



**Master of Library and
Information Science**

**MLIS 202
Information Storage
and Retrieval**

UNIT No. 1

**Department of Distance Education
Punjabi University, Patiala
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Lesson No.:

- 1.1 : Classification : Development and Trends in General Classification Schemes
- 1.2 : Activities of Organisations in Classification Research : CRG, DRTC and ISKO
- 1.3 : Anglo-American Cataloguing Rules (AACR) : Development and Trends
- 1.4 : Development and Recent Trends in Cataloguing
- 1.5 : OPAC and Subject Cataloguing for online search

**CLASSIFICATION : DEVELOPMENT AND TRENDS IN
GENERAL CLASSIFICATION SCHEMES**

LEARNING OBJECTIVES

After studying this lesson, you will be able

- (a) To understand the concept of General and Special Classification Schemes as well as trends of general classification schemes.
- (b) To gain knowledge about Dewey Decimal Classification, Universal Decimal Classification, Library of congress Classification, Bibliographic Classification, Colon Classification, Broad System of Ordering, and Automatic Classification.

Structure :

- 1.1.0 Introduction
- 1.1.1 Dewey Decimal Classification
- 1.1.2 Universal Decimal Classification
- 1.1.3 Library of Congress Classification
- 1.1.4 Bibliographic Classification
- 1.1.5 Colon Classification
- 1.1.6 Rider International Classification
- 1.1.7 Broad System of Ordering
- 1.1.8 Automatic Classification
- 1.1.9 Summary
- 1.1.10 Reference and Further Reading
- 1.1.11 Self Check Exercise

1.1.0 Introduction

Classification schemes are generally grouped into two categories : general and special. A general classification scheme is one which has scope for classification of all the branches of knowledge. They aim at providing for classification of subjects falling within any branch of knowledge. The first edition of Dewey Decimal Classification in 1876 marked the beginning of general classification schemes. These attempts have resulted in the publication of various classification schemes such as Ranganathan's Colon Classification (1993), Universal Decimal Classification (1895), Bliss's Bibliographic Classification, Rider's International Classification (1961), and recently

Broad System of Ordering. Among these Dewey Decimal Classification, and Universal Decimal Classification are widely used while other systems are limited to particular region or to a few libraries.

Special classification systems are those that have been designed for the purpose of classification of specialised literature pertaining to one subject or the other. For example, the classification system being used by major abstracting services such as INSPEC, Chemical Abstracts, Library and Information Science Abstracts (LISA) are all special classification systems designed for use in those special subjects. The general classification systems are too broad to coextensively classify the specialised literature that is handled by special libraries and information centres. The need for detailed coextensive specialised classification scheme for specialised literature is generally conceded. Therefore, a number of special schemes such as those developed by Jack Mills for Library and Information Science (used in LISA), by D. J. Foskett (for education), B. C. Vickery (for Soil Sciences), by E. J. Coats (for Music), by Bernice Field for the (INSPEC databases), etc. The other approaches also advocated by another school of thought that the best way to solve this problem is to design a specialised classification scheme in an extended or depth version of general classification schemes in an extended or depth version of general classification scheme. UDC has come out with different versions/editions such as an abridged edition, medium edition. Depth versions of Colon Classification in VII Edn., provides schedules for number of areas designed and published particularly in Science, engineering, medicine and so on.

1.1.1 DEWEY DECIMAL CLASSIFICATION (DDC)

In 1876, Melvil Dewey published the Decimal Classification scheme with the title "A Classification and subject Rules for Catalogue and Arranging of the Books and Pamphlets of Library". The first edition of Dewey Decimal Classification (DDC) consisted of twelve pages of Introduction, twelve of Tables and eighteen of Index.

In the second edition of DDC, some of the important features that were not present in the current edition were introduced for the first time. Some of these are : (a) the use of digital notation with a decimal following the third, if further subdivided ; (b) a separate table for divisions (now called Standard Subdivisions) applicable throughout the schedule of form divisions at the main class headings; (c) provisions at certain classes to 'divide like' (now 'add to').

