CHAPTER - 8

UNESCO'S CONTRIBUTION IN SOFTWARE DEVELOPMENT
FOR LIBRARY AUTOMATION

8.1: Information Technology and Its Use in Library and Documentation Centres

The major reason for getting involved in the automation of library operations is to improve the efficiency and effectiveness of library operations for library users especially when more and more information is available in a variety of formats and in a variety of places, and the need to manage information efficiently becomes critical. Information Technology in general and computers in particular have brought out a sea change in the library and information systems and services. They have helped in speeding up and precision of information collection, processing and distribution. The objective of Information Technology is to establish, create and maintain all information in machine readable form and to make major portion of its online. Viswanathan is of the view, "a number of techniques like radio, motion pictures, telecommunications, computers, optical storage technologies etc. have added strength in terms of sophistication, speed and accuracy. But to retrieve the information quickly, especially when the size of information is large, is rather difficult and time consuming. So fare there is no foolproof system to store all the information of human knowledge and retrieve the same as and when required."\(^1\)
8.2 The Growth of Library Automation during 1940 to 1990s

1940-49: Semi-mechanised application including edgenotched cards, optical coincidence (i.e. peek-a-boo-principle) etc.

1950-59: Use of punched cards, data processing equipment (like tabulators, collators, sorters), early computers and micro image searching systems. 1960-69 application of general purpose digital computers to information retrieval in an offline batch processing mode; feasibility studies of online interactive and advanced micro-image systems; experiments in library networking.

1970-79: Design of online systems and conversion of batch systems into the online mode, growth of library networks and databases.

1980-89: Intensive use of online systems, networks, mini and micro computers, optical discs, CD-ROM's, Fax etc.

1990s: Library networks expected to take firm root in developing countries like India.

As stated earlier, UNESCO as an international organisation, has played a very vital and significant role in the development of library and documentation services in the developing countries through its various programmes and policies. UNESCO also took note of the tremendous information explosion which created lot of problems in its storage, retrieval and dissemination and made special effort to overcome such problems being faced by the libraries and documentation centers. Therefore, UNESCO made several efforts in creating information technology culture in the libraries and documentation
centers in developing countries by organizing various workshops, seminars and symposiums in addition to sending technical experts to impart training to the professions working in the libraries and documentation centers. In this regard, significant developments took place which are considered to be the landmark in the history of librarianship and contributions of UNESCO in the development of libraries and documentation centers in developing countries. These are:

1. Library Network and Networking systems.
2. Development of Library Softwares
3. Development of CD-ROM databases
4. Development of Bibliographic Standards

**Library Network and Networking Systems**

Modern technology and communication networks have substantially increased the output of published works, which have created a situation where no library can receive, process or store all documents that its users require. On this aspect Cargil opines: "No library can afford to acquire even half of all published materials, both in terms of cost, and the investment in space and personnel time required to process and provide access to a burgeoning quantity of information. An average size library of a college or university may subscribe to 3,000 to 10,000 journals, a fractions of nearly 260,000 possible acquisitions."²

This phenomenon is not a recent one but has been there in varying degrees since the publishing actually began. The limitation of funds, inadequate space to accommodate new arrivals, and insufficient man
power to library staff then compelled the need for library resource sharing all over the world.

UNESCO, as an international organisation also took note of the process of change and transformation from traditional manual system to automated system to overcome the problems of information explosion, increasing cost of publications, space, standardization, professional development of the staff etc. and accepted in principles that the solution to the problems of information explosion, increasing amount for subscription to periodicals, shrinking of library budgets can best be found up to certain level in the following means:

- Use of computer and communication networks for resource sharing;
- Use of national and international databases through communications networks; and
- Introduction of full text CD-based information systems such as ADONIS and IPO for shared use; and backed fully all activities relates to above areas through its UNISIST programme established in 1971. The UNISIST report state 3:

"the trend rests upon economic forces, and appears to be universal. Basically, the increases in volume of the information units to be processed, coupled with the increase in manpower costs of processing them, is driving the sponsors and managers of information systems at all levels to examine the re-allocation of funds and resources as condition of successful adaptation of their governing responsibilities."

