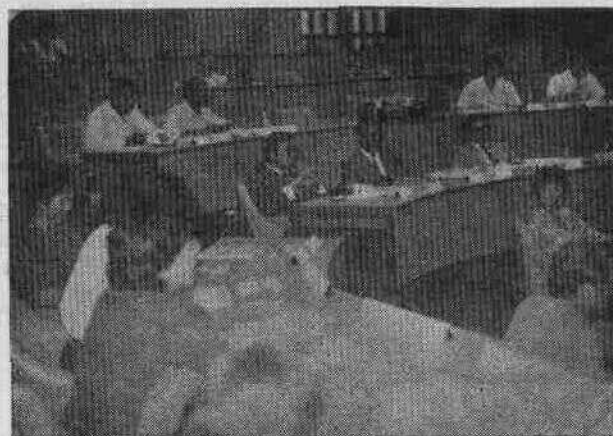
The progress of work since the last meeting was reviewed by Ms Josephine C. Sison, Project Officer of AIBA and Coordinator for APINMAP Network Centre, while delivering the inaugural address. Among the noteworthy accomplishments mention was made of revision of preliminary standards, training programmes conducted in information management and creation of the integrated database comprising bibliographic and referral databases.

On behalf of Unesco, Ms Delia E. Torrijos, Regional Advisor for PGI, suggested APINMAP's close collaboration with various existing information services and networks in related areas such as NAPRALERT and PROSEA. She said that attention should be given to production of Information products and factual and numerical databases.

Prof. Kamchorn Manunapichu, Secretary General of APINMAP Secretariat in his remarks outlined the activities of the Network and expressed concern over the problems being faced by national nodes for lack of personnel, facilities and funds faced by national nodes.

Country Report

Presenting the Country report on behalf of India, Shri H.C. Jain talked about the methodology followed by PID for data collection input preparation using the standard format and some problem areas encountered by the national node, namely,



APINMAP Board in Session. India's Shri H.C. Jain is at left corner, third row from the back.



Board Members' Group Photo

PID. He suggested development of an APINMAP Thesaurus, creation of a factual database and establishment of linkages with other international databases.

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Shri Jain also underlined the problem of inadequacy of the present Computer system (HP 3000/37) installed at PID for database creation and simultaneous creation of hard copy of MAPA (*Medicinal and Aromatic Plants Abstracts*).

(Continued on page 25)

Recent Publications

Publishers are invited to send to the Editor for review and noticing their new publications on information industry and technology, librarianship, documentation, archival science, micrography

Development of an Information and Library Network : Report of the Inter-Agency Working Group : University Grants Commission, New Delhi xxxii + 474 pages. 1988.

The publication is the result of several months of deliberations to give shape to a project proposal for the creation and development of an information and library network (INFLIBNET) by an inter agency working group set up by UGC. The project is slated for implementation during the Eighth Five Year Plan (1990-1995).

The project is viewed as a national effort to improve capability of information transfer and access in order to provide support to research and academic pursuits. Participants in the project will include institutions of higher learning, R & D organizations like CSIR, ICAR, DRDO, ICMR, ICSSR, DAE, DOT, etc. In effect, it is a major programme aimed at modernising libraries and information centres in the country applying computer and communication technologies. The services proposed include catalogue based services, database services and document supply and communication based services.

In regard to standardization, it is envisaged that INFLIBNET will have its own standards. Situations like this can lead to multiplicity of standards which, in fact, is the very anti thesis of standardization and must be guarded against. There is a national standards body functioning in the country for 42 years. Why then duplicate its work by setting up a parallel standards setup?

The Govt. of India is to provide funds to the INFLIBNET Society to establish and run the network. The total cost of implementing the network in the first four years is estimated at Rs. 15068 lakhs (why not give the figure in millions/crores of rupees?).

A section on abbreviations used in the Report is certainly helpful though there are some omissions and inaccuracies.