Dewey himself supervised and revised it up to thirteen edition of DDC i.e., until his death in 1931. In the 15th edition some of major changes were effected such as : (a) reduction in the average length of class number (maximum of 5 digits in many cases); (b) most of the 'divide like' devices were omitted; (c) number of entries reduced from 31,000 to 4700; (d) the form division were reduced to nine as it was thought that this number was increased in the revised version brought out under the editorship of

Melvil Dewey's son Godfrey Dewey. The 16th edition was brought in 1958 with two volumes. The index was published as a separate volume. The 16th edition contained in the first part 'phoenix' schedules, it was recognized that certain schedules were out of date and that the only satisfactory way to revise them was to replace them entirely with new schemes. The 17th edition was brought out in 1965 in two volumes with an additional set of rules for adding zeros in the 'form division'.

The 18th edition published with current title "Dewey Decimal Classification", in 1971 in 3 volumes : volume 1 Tables; Volume 2 Schedules; and Volume 3 Index. In this edition various changes were made to make the schedules easier to use : (a) 'divide like' was replaced with 'add to', (b) introduction of new terms such as 'citation order', (c) introduction of new phoenix schedule for 340 Law and 510 Mathematics, (d) introduction of more tables of common facets (7 tables). The 19th edition was published in 1979 in 3000 pages in three volumes. 20th edition of DDC was published with four volumes as it superseded the three volumes. It included the manual for classifier to use the scheme and the schedules.

The 21st edition of DDC was published in 1996 in four volumes. In mid 2003 the DDC Ed. 22 was published. It included new features that make the classification easier to use. Scheme is available in print and has web format, both full and abridged editions. The latest 23rd edition was published in 2011.

The outline of the main classes in DDC is based on the schemes devised by Bacon and Harris. The order of main classes is based on the Harris's classification. DDC is hierarchical scheme which proceeds from the general to the specific, using the decimal principle for the subdivision of knowledge. It divides universe of knowledge into nine main classes and append a main class for general works. The ten main classes are :

0. Generalities
1. Philosophy and related disciplines
2. Religion
3. The Social Sciences
4. Languages
5. Pure Sciences
6. Technology (Applied Sciences)
7. The Arts
8. Literature (Bells-Letters)
9. General Geography and History and their Auxiliaries

Basically the DDC was enumerative in character; but from 16th edition onwards it slowly began to adopt additional synthetic features. There were sever tables introduced in 18th edition onwards viz., (i) 1. Standard Subdivisions, 2. Area Divisions, 3. Subdivisions of Individual literature, 4. Subdivision of Individual Languages, 5. Racial, Ethnic, National groups, 6. Languages, and 7. Persons to synthesis the auxiliary

ideas with basic class.

Dewey has given more importance to index. This type of index enumerates topics mentioned including all synonyms and to a great extent shows the relation of each subject to other subjects.

The 22nd edition of DDC available in print and web versions, was published in July 2003 in the context of web environment. It provides many new and updated numbers and topics, as well as tools to enhance efficiency, all without major revisions to the schedules. The first electronic versions of DDC 22 became available as 'Web Dewey' on June 15, 2003. Web Dewey and Abridged Web Dewey are available as services to OCLC. All copyright are owned by the OCLC, and DDC and Web Dewey is registered trademark of OCLC.

1. Web Dewey 2.0 is now available for use. The new Web Dewey is easier to use and has got following significant features :
 - (a) An easy to navigate, simple user interface of the novice and power user.
 - (b) An easy to personalize scheme, often done with a single clicks.
 - (c) Continuous updating.

This structure of the scheme is : Volume 1. Manual and Tables; Volume 2. Schedules 000-599; Volume 3. Schedules 600-999; and volume 4. Relative Index.

DDC 22 contains many new numbers and topics, ranging from new geographical areas, administrative regions, etc. New number for emerging topics in fields such as computer science, engineering, sociology, medicine, and history. Some of the major changes are :

- (i) Table 7 completely removed as an auxiliary devices.
 - (ii) 004-006 Data processing and Computer Science have been completely updated.
 - (iii) New edition plans to reduce Christian bias in 200 Religion as initiated in edition 21, in edition 22 contains the rest of the relocations and
 - (iv) Updated schedules provided for social groups (305-306), Mathematics, Medicines classes.
 - (v) Table 2 geographic Areas, Historical periods, Persons are updated.
 - (vi) Table 5 'Racial, Ethnic, National Group's is renamed as 'Ethnic and National Groups.
2. The 23rd printed edition of DDC was published in 2011. DDC 23 includes several major changes and updates significant features of DDC 23 may be summarised as follows :
 - (i) Many new topics and significant updates to selected fields.
 - (ii) A complete overhaul to the representation of groups of people.
 - (iii) Revisions to several standard subdivisions.
 - (iv) Elimination of dual headings and unbalanced spams.