8.3 UNESCO Network of Associated Libraries (UNAL)
UNESCO, in early 1990, set up a Network of Associated Libraries (UNAL) with the aim of bringing together and supporting a number of libraries, preferably public libraries, from all over the world which are willing to work in association with UNESCO or through cooperative arrangements among themselves in order to:

- foster international understanding;
- promote the dialogue between cultures;
- spread knowledge of minority cultures;
- increase awareness of international issues; and
- pursue some UNESCO's main goals such as the fight against illiteracy, cultural development, promotion of human rights and peace, protection of the environment, status of women and young people to cite only some of the most important one of these goals.4

Activities within the Framework of UNAL

Activities so far organized within the framework of UNAL, include a Exhibition of Books for Young Readers (Thailand, 1990), an International Workshop on Inter-cultural Activities in some African Libraries (Dakar, 1990), a Sub-Regional Workshop on the Role of Public and School Libraries in Promoting Awareness in Environmental issues (Bangkok, 1991), A European Workshop on Library Cooperation (The Hague, 1992), and a National Seminar on the Role of Associated Libraries in the Service of International Understanding and the Promotion of Human Rights (N'Djamena, 1992). The last Workshop was organized in January 1993 by the Bibliotheque publique d’information of the Georges Pompidou Centre, Paris, on the theme, “Libraries in the Service of the Community”
The purpose of these workshops, organized at irregular intervals, is to present and discuss experiences which libraries have made with activities in these various subject areas and to draw up a joint plan of action for future activities. Besides these activities organized with financial assistance from UNESCO, suggestions for such activities on the local level include, for instance, conferences, debate or exhibitions on one or the other of UNESCO's main missions. The UNAL Coordination Office at UNESCO contains reports on such activities in its information bulletin UNAL INFO. The purpose of which is to promote the exchange of information within the Network and to stimulate member libraries in different parts of the world to undertake joint projects. If number of members, mainly from the northern hemisphere, grows rapidly, some twining and staff exchange arrangements may also be initiated.

**Network of Libraries**

The Network now counts about 70 members from 33 countries coming by order of priority, from Africa, Asia, Latin America, Europe and the Arab States. An 'Associated Library' is no different from any other. It is not a 'UNESCO Library' and it does not act in its name. It has been selected by virtue of its desire to carry out activities in support of international understanding and to collaborate with libraries of other countries or regions.

- participation in the Network affords numerous opportunities. Among other things, it enables libraries to:
  - establish contacts with libraries in other countries, which presents a degree of cultural enrichment;
• contribute directly and effectively to the promotion of internal understanding and peace;
• attract new population groups to libraries and arouse their interest in reading;
• establish direct contracts with UNESCO.

**Constraints in Networking**

There are certain constraints of UNAL networking such as:

• a commitment to making an active contribution to the Network;
• informing UNESCO of activities implemented in connection with the Network by means of activity reports, the content of which will be communicated through UNAL INFO in order to encourage other libraries to undertake similar projects;
• extending, if possible, its collection of material concerning other countries and other cultures and drawing the public attention to its existence;
• expanding its activities concerned with local or national problems and giving them a regional dimension.

**Support to the Objectives of UNAL**

UNESCO hopes that UNAL will be as widely supported and appreciated as UNESCO's other library and documentation development activities in addition to the following network activities:

• the Associated School Libraries Network Project, established in 1953, which by now counts more than 2,000 institutions in 98 countries; and
the UNESCO Club movement, which started in 1947 and has by now more than 3,400 UNESCO Clubs or centers in more than 90 Member States all over the World.⁶

Any public library, be it for adults, youth or children sharing the open-minded spirit of the network, may join UNESCO Associated Library Network (UNAL) in writing to the Division of the General Information Programme, UNESCO, 7, Place de Fontenoy, 75352 Paris 70 SP, France.

8.4 UNESCO – Regional Network for the Exchange of Information and Experiences in Asia and the Pacific (ASTINFO)

The Intergovernmental Conference, Castasia II, held in Manila from 22 to 30th March, 1982, recognized the importance of scientific and technological information in national and regional development and recommended the creation of a scientific and technological network for Asia and the Pacific for the exchange of information and experience. Thus, UNESCO planned the Regional Network for Exchange of Information and Experiences in Asia and the Pacific called ASTINFO programme of UNESCO for Asia and the Pacific.