The implementation of the Report, as scheduled would no doubt be looked forward to with keen interest by academics and researchers in as much as INFLIBNET holds the promise of 'instant contact' for academic dialogue with counter parts in any part of the country.

and reprography, information systems and services, science communication, printing and publishing (including electronic publishing, computer hardware and software, etc.)

Annual Review of Information Science and Technology. 380 pages. Elsevier Science Publishing Co., New York.

The 23rd edition of ARIST, the *Annual Review of Information Science and technology*, published in 1988, examines critical developments in basic techniques and technologies, applications of technology, and the planning of information systems. Published by Elsevier on behalf of the American Society for Information Science (ASIS), ARIST provides timely coverage of, among other topics : information marketing for libraries; optical disks and CD-ROM; publishing and access; quality control in online databases; psychometric measurement and information retrieval; office automation, and information and information technology management.

Glossary of Library and Information Science Terms, (English to Bengali) by S/Sh. B K. Sen, S B. Roy and A. Poddar, Calcutta, Bengal Library Association, 1988, xxvi+106 p. Rs. 25.00.

The Bengal Library Association was started in 1925, and its mouthpiece "Granthagar" in 1951. *Granthagar*, ever since its establishment, has been a Bengali periodical on library science and a dynamic vehicle for the communication of ideas on the subject in Bengali. Over the years, this periodical has played an important role in the generation and nurturing of terms on library science. The Association started a certificate course in 1934, and library science books in Bengali started appearing since 1950s. More than a dozen books on various branches on library science are now available in Bengali. Teaching of library science in Bengali is thus gradually gaining ground.

For the writing of books in modern Indian languages, terminology poses a big problem. Sometimes terms created by someone are not readily available; a number of terms are created for a single concept and terms created are sometimes not apt. To minimise these difficulties, an attempt has been made to compile a glossary.

While compiling the glossary, care has been taken to collect terms on the subject as comprehensively as possible. Apart from library and information science, subjects terms from computer science, reprography, binding, printing, etc. have also been included selectively. The

number of terms thus covered has gone beyond 4,000. Gleaning of Bengali equivalents from books, periodicals dictionaries, etc. has been a tough job. New terms in Bengali have been created where none were available.

The manuscript was scrutinised by a Committee formed by the Bengal Library Association. Many valuable suggestions of the Committee have been incorporated to give the glossary the final shape.

Amongst Indian languages, this glossary may be considered as a pioneering attempt on the subject, since the available glossaries are not comparable to this as far as comprehensiveness and coverage are concerned. Even the existing glossaries in European languages are not so comprehensive as this one.

Indian Standard Guide for Drafting and Presentation of Indian Standards 1988 Bureau of Indian Standards, New Delhi. Price 65.

This Guide just published (IS 12 : 1988) is the revised version of the one originally issued in 1949 for the guidance of Sectional Committees, Subcommittees, Panels and staff of BIS entrusted with the task of drafting, editing, and publishing Indian Standards, technical reports and other publications. It was subsequently revised in 1958 and 1964.

The present revision has been taken up in order to update the guide in the light of experience gained in its use in the last 24 years and to align it with the latest practices being followed in the field at the international level and in many other countries. Guidelines for presentation of Indian Standards adopted from the International Standards have also been included in this revision.

This standard has been divided into the following two parts :

Part 1 Drafting and editorial practice

Part 2 Adoption of International Standards in Indian Standards

The contents of Part 1 have been divided into the following two sections :

Section 1 General guidance on drafting

Section 2 Editorial and typographical style

The *Guide* has served as a very useful ready reference book for many years not only for those entrusted with drafting, editing and publishing Indian Standards but also for many others concerned with copy editing and publishing in general. The revised version is no doubt more comprehensive in scope and content though there still are a number of omissions and errors in respect of language and style. Nevertheless, the *Guide* offers valuable guidance on a large number of small details which make for saving of time, help ensure uniformity, consistency and clarity of expression.