- (v) Significant expansions in Table 2, with parallel provisions in 930-990.
- (vi) updated historical periods throughout 930-990.

1.1.2 UNIVERSAL DECIMAL CLASSIFICATION (UDC)

The Federation International de Documentation (FID) sponsored a scheme initiated by two Belgians Paul Otlet and Heri La Fontaine for the establishment of comprehensive classified index to all published information using the DDC as the basis. These two Belgians proceeded to enlarge the schedules of Decimal Classification by adding extensively to its enumerative classes. The extension provides an apparatus for synthesis of number building. The first complete UDC in French language was published in 1905 under the title 'Manuel Du reportion Bibliographique universality. The responsibility for revision and maintenance of UDC was with the Central Classification Committee of FID (FID/CCC) which works in cooperation with the numerous national committees of the member countries. The second edition of UDC was published between 1927-1933 in French. The third edition commenced in 1934 and was completed in 1952. The work had begun on the fourth edition in the year 1943.

An abridged version of the UDC was first published in English in 1948 by the British Standard Institutions (BSI), with official British Editorial Body for the scheme. The third edition was published by BSI as BSI000A in 1961. It has been adopted widely in Europe. I now appears in three versions - full medium and abridged - and has been translated in over twenty languages.

Some of the salient features of the UDC are :

- (i) UDC is a practical scheme based on documents, pamphlets, reports and literature rather than in the framework of theory.
- (ii) Although the scheme is based on Decimal Classification, it cannot claim to be a first 'analytico-synthetic' library classification scheme.
- (iii) It is a general classification scheme and it is not a bundle of special classification, rather integrated whole.
- (iv) The scheme reflects exhaustive enumeration in the schedules with due provisions for synthesis of coordination.
- (v) The use of synthetic devices like colon (:) permits coordination of the concepts in different permutations, thereby minimizing the rigidity in the enumerative classification scheme.
- (vi) The notation in UDC is international in nature. So a file organised by it makes sense in any language.
- (vii) An International body for its maintenance and revisions with the full cooperation of its users, guaranties the continued existence of the system as a current and an update one.

The UDC is a general classification scheme covering the whole field of knowledge

which is divided into nine major classes (numbered 1-9). A tenth class, originally designed to accommodate documents covering generalities, also includes certain specific subjects concerned mainly with the organization of knowledge (e.g., Bibliography, Libraries and Librarianship). Each main class is sub..... into subclasses, each of these into more subclasses, each of these into yet more, and so on. The main classes are :

0. Generalities, Science and knowledge. Organization Information. Documentation. Libraries. Institutions and Publications.
1. Philosophy, Psychology and Ethics.
3. Religion and Theology.
4. Social Sciences, Statistics, Politics, Economics, Trade, Law, Government. Military affairs, Welfare, Insurance, Education and folklore.
- (4) Previously this was allotted to Language and Literature; now shifted to 8. Now, it is vacant for future accommodation.**
5. Mathematics and natural sciences.
6. Applied sciences Medicine and Technology.
7. The art, Recreation, Entertainment and Sport.
8. Language, Linguistics, Literature, Belles and Letters.
9. Geography, Biography, History.

The term 'auxilliarities' implies that these are secondary aspects which may be used to qualify primary aspects. They are usually distinguished by special symbols or 'facet indicators' : special auxiliaries by hyphen (-), point of view (.0,) and common auxiliaries by some other symbols. The common auxiliaries are : (a) Addition and Consecutive Extension Sign (+ and /); (b) Relation signs - colon (:), square brackets ([]), and double colon (::); (c) Common auxiliaries of Language (=); (d) Common auxiliaries of Race and Nationality (=0/9); (g) Common auxiliaries of Time ("...") (h) Common auxiliaries of Point of View (00); and (i) Alphabetical and (non-decimal) numerical sub-divisions. Another development in the publication of UDC was the bringing out of medium editions and special subject editions. Medium edition was first published in German, which was intended to fall between the full and bridged editions. Special subject edition was brought out in Nuclear Science. Mining and Metallurgy, and Building. These editions are usually based on the practice of a larger library system.