- It was formulated in 1982 with the following main objectives:
- to strengthen bibliographic control of the country’s own scientific and technological output;
- to stimulate and promote the creation of non bibliographic data bases in science, technology and socio economic fields of importance to development in the region;
- to develop and promote the technical and organisational structures and capabilities for cross border exchange of data
and for the sharing of processing facilities; including the development of national networks and their interconnection to form a regional network;

- to create and strengthen specialized networks in particular sectors, disciplines or missions;
- To create and strengthen local and regional data bases using modern technologies;
- to promote the training of information specialists and users interconnection;
- to improve resource sharing involving experience, expertise, information processing facilities, including computer hardware and telecommunications both within and outside the region. 

ASTINFO is closely associated with the NISSAT in India, which acts as a national coordinating unit. It has recently undertaken the initiatives in setting up a new network in the area of medicinal and aromatic plants, called the Asian and Pacific Information Network for Medicinal and Aromatic Plants (APIMAP). In close co-operation with ICSU's Abstracting Board and the Committee on Data for Science and Technology (CODATA) and the World Federation of Engineering Organisation (WEFO), UNESCO has undertaken steps to facilitate the access of both developed and developing countries to secondary sources of information and to quantitative, evaluated data and assist developing countries in gaining access to multilingual scientific literature and, on the other hand, to information handling equipment, assistance was provided towards a regional translation network for Arabic speaking countries and towards the implementation of the International Referral Centre for Information Handling Equipment. To this end the following activities are engaged in:
• development of an interchange format for, and a scheme for machine readable identification of quantitative data;
• Organization of training courses concerning data evaluation and dissemination;
• The establishment of a World Data Referral Centre (WDRC) whose function is to provide users with information on existing data evaluation and dissemination. The WDRC was set up in cooperation with ICSU/CODATA in 1976 by the UNESCO; and
• the development of guidelines for the establishment and running of a data bank, for sharing procedures among abstracting and indexing services, etc.

A workshop was organized under contract with the International Council on Reprography (CR) in an African country to examine how reprographic techniques can be adopted to the needs of developing countries. A Pilot Project was established in Africa to demonstrate recently introduced modern techniques facilitating the transfer of information from the developed to the developing countries. The Pilot Project undertaken in Tunisia on the mechanization of information services is being continued.

Further, in order to improve the flow of information between developing and more advanced countries, the services of short term consultants have been provided to Member States upon request.

8.5 Development of CDS/ISIS Versions

CDS/ISIS software was released by UNESCO in 1985. It was officially called ‘CDS/ISIS Mini-Micro version’ but is usually called ‘CDS/ISIS’ or simply ‘ISIS’. The first version of the package consisted in effect of
five programme which were run separately, but which acted on the same database. One programme included data entry and information retrieval and the remaining ones corresponded to the other options on the main menu of later versions: Sorting and Printing, Data Base Definition, Master File Services and System Utility Services.

In 1988 version 2.0 was release. It was little more than an amalgamation of the different programmes into one but with the addition of Pascal programming to enable additional functions to be added to the basic package. The next public release was version 2.3, which included improvements in the speed of the indexing and in the space used by the indexes. This was achieved in part by setting up two indexes, one for short and one for long terms. At the same time the package was made more resilient; hitherto a database could be irreparably corrupted if a power failure occurred while a record was being entered. The database then had to be restored from the previous backup. This changed from version 2.3. onwards because the files containing a database are closed after each record is modified or added. A further feature from this version onwards is SYSPAR.PAR, a system parameter file. The programme looks at this as soon as it is loaded. It allows sets of files used by the programme to be placed in different directories. It allows the programme to be set to start at any menu or to load a particular database automatically. It also permits a Pascal programme to be loaded and run before the main programme itself. Further information about this file is given in Section 3.2. At the same time as SYSPAR.PAR was introduced, it became possible to set up a parameter file for each database so that the separate files which make up the database can be allocated to different directories or devices. The initial reason for the introduction of this feature was to enable CDS/ISIS to be used as the search software for CD-ROM
database. CD-ROM is a ready-only device and CDS/ISIS required that certain files should be capable of being written to. These files have to be placed on the hard disk of the computer which can be copied from a CD-ROM; the large files containing the data and indexes remain on the CD-ROM.