Banana in India, CFTRI Mysore, Rs. 30

The Central Food Technological Research Institute, Mysore, has just published a Monograph entitled "*Banana in India—Production, Preservation, Processing*". This industrial monograph contains information on production propagation, harvesting, yield, chemical composition and post-harvest technologies for handling, transportation, storage, ripening, marketing and export. The processed products covered include banana pulp, fig, liquid fruit, juice concentrate, toffee, deep fat fried chips, powder, fruit bar, squash and brandy. Brief notes on physiological disorders and suggestions to minimise losses in marketing channels add further to the usefulness of the publication.

For copies, please write to the Sales and Distribution Officer, FOSTIS, CFTRI, Mysore-570013.

APINMAP Board—Continued from page 23

Taking note of this Unesco has agreed to release USD 8000 for the purchase of a microcomputer in January 1990 for enhancement of the system.

Plan of Action

The Board agreed that double density diskettes will be used for data exchange. The Board also agreed that in early 1990, the Network Centre

will publish the merged national databases containing data from 1987 to 1989; a directory of research institutions, information centres, researchers and research projects covered during 1987—

Broad policies on the provision of information services to users were also drawn up.

News and Events

Standardization in Information Technology : Hyderabad Colloquium

A Colloquium on standardization in information technology was organized by the Bureau of Indian Standards at Hyderabad last April in collaboration with STQC Directorate (DOE). Experts from agencies in the telecom, data communication and computer sectors attended the conference to discuss problems and prospects for standards in these fields.

Shri U. Venkateswarlu, Chairman and managing director of A.P. Electronics Corporation Ltd, the Principal speaker, pointed out that of the 1073 standards that BIS had published in the area of electronics and telecommunications, over 600 related to components. Though a worthy effort; it was hardly representative of the directions that the industry was now taking.

Shri M. Mukutmoni, STQC DG revealed that BIS and STQC had jointly brought out a set of specifications for personal computer products and were about to launch a certification scheme for PC manufacture in the country. In another project sponsored by DST, NCST, CMC and Tata R & D Centre had evolved a standard for Computers in power management.

STQC was forging ahead with its task of establishing a nationwide chain of testing and standards laboratories. Two interesting software packages planned around Unix based 32-bit computer systems had been developed: a Computer-aided laboratory management package, "CALM", for jobs like equipment maintenance and repair scheduling, financial planning, work scheduling, equipment procurement monitoring and cost-revenue analysis for marketing. The software was already said to be available at selected STQC labs nationwide.

ISO to Decide on Adoption of Fortran 88.

One of the important decisions which the next meeting of ISO working Group scheduled in June 1989 is expected to take is approval of the new standard on Fortran—Fortran 88. The meeting is to be held at Ispra (Italy).

According to Prof. H.N. Mahabala (IIT, Madras) Fortran 88 was fully compatible with Fortran 77; had features of Pascal and Ada and matched the latter in scientific computation. Its formal acceptance as the new standard would prove beneficial to Indian software effort. "We should begin work on developing production compilers for the new Fortran so as to promote our export of engineering and scientific software".

Prof. Mahabala feels that it is important for India to participate in the June meet because there is a strong lobby from the advanced countries which is might thwart acceptance of Fortran 88. These are the manufacturers of proprietary "third party" front end software for Fortran whose business is threatened if the new Fortran is too "comprehensive". Hence the attempts to keep out of the new Fortran features like multiprocessing, precision specification and

variable length string manipulation. Specifically such efforts seek to water down the new Fortran's facilities for parallel processing applications.

C-DAC Centre in Bangalore

After Pune, Bangalore is the first stop for the Centre for Development of Advanced Computing (C-DAC), where it has finally begun operations. Though presently it is functioning from BEL's new Central Research Laboratory (CRL), the Centre will shift to a new building with a total carpet area of about 20,000 sqft.

The Bangalore centre is part of C-DAC's ambitious mission to design, develop and deliver a supercomputer by mid-1991. While its main centre at Pune will handle the hardware and applications development part of the project, Bangalore will take care of software development. It will also act as an advanced computing research facility for C-DAC.