In the years 1985-88 the **International 'Medium' Edition** (Bs 1000 M) (ME) was published. The 2nd English edition (BS 1000M: 1993) published in 2-volumes.

Later it was published in French, Spanish, Japanese, Dutch, Danish, Hungarian, Polish, Czech, etc. Task Force recommended creation of standard machine-readable version, and a consistent facted structure was formed in 1911. UDC Online accessible to subscribers via the web. This supersedes the *International Medium Edition*. This can be accessible through <http://www/udc-online.com/>. Another development in UDC

publication is the Pocket Edition; the 1st English edition (PD 1000: 1999) contains 4,000 entries.

In the year 2009 The Universal Decimal Classification Summary (UDC Summary) was brought out. It is the intellectual property of UDC Consortium. It represents a selection of around 2000 classes extracted from UDC Master Reference file (UDC MRF) which contains over 68,000 classes. UDC consortiums is encouraging and supporting translations projects of UDC summary.

1.1.3 LIBRARY OF CONGRESS CLASSIFICATION (LC)

The Library of Congress Classification (LC) is a system of library classification developed by the Library of Congress. It is used by most of the research and university libraries in U.S.A. and several other countries and some of the public libraries.

The classification was originally developed by Herbert Putnam with the advice of Charles Ammi Cutter in 1897 before he assumed the librarianship of Library of Congress. It was influenced by cutter Expansive Classification and DDC, and was designed for the use by the Library of Congress. The new system replaced a fixed location system developed by Thomas Jefferson. By the time of Putnam's departure from his post in 1939 all the classes except K (Law) and parts of B (Philosophy and Religion) were well developed. It has been criticized as lacking a sound theoretical basis; many of the classification decisions were drawn by the particular practical need of the library, rather than considerations of epistemological relevance.

Although it divides subjects into broad categories, it is essentially to be enumerative in nature.

- A GENERAL WORKS
- B PHILOSOPHY. PSYCHOLOGY AND RELIGION
- C AUXILIARY SCIENCES OF HISTORY
- D HISTORY : GENERAL AND OLD WORLD
- F HISTORY : AMERICA
- G GEOGRAPHY : ANTHROPOLOGY AND RECREATION
- H SOCIAL SCIENCES
- J POLITICAL SCIENCE
- K LAW
- L EDUCATION
- M MUSIC AND BOOKS ON MUSIC
- N FINE ARTS
- P LANGUAGE AND LITERATURE
- Q SCIENCE
- R AGRICULTURE
- T TECHNOLOGY
- U MILITARY SCIENCE

- V NAVAL SCIENCE
- Z BIBLIOGRAPHY . LIBRARY SCIENCE AND INFORMATION RESOURCES
(GENERAL)

Some of the important features of the system are :

- (i) the high degree enumeration. Even forms such as 'Dictionaries' and 'Encyclopedias' are given in the schedules.
- (ii) The use of alphabetical order within a systematic arrangement by means of initial letters followed by Arabic numerals. The numbers are used decimally and are assigned from special tables in a manner which preserve the alphabetical order.
- (iii) Provision of hospitality by leaving gaps in the notation.

1.1.4 BIBLIOGRAPHIC CLASSIFICATION (BC)

The Bibliographic Classification developed by H.E. Bliss, is the leading example of a fully faceted classification scheme. It provides a detailed classification for use in libraries and information services of all kinds, having a broad and detailed structure and order.

The vocabulary in each class is comprehensive and complemented by an exceptionally brief faceted notation considering the detail available, providing indexing to any depth, the classifier wishes. The structure of the subject within each class is clearly and simply laid out with rules provided for the quick and consistent placing of any item. A thorough A-Z index is provided in each volume. Users can access a subject catalogue record via any part of the whole, depending upon the primary interest of the user.