The SYSPAR.PAR file also proved necessary for putting CDS/ISIS on to a network, and version 3.0 was released in May 1992 as a network sensitive version. Under version 2.3 it was possible to run the software on a network, by specifying certain parameters of SYSPAR.PAR as being network drives. However, a network allows multi-user access, and files could be corrupted if two users tried to make changes to the same database at the same time. An individual record would certainly be corrupted if two users tried to update it at the same time. This problem has been overcome by the introduction of record locking and database locking in version 3.0 onwards.

At every stage in the development of CDS/ISIS, new Pascal routines and functions are added to the Pascal programming library. Version 3.04 and later versions, for example, include a function called USES which allows the writer of a Pascal programme to specify other programmes called by that programme. It was necessary because conflicts between programme in memory were being caused when one programme called another. This was particularly the case when programmes called to display one or more records if the display format included a specially written Pascal programme.

After several revisions the CDS/ISIS software is now available with the following versions:
• CDS/ISIS, a menu-based character-mode system on three computer platforms:
  • Micro CDS/ISIS for PC (MSDOS)
  • CDS/ISIS for UNIX (Intel based UNIX: SCO, Linux, Free BSD...)
  • CDS/ISIS for VAX (not maintained anymore)
  • WINISIS, the Windows-based release of CDS/ISIS with multimedia extensions
  • CISIS, a set of command-line tools for database maintenance, available for most UNIX-environments and DOS
  • WWWISIS, a server software allowing for WWW-based access to ISIS-database on UNIX, NT (as a DLL) and DOS/Win95
  • ISISDLL, a programming library to develop graphical interfaces and applications based on the ISIS-formats for data storage, retrieval and formatting
  • JAVAISIS, is a Client-Server software which allows you to browse any CDS/ISIS databases through a JAVA interface.

**CDS/ISIS and Its Important Characteristics**

Some positive characteristics of CDS/ISIS are:
• the software is suitable for IBM micro computers and compatible;
• it makes efficient use of disc memory space as it does not allot fixed space for each field in a record;
• it has powerful search capabilities;
• its version 2 uses one programme to cover all functions unlike the earlier one which has six programmes, all functioning separately;
to assist users it offers a series of menus on the screen along with little menus that provide clarifying prompts for specific functions;

- it is a flexible system for database management;
- in version 2.3 a record can be linked with another in the same database;
- it allows the use of more than one data entry worksheet to provide a different data entry sheet.\(^8\)

The CDS/ISIS does have some disadvantages also. Some of them are:

- it is not multi-user and, therefore, is unsuitable for networking;
- a user has to get into separate menus to modify or remove data while searching for it which is a lengthy process;
- though MS-DOS accepts names with eight characters, CDS/ISIS accepts names with only six characters, thus, causing confusion to database creators;
- it is not suitable for sketches, photographs, prints and drawings as it does not use windows, icons, mouse and pull down techniques;
- one Field Definition Table (FDT) can be used only for one database and not for several, though they may have identical record structures;
- it has no facility for viewing different records at the same time.\(^9\)

Even though CDS/ISIS has some de-merits in its operation, it is still doing a great job and help to libraries and documentation centers in the developing countries in general and in India in particular. It has
been used for various purposes including Current awareness and Selective Dissemination of Information Services.

8.6 CD-ROM Databases for Libraries

The search for an efficient large volume computer readable data storage medium led to the development of Computer Disc Read Only Memory (CD-ROM). It is essentially a plastic material called polycarbonate on which data is recorded by using LASER beams. It was introduced in January 1985 as a medium for library storage of large amount of information. Since then the use of this new technology has proliferated and generated excitement in the information community. With on-going enhancement and a multitude of vendors offering their products on CD-ROM, this technology is making an impact on the provision of many type of library services. There are several variations of CD-ROMs presently available in the market which include CD-interactive, CD-Video, Optical cards, Write Once and Read Many Times (WORM) and Erasable Discs.

The CD-PACs were first introduced by Brodari in 1985. In less than five years since the introduction of bibliophile, the first commercially available product, CD-ROMs have come to be widely regarded as nothing less than a library fact file. The 1993 edition of “CD-ROMs in Print” lists over 2,000 commercial titles as well as over 1,000 corporate titles.