The contribution of Bangalore centre towards the super-computer project will be in the area of operating systems development, compilers, languages and tools. Advanced research will also be carried out in algorithms languages and tools. Some of the applications targeted are oil reservoir modelling for ONGC, image processing and remote sensing for NRSA, seismic data processing, etc. When fully functional, C-DAC Bangalore will have 10 Sun workstations, several VAX systems, superminis and vector processing machine.

Workshop on Information Consolidation

A two-week Workshop on information consolidation was organized in Calcutta during 3-15 April, 1989 by Indian Association for Special Libraries and Information Centres (IASLIC). Nine participants attended the workshop which was co-sponsored by NISSAT, New Delhi.

The workshop was inaugurated by Professor R. C. Poddar, former Vice-Chancellor of Calcutta University and a Member of Parliament. Col. D. Lahiri, Director of National Institute of Homoeopathy presided over the inaugural function.

The participants were given an extensive exposure on the methodology of information, consolidation and various tools and technologies involved in the process like study of subjects, information analysis, indexing and abstracting, technical writing, visual communication techniques, packaging for mass media, etc. and also the marketing of information products and services. Several case studies were presented and demonstrated. There were also practical sessions for the participants to design information consolidation products. The Workshop was conducted by Dr. G. Bhattacharya, Dr. S. Seetharama and Shri N.K. Gopalakrishnan as resource persons.

At the conclusion of the workshop, a round table discussion was held, presided by Prof. Prabir Roychowdhury of Jadavpur University, wherein the participants gave a brief presentation of their assignments and a evaluation of the workshop, followed by a lively discussion. The valedictory session was chaired by Professor Sankar Sen, Vice-Chancellor, Jadavpur University and President, IASLIC, who applauded the efforts of IASLIC in organising such

specialised training courses. He gave away the certificates to the participants. The annual special lecture of IASLIC was also delivered on this occasion, by Professor S.K. Roy, Department of Radiophysics and Electronics, University of Calcutta. The theme was "Electronics and Telecommunication for Networking of Information Systems". Shri S.M. Kulkarni, Vice-President, IASLIC proposed a vote of thanks.

International Food Aid Information System

The World Food Programme (WFP) is developing an International Food Aid Information System (INTERFAIS) as a network for information sharing, linking all organizations and services interested in food aid operations and statistics. Its main purposes are :

to provide a central depository of information on all food aid pledges and shipments, port and internal transport capacities, and opportunities for local purchases and triangular transactions, in order to help donors, recipient governments, WFP units and the Global Information and Early Warning System of the Food and Agriculture Organization of the United Nations (FAO) in monitoring food aid supply and in planning and co-ordinating food aid policies and programmes;

to combine information routinely requested from various intergovernmental organizations and committees into one consolidated database, in order to reduce the time and costs incurred by aid administrations in reporting on their food aid programmes;

to develop, promote and maintain the use of uniform data collection and reporting formats, procedures, and codes and classifications, in order to improve the timeliness, accuracy and consistency of data and their overall utility for food aid management

Closely linked to the Programme's Management Information System (MIS), with which it shares the same codes and mainframe computer facilities, the system has been designed to incorporate all relevant MIS data on WFP food aid and other food aid handled by WFP. Data is automatically transferred to INTERFAIS, avoiding duplication of the data collection and entry processes.

The success of INTERFAIS, WFP expects, will rely heavily upon the voluntary co-operation of donor and recipient governments, intergovernmental organizations and Non-Governmental Organizations in providing information to the system in a timely and uniform manner.

ILO Population Packages

The International Labour Office (ILO) has produced, on diskette, two microcomputer-based software packages in connection with its training activities in the area of population, human resources and development planning.

POPULO—Population and Labour Force Projections is a population projection program which could be used in labour market analysis, and which takes the form of a Lotus 1-2-3 spreadsheet. POPULO can be used on a PC-compatible micro-computer with a minimum of 256 Kilobytes of main memory and Lotus 1-2-3 software (Version 1 or above).