The classification (known as BC) was first published in four volumes in the USA between 1940 and 1953. Bliss stated that one of the purposes of the Classification was to "demonstrate that a coherent and comprehensive system, based on the logical principles of classification and consistent with the systems of science and education, may be available to services in libraries, "to aid revision ... of long established ... classifications" and to provide an 'adaptable, efficient and economical classification, notation and index.'" A fundamental principle is the idea of subordination - each specific is subordinated to the appropriate general one. This version of the classification is now known as BC1.

BC1 was first applied in broad outline at the College of the City of New York (where Bliss was librarian) in 1902. The full scheme followed the publication of two massive theoretical works on the organization of knowledge. Its main feature was the carefully designed main class order, reflecting the Comptean principle of gradation in speciality. Work on a radical revision of BC1, incorporating the great advances in logical facet analysis initiated by Ranganathan and developed by the Classification Research Group in Britain, began in the early 1970s.

On the formation of the Bliss Classification Association (BCA) in 1967, it was suggested

that a new and completely revised edition of the full BC should be made available. However, the revision has been so radical that it is more accurately described as a completely new system, using only the broad outline developed by H.E. Bliss. The new, revised edition was initiated by Jack Mills and was to be produced in 22 parts, comprising one or two subjects per volume. The first two volumes were published in 1977 (Bliss Bibliographic Classification, edited by J. Mills and Vanda Broughton. London : Butterworth, 1977-). Publication is now undertaken by K. G. Saur.

The main features of 2nd edition of BC (BC2) are as follows :

- * The main class order is based on closely argued theoretical principles; These are the principle of gradation, supplemented by that of integrative levels, developed by Feibleman and others.
- * Each main class, and every sub class demanding it (whatever its hierarchical level) is fully faceted; i.e., the vocabulary is organized rigorously into clearly defined and easily grasped categories. For example human biology and medicine is organized into Type of persons, Parts and system of the person, processes in the person, Actions on the person, Agents of actions.
- * A comprehensive and consistent citation order is observed throughout, making the position of any compound class highly predictable. for example, the citation order in medicine in the order of the facets listed above; so a work on nursing child victims of cancer would go under (Type of person) Paediatrics - (Processes) ; Pathological - Cancer - (Actions on) Nursing. This reflects the Standard Citation Order in which, for any subject, the primary (first cited facet is that reflecting the purpose of the subject (its defining system, end product, etc.) followed by its Types, Parts, Processes, Actions, Agents - always in that order. Medicine is definable as the study and treatment of biological process in humans - hence the citation order in the above example.
- * The filing order consistently maintains general-before-special. In the example above, HMY Nurshing in general files before HQE Cancer in general, which files before HOO Paediatrics in general. The subject Children - Cancer - Nursing files after all of them at HXO QEMy, being more specific. Note that the initial letter for this class (H) is dropped when combining subclasses.
- * The notation is fully faceted and synthetic. Any class be qualified by all the classes following it in citation order (and therefore filing before it). The notational base is very wide - 35 characters (1/9, A/Z). It is also purely ordinal, i.e. it does not attempt the impossible task of always reflecting hierarchy. These two features produce class marks which

are exceptionally brief in relation to their specificity (number of compounded concept defining the class). For example, the class of a work on the nurse as a care give for terminal patients and their families is exactly represented by the class marks HPK PEY FBG K. No other general scheme can approach this degree of specificity without significantly longer class marks. No symbols other than numbers and letters are needed in BC2.

- * Fully detailed alphabetical indexes to all classes are provided, using the economics of chain procedure.

1.1.5 COLON CLASSIFICATION (CC)

Dr. S. R. Ranganathan, who is the father of library movement in India has devised the Colon Classification. Soon after appointed as librarian in the Madras university, he started to work for eight years. The first edition of Colon Classification was published in the year 1933 with two volumes dealing with Rules and Schedules separately. The colon is used as connecting symbols. Thus the scheme was called 'Colon Classification'. Ranganathan published the various editions of CC during his lifetime. The Second edition appeared in 1939, subsequently in the years 1950, 1952 and 1960 appeared third, fourth, fifth and sixth editions respectively. In the year 1960, the 6th edition published with some important amendments. The seventh edition of CC was published in 1987.

The structure of scheme is based on strong theories of classification. Bliss theoretical work on classification induced Ranganathan to develop a work "Prolegomena to Library Classification. In his theory of Library classification he states classification should be pursued in three distinctive planes - idea, verbal and notational.