UNESCO – Development of CD-ROM Databases
UNESCO through its survey projects could very well understand the poor information facilities in developing countries, and realized the need for promoting the CD-ROM facilities in library and documentation centers in developing countries to strengthen the library and information services to meet the information requirements of the users. Thus, UNESCO directly or indirectly through its technical and financial assistance programmes promoted activities related to the development of CD-ROM databases in the developing countries.

For development of database, UNESCO published some useful inventories and studies like the International Inventory of Software Packages in the information filed and the applications of Microcomputers to information handling. It is available at the PGI Documentation Centre. It has been compiled by C. Keren and Sered of the National Centre of Scientific and Technological Information (COSTI) Israel. It contains descriptions of some 160 software packages which made use of main frame, mainframe or micro computers for the purpose of library, information centre and archives automation, along with guidelines on selecting and acquiring software, and a number of tables and indexes to facilitate use of the data presented. During 1983 a complementary inventory project covering information handling equipment (computer hardware, world processors and reprographic/micrographic equipment was undertaken by the International Referral Centre for Information Handling (IRCHIE) under the sponsorship of the Yugoslavia Government, and with the support from the PGI. Also a mini/micro version of Computerized Documentation System/Integrated Set of Information Systems Software was developed by UNESCO and has been made available free of cost to the libraries and documentation centers and non-profit
organisations of developing countries. In addition, within General Information Programme (PGI) framework, UNESCO boosted over 50 projects on creation of databases for which assistance regarding software, consultation, equipment and training has been provided.

8.7 UNESCO’s Efforts in the Field of Bibliographic Standards

UNESCO has contributed in the field of bibliographic standards for the exchange of data by developing the following standards:

1. UNISIST Reference Manual
2. Common Communication Format (CCF)

UNISIST Reference Manual

UNISIST Reference Manual\(^{11}\) was published in 1974 including a format based on ISO-2709 in collaboration with the International Council of Scientific Unions Abstracting Board (ICSUAB) and maintained by the UNISIST International Centre for Bibliographic Description (UNIBID). The aim of this format was to incorporate secondary information (indexing and abstracting) services and exchange of journal articles and contributions to monographs. Its second edition appeared in 1981 to serve as a ‘standardized communication format’ for the exchange of bibliographic records. The reference manual basically lists various data elements with their descriptions. It does not specify any cataloguing rules for rendering and inputting the data for fixed form of output. The manual presents guidelines for machine-readable exchange of data.
In April 1978 the UNESCO's General Information Programme (PGI) sponsored an International Symposium on Bibliographic Exchange Formats, which was held in Taormina, Sicily. The Symposium was organized by the UNISIST International Centre for Bibliographic Description (UNIBID) in cooperation with the International Council of Scientific Unions-Abstracting Board (ICSU-AB), the International Federation of Library Associations and Institutions (IFLA), and the International Organisation for Standardisation (ISO). The Symposium was organized to study the desirability and feasibility of establishing maximum compatibility between existing bibliographic exchange formats. One of the major results of this symposium was formation of an ad-hoc group on the establishment of a Common Communication Format consisting of experts and representatives from several countries including ICSU-AB, ISDS, IFLA, ISO and UNIBID. The Group first of all decided:

- that the structure of the new format would conform to the international standard ISO-2709.
- that the core record would consist of a small number of mandatory data elements essential to bibliographic description, identified in a standard manner.
- that the core record would be augmented by additional optional data elements, identified in a standard manner.
- that a standard technique would be devised for accommodating level, relationships, and links between bibliographic entities.

**8.8 CCF: Scope and Use**
The CCF is designed to provide a standard format for three major purposes:\(^{13}\)

- to permit the exchange of bibliographic records between groups of libraries and abstracting and indexing services.
- to permit a bibliographic agency to use a single set of computer programmes to manipulate bibliographic records received from both libraries and abstracting and indexing services.
- to serve as the basis of a format for an agency's own bibliographic database, by providing a list of useful data elements. To assist the development of individual systems, other UNESCO documentation will provide implementation notes for the CCF, and a guide for AACR2 cataloguers who use the CCF.