TM1—Population and Development Training Module 1—is an interactive training program, designed for use in self-

study or group sessions. It examines interactions between fertility, mortality and other elements of population dynamics, on one hand, and labour force, health and education needs, on the other. TM1 runs on PC-compatible microcomputers equipped with the DOS operating system.

Compact Library on AIDS

A library of information and research on Acquired Immune Deficiency Syndrome (AIDS) has been published on compact disc by the USA-based Medical Publishing Group (MPG), the publishing division of the Massachusetts Medical Society. MPG hopes that it will be the first in a series of compact libraries of information resources on selected medical topics.

The Compact Library on AIDS, which runs on PC-compatible microcomputers, includes the following databases: the AIDS Knowledge Base, an electronic textbook written and continually updated by more than 50 physicians and other experts; the MEDLINE-AIDS subset, bibliographic references and abstracts from 3,200 international biomedical journals and full texts of original articles on AIDS from leading medical and scientific publications.

All databases are linked and fully integrated, so that users can search them simultaneously and move easily from one to another.

A subscription to the Compact Library on AIDS, which is updated on a quarterly basis, costs USD 875 within the USA, and USD 950 elsewhere. Discounts are available for orders of multiple copies. For an order form, or further details, please contact: The Medical Publishing Group, 1440 Main St., Waltham, MA 02154-1649, USA or The Medical Publishing Group, Saxon Way, Melbourn, Royston, Herts SG8 6NJ, UK.

High Density Information Storage

A British-developed electron microscope being used at Liverpool University in North-West England is offering the prospect of storing information at a density at least 1,000 times greater than in the latest computers.

The ultra-powerful field emission electron microscope, the brainchild of Professor Colin Humphreys, Professor of Materials Science and Engineering at Liverpool University, will achieve this by drilling an array of holes in a given pattern in a way similar to piano rolls storing music for a pianola.

The U.K. Science and Engineering Research Council (SERC) says in its 1987-88 annual report that this is one of a number of exciting applications for the microscope being pursued in collaboration with industry.

Scientists are puzzled by its mechanism of drilling. Prof. Humphreys explained: "Some materials we can drill a hole through in a thousandth of a second, other materials take a minute. It was a very unexpected discovery. We knew a very intense electron beam would drill holes in materials—but not by melting them. The material remains reasonably cool."

Of the microscope's ability to store information, the Professor said: "We can certainly store enormous quanti-

ties of information, but at the moment we would need an electron beam microscope to read the information back again. Police at New Scotland Yard in London have already contacted the Professor to ask about storing photographs, which take a lot of space.

In another demonstration of the power of the microscope, Prof. Humphreys and his colleagues have shown that it is possible to drill a million holes or write the entire contents of the 29-Volume Encyclopaedia Britannica on the head of a pin. In another exercise, the image of Marilyn Monroe was etched in dots on an area smaller than the point of a pin.

Apple Wins First Round

The Visual display infringement suit between Apple Computer Corp. and both Microsoft Corp. and Hewlett-Packard (*Nissat Newsletter*, No. 2, 1988) has gone through the first round with Apple emerging the victor. The federal judge ruled that the 1985 technology licence agreement between Apple and Microsoft covers only the 1985 version of the Windows and not the current version in use. However, the judge stated that the agreement gave Microsoft the right to use the same friendly user interface displays in its future products. Also, the ruling did not establish that Apple had any rights to the technology.

In the second round, Apple has to prove that it originated the user interface technology and that it comes under the purview of the copyright law. According to the law, basic concepts cannot be protected. Therefore, Apple cannot claim copyright infringement for the idea of picking commands from a menu or for the use of overlapping windows but what it can do is to have copyright protection for the "look and feel" of a particular menu or window. The 1985 license is still valid and now Apple can only complain about the new features in the current version of Windows.

The final result of this year-long suit will clear some doubts about copyright protection for the computer industry's intelligent property. This in return will prevent future disputes among software developers. *Computers Today*, May, 1989.