CC divides the whole knowledge into three sectors and each sector into certain number of Basic classes. Apart from the Basic classes, there can be one or more Isolate ideas. He has also provided the ideas of postulate, of fundamental categories. The postulate state that, there are five and only five fundamental categories viz., Personality, Matter, Energy, Space and Time (PMEST). CC recognizes the concept of Rounds and Level to denote the different manifestations of the Fundamental Facets.

In the edition 6 part III of CC there is a long and detailed list of Sacred works and Indian Classics. There is a separate index for Classics and Sacred works.

CC uses mixed notation. The main classes are generally denoted by Roman capital letters, also uses Roman small letters, Indo-Arabic Numerals, and some Greek letters. Divisions within main class are largely by using Indo-Arabic numerals. Several indicator digits are also used apart from the facet indicators such as indicator for phase relation (0), subject device (()).

Work began on the seventh edition in the early 1960s, and most of the detailed work has been carried out at DRTC, Bangalore. The present 7th edition is much more of

analytico-synthetic nature than previous editions. The scheme had proposed to published in two volumes, viz., vol. 1-Schedules for classification, volume 2 - Index. So far volume 1 has been published by its publisher. Some important features of the 7th edition of CC are :

- (i) Basic subjects are categorised into two groups : primary and non-primary basic subjects. Again the primary subjects are traditional and non-traditional.
- (ii) New set of Matter isolates were identified viz., Matter property, Matter material and matter method.
- (iii) In addition to five kinds of phase relations viz., General Bias, comparison, Difference and Influence, a sixth kind is added which is called "Tool".
- (iv) New schedule for 'Environment Division' Given in Chap DC of CC 7.
- (v) A separate schedules for 'Common Matter Isolates' given in Chap DK.
- (vi) The concept of 'Speciator' has been introduced for which indicator is (=).
- (vii) New indicator digits are used to denote the facets and relations : comma (,) for personality, instead of zero (0) now ampersand (&) is being used to indicate Phase relation, hyphen (-) is used for speciation, double inverted comma (" ") for anteriorising common isolates, equal to (=) is used to indicate Speciator of Order 2 and plus (+) to indicate fractions or part of multinominals.

1.1.6 RIDER INTERNATIONAL CLASSIFICATION (RIC)

The only edition of Rider International Classification (RIC) was published in 1961. It is one enumerative scheme of classification, which provides readymade class numbers. It has got pure notation comprising only capital between of English Alphabet. Every class number has got three digits only. RIC has got 33 pages of introduction, 931 pages of schedules and 242 pages of index.

Rider International Classification (RIC) could not prepher due to intimely death of A. Fremont Rider, who had developed this scheme.

1.1.7 BROAD SYSTEM OF ORDERING (BSO)

Broad System of Ordering (BSO) is a general faceted classification scheme for information exchange and switching. It was designed with the purpose of interconnection of information system in the framework of the UNISIST programme, which will serve as a switching mechanism between information system and services using diverse indexing/retrieval languages ...' It is a knowledge classification which attempts to reflects a modern consensual world outlook, and because it is essentially concept oriented rather than word-oriented.

BSO originated in the context of the idea which emerged in the 1960s that consideration should be given to the possibility of a global network of scientific

information centres, taking into account particularly the needs of developing countries. In 1967, a Joint Central Committee was set up by UNESCO and ICSU to carry out a feasibility study of an information system namely UNISIST. The committee stressed the need for a universally acceptable switching language which should act as switching language between system. The Committee did not favour the use of any existing classification system including the UDC as a switching language and was of the view that completely new scheme should be developed to the known as the standard reference code. A subcommittee FID/SRC working group was set up to develop the proposed new scheme. In 1974 the FID/SRC working group was succeeded by a three man panel consisting of Lolyds, E. J.. Coats and D. Simond. In 1975, a provisional draft without notation was circulated to some 400 experts. This was followed in 1977 with a second draft with an alphabetical index, incorporating the results of further study by the panel. This draft was tested by 26 institutions in 1977 and once again revised in 1978. Since then the scheme has been undergoing further testing. The BSO Manual was published in 1979.

BSO is a compilation of about 6800 terms, arranged in an order which is systematic or structured at the level of meaning. The system gives solutions to many dilemmas met by searches looking for “composite” subjects which can be represented in language only by phrases.