These uses have been accommodated in the following ways:\(^{14}\)

- by specifying a small number of mandatory data elements which are recognized by all sectors of the information community as essential in order to identify an item.
- by providing mandatory data elements that are sufficiently flexible to accommodate varying descriptive practices. A section entitled 'USE' for each field and subfield indicates whether the use of that data element is mandatory or optional.
- by providing a number of optional elements which may be useful to describe an item according to the practices of the agency which creates the record.
- by permitting the originating agency to include non-standard elements which are considered useful within its system even though they are not used by other agencies.
• by providing a mechanism for linking records and segments of records without imposing on the originating agency any uniform practice regarding the treatment of related groups of records or data elements.

**User-friendly Features of the CCF**

The Common Communication Format has the following important features:

• it can be used to produce catalogue cards as all the necessary data elements are incorporated;
• it is user-friendly and rather cataloguer-friendly for no cataloguing rules are imposed;
• it is a popular format among UN organisations and international bodies. Many developing countries are adopting it for the creation of bibliographic records in machine-readable form;
• it provides basic data elements and has provision for optional elements and private fields. It does not provide a comprehensive list of private field thus enabling an agency to incorporates non-standard elements considered important;
• it is compatible between formats, links records and segments of records and thus helps in fast exchange of data between groups of libraries and abstracting and indexing services;
• it allows a library and a bibliographic agency to use a single set of computer programmes for the exchange of data; and
some of the mandatory data elements are flexible and can accommodate varying descriptive practices.

CCF can also be used by the libraries and documentations centers for creating databases of users, equipments and staff. This can be systematized by using content designating systems for all types of data elements. Since it is not based on cataloguing rules it does not recommend any for entering records. It provides mechanisms that show relationships between records in a file or fields in a record. It allows the creation of record segments - a group of related fields within a record. The use of these segments allows the description of 36 related bibliographic entities in a singly record. On the usefulness of CCE, Alan Hopkinson says, "to be useful, what is required is a pool of records which can be drawn on by agencies to avoid their having to catalogue their own records themselves, working on the same principles as cooperative cataloguing projects found in some countries."

CCF can, thus, be used as effective bridge between information and library communities and would be properly sued as an internal format.

The above discussion is self evident that the standardization of bibliographic records is facing arduous challenges. On the one hand, efforts are being made to de-link formats from cataloguing rules and on the other cataloguing cods, especially AACR2, are being updated to match the requirements of generating machine-readable records. Further, while the multiplicity of existing formats is being reduced with the use of CCF, software's are being developed to support exchange of records in incompatible environments. Efforts are also
being made to develop characters that can accommodate records currently available in different scripts the world over. International organisations such as IFLA and UNESCO are continuing their efforts in this regard. Roberts and Bourne\textsuperscript{18} make the following observations regarding IFLA's standards work:

- that the data elements in a standardized bibliographic description should largely be those traditionally making up records included in library catalogues, themselves based on the predominant medium, the printed book;
- that unit records should be constructed for each item (ie. With all data elements given in one record with a main entry heading and appropriate added entries and references); although the construction of unit records might vary as appropriate to different media;
- that the design of machine-readable catalogue formats should also accommodate the traditional bibliographic description and the technique of the unit record (this being also due to the fact that magnetic tape, the predominant medium of exchange of bibliographic records, offered only serial access);
- that the bulk exchange of machine-readable records would take place on magnetic tape and would continue to be largely a matter for research libraries and publicly funded national libraries (or other national bibliographic agencies) able to invest heavily in exchange of bibliographic records on tape.

Similarly, the International Serials Data System (ISDS) was established by UNISIST in 1971 to maintain and develop an international register of serials, define and promote the use of International Standard Serial Number (ISSN), facilitate retrieval of
scientific and technical information from its databank and make information available to all participating countries, organisations and individuals. It also attempts to promote international standards for bibliographic description. Communication formats and exchange of information from serials, besides developing a communication network between libraries, publishers and international organisations.

On the one hand the innovations in the field of information technology and communications networks are helping librarians to meet the challenge of information explosion and render information services more efficiently, effectively and accurately and on the other hand continuing efforts of the international organisations like IFLA and UNESCO may result in to the possible solution to the problems in bibliographic standardization for the exchange of data in near future to eliminate the hurdles in the way of exchange of information for the purpose of resource sharing and networks.

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