World's Smallest Two-Way Satcoms System

The world's smallest, most portable commercial satellite communications system, using low-cost earth stations small enough to be fitted to any vehicle or even carried in the hand, has just gone into service.

The first transmission was a test telex call sent from a mobile terminal, via the Inmarsat Atlantic ocean region satellite. The call was received at Inmarsat's test and demonstration ground station at British Telecom International's Goonhilly earth station complex in Western England, and relayed to Inmarsat's headquarters in London.

The new system, using Standard-C technology developed by the International Maritime Satellite Organisation (Inmarsat) at a cost of more than £5.5 million, is expected to be handling tens of thousands of messages on a daily basis worldwide within a year. Mr. Alex Da Silva, Inmarsat assistant director of operations, commented: "This marks the beginning of a new era in communications, not just for business but for consumers as well. Now anyone can send messages using satellite terminals small enough to be personal communicators."

Courses in Management Training for Librarians and Administrators

With a view to improving upon the information management capabilities of the information centre/library managers, NISSAT proposes to give significant emphasis on the conduct of short or medium term training courses on application of concepts and techniques of modern management.

A ready-made course package on the subject is however not available. Such a course is difficult to develop and conduct. The management scientists are conversant with techniques to an industrial environment, however, they may not be too familiar with organizational/functional aspects of information centre/library management. On the other hand, the majority of information/library scientists coming through a conventional university education system, do not get adequate exposure to modern management tools and techniques.

Therefore, the major tasks, if such courses were to be conducted, are to evolve course curricula, to formulate mechanisms to ensure complementarity of efforts of management specialists and practising information/library manager in the conduct of the course, to identify resource persons and resource institutions, and to formulate a specific course of action. For this purpose, a meeting of experts was organised by NISSAT. Based on the recommendations made in the meeting, the National Institute of Personnel Management, Ranchi has drawn up a tentative curriculum for a 3-week course. Now, the Institute of Public Enterprises, Hyderabad would conduct a series of four courses for practising information scientist as indicated below:

| | |
|------------|-----------------|
| Course I | 16-21 Oct, 1989 |
| Course II | 23-28 Oct, 1989 |
| Course III | 6-11 Nov, 1989 |
| Course IV | 13-18 Nov, 1989 |

For details please contact: Shri N. K. Gopalakrishnan, Course Co-ordinator, Institute of Public Enterprise, O. U. Campus, Hyderabad 500 007.

SDI and COMPENDEX

The COMPENDEX database covers more than 3500 primary sources including journals, monographs, technical reports and standards from over 40 countries. INSDOC, New Delhi has been subscribing to the monthly magnetic tapes, but services could not be generated. Under an agreement reached between NISSAT and INSDOC, INSDOC would now transfer the back tapes and subscriptions to NICMAP/CMTI. NISSAT would support database acquisition from 1988 onwards and processing charges for running the SDI services. The services will not be limited to subjects like machine tools, metal working (which are of interest to NICMAP), but would also cover the entire field of engineering. The services will be made available to all types of users academic and R & D sector, industries, consultancy groups, etc. on the basis of a fixed schedule of charges. For details contact Project Co-ordinator, NICMAP, Central Machine Tools Institute, Tumkur Road, Bangalore 560 022.

Library & Information Science Periodicals: A Study

Like in all other disciplines of science and technology, there has been a proliferation of periodical publications in the field of information science also. It is estimated that there are about 50-60 periodical publications on the subject by research institutions, professional societies and individuals. Except a few, such publications are not regular, their content, format, etc. are non-standard and possibly are not good enough to merit serious attention.

Before any step is taken to improve the situation, it is necessary to have a clear understanding of the present status sources of publications periodicity and actual accomplishments, critical analysis of contents and editorial procedure, circulation, sources of funds, etc. The problem was discussed at a meeting of professional bodies and it was decided that the responsibility be given to the Society for Information Science, the collaborator of NISSAT in the publication of NISSAT Newsletter. The study is now in progress.