The arrangement of subject fields in BSO is in the ascending order of complexity of the entities associated with each field. This result in sequence which begins with general fundamental and physical sciences, passes through the life sciences to the human and social sciences and concludes with technology and arts. The subjects are arranged at three levels viz., subject areas, subject fields, subject field divisions.

Subject areas :

100 Knowledge generally
 200 Science and Technology
 300 Life sciences
 400 Education
 500 Humanities, cultural and social sciences
 600 Technology
 910 Language, Linguistic and Literature
 940 Arts
 970 Religion and Atheism

Subject fields :

112 Philosophy
 116 Science of Science
 118 Logic
 120 Mathematics
 128 Computer Science
 140 Information Science

Subject field Divisions :

128 Computer Science
 0.20 Programming and
 Software .022 Application
 Programming

Notation is the last feature of the BSO to be dealt with in this descriptive account of the scheme, and this perhaps reflects the view of the compilers that notation is at all times to be regarded as an ancillary to the structure of the classification.

Usages of BSO

Usages of BSO may be summarised as follows :

1. It acts as a subject sending tool on the net or only misalliances comprilation or collective covering many subject fields.
2. It provides orderly subject tagging code for individual items or records in wide angle collections.
3. It acts as mediating tool for information exchange from one subject indication system and another system.

1.1.8 Automatic Classification

A lot of research is going on whether classification by human intellectual effort can be superseded by computerized techniques. The computer is not a 'thinking' machine. Classification requires the basic intellectual capacity to understand likeness and difference between subjects and the ability to determine sometimes subtle and complex relationship between them. The computer is incapable of conceptualizing relationships, that is, of making associations between concepts, and, as this is fundamental to classification theory, it would appear computers have no role to play in this sphere of activity.

However, what computers are able to do is count and compare, and they can perform these functions at incredible speeds. In order to harness the power of the computer to provide 'meaningful' classification we must use these two basis functions. That these can in fact be used to provide what appears to be a degree of intelligence is illustrated in fairly recent developments in 'artificial intelligence' and its application, for example, the automatic detection of a documents authenticity, in language translation and in the design of complex expert systems which perform a whole range of tasks previously seen to be completely in the domain of the human expert. But classification is beyond it.

1.1.8.1 Definition :

Automatic classification deals with the way in which we group either the index terms assigned to documents or the documents themselves in order to highest the relationship between documents on similar subjects. Automatic classification is concerned with procedures and systems which can make comparisons between terms used to index documents and from this draw conclusion concerning the degree of similarity of the keywords used to index documents or the degree of similarity of the documents themselves.

If we consider a matrix each row of the matrix representing a document using the terms which define its subject content and the columns representing all potential indexing terms used to describe documents in a collection - it can be seen that we can approach automatic classification either by considering the relationship between documents (hat is, rows of the matrix). Thus, automatic classification, as it will be

discussed here, will refer to the measures of similarity (or dissimilarity) to provide one of two distinct arrangements : grouping of index terms or grouping of documents themselves. The former of these is usually referred to as keyword clustering and the latter as document clustering.

1.1.8.2. Elemental Analysis Techniques :

In order to be able to apply classification automatically. It is important that we first establish how we can construct representations of documents capable of computer manipulation. Before going on to look at experimental systems which have been constructed in this field it is useful to look at some of the basics of elemental analysis techniques which represent much of that work. The following point may be taken into consideration to understand the complexity of automatic classification.

1.1.8.2.1 World Frequency :

We can to an extent 'classify' a document on the basis of comparing the words used in the document with words by other documents and documents which contain similar words should be classified together. Such a measure is obviously too simplistic to be employed in a serious attempt at analyzing a documents content. Over one third, and in some subject areas as much as 46 per cent, of words employed in documents are function words, words with no lexical meaning such as 'and', 'of', 'the', etc. They belong to the set of words in any language which serve a syntactic function-prepositions, conjunction, articles, etc - but don't serve directly to express content. Obviously we need to use a more refined technique than simple word frequency counts if we are to use the words contained in a document as a basis for determining its 'subject'. No such theory has been sufficiently developed to be applied to IR. The statistical approach is therefore still very much more prominent in current investigations into automatic