Library Management Package

The KASBAH Systems Software, Madras have recently announced their library management package in three versions i.e. LIBMAN (single user package), LIBERACE (on LAN) and UNILIB (on UNIX).

LIBMAN is the basic version (single user) which supports creation and maintenance of book catalogue, membership records, periodicals databases; loan registry and fine collection; order processing; enquiries based on keys like ISBN/ISSN, accession number, title, author, subject and combinations of any of the keys above; searches by Boolean logic and generation of various reports.

LIBERACE is the multi-user library management package on a local area network (using Novell Network Adv. Ver 1.06 or above and MS/PC DOS operating System Ver 3.1 or above). UNILIB runs on UNIX and also supports card cataloging, periodicals renewal, and keyword searches. All the versions are supported by proper documentation.

Apart from being marketed in Malaysia, France, Germany etc. LIBMAN has now 3 installations — Coimbatore Institute of Technology, Kumaraguru Institute of Technology (Coimbatore) and E.M.R.C., Pune. For further details, please contact: Kasbah Systems Software No. 7, Second Street, Dr. Radhakrishnan Salai, Madras.

New Electronic OED

The second (20-volume) edition of the Oxford English Dictionary, considered by many to be the definitive authority on the English language, was completed in a staggering seven years. The key to this speed—producing its predecessor took decades—is a word which was not invented in time to be cited in the first edition computerization.

Containing, within 21,728 pages, definitions of 616,500 words and terms, the new OED is not raising eyebrows solely because of the herculean scholarship it involved. The dictionary was published using a method which may herald a revolution in the way in which it and other dictionaries are used in the future. In short, the OED now exists as a database, managed by custom-built software which can quickly and effortlessly retrieve the sort of information which would previously have taken years of painstaking labour to assemble.

The new, electronic OED illustrates some of the doors opened by electronic document storage. It also demonstrates the potential unleashed once the leap in thinking is made, and a dictionary is thought of as a database. Apart from such obvious, if esoteric, benefits as the power to produce lists of references to the Malay language, by-products such as historical dictionaries, containing only the language which would have been available to Shakespeare, move from the realm of the impracticable into that of the relatively straightforward.

Of more immediate use, perhaps, the OED database will be available at a yet unspecified date and price, in machine-readable form. A CD-ROM of the first edition, with less powerful software than that used to produce its successor, has been commercially available for the past year.

Obituary

Dr. V.N. Misra, Librarian IIT, Bombay passed away on 8 April 1989 after a brief illness. He was only 54.

A distinguished librarian and information scientist, Dr. Misra was Honorary Fellow of the Society for Information Science and took keen interest in its activities. He was also actively associated with other professional bodies such as IIA, IASLIC, IIPA, UPLA and BOSLA, to name a few. He authored about 35 papers which were presented at various conferences and seminars and were published in professional journals in India and abroad. He had thus created a niche for himself in the profession.

Dr. Misra was very popular with his colleagues and friends because of his amiable disposition and pleasant manners. His passing away is a great loss to the profession.

We extend our sincere condolences to the bereaved family.

INVENTORY OF INDIAN DATABASES

NISSAT is presently preparing an inventory of Indian databases/indexing and abstracting services. You could help us in this endeavour by providing the following information :

Your Institutional Title
and Address

Type of Institution

Name of Database

or

Title of the 18 A publication

Type of Database

Reference

Referral

Numeric/(statistical)

Factual

Subject Area

Producer/Publisher

Name & Address

Physical form :

Print

Machine readable

Condition of Access/Supply

Restricted

Fee-based

Public

Free

Content : Subject :

Coverage :

Scope :

Language :

Date of Origin

Updating Frequency

Standards followed

Input format :

Bibliographic

Software used :

Standards :

Any other information :

Please include a sample printout.

Kindly send the information in the above format at the earliest to enable us to prepare the Inventory. Communications may be addressed to Director, NISSAT (DSIR), Technology Bhawan, New Mehrauli Road, New Delhi-110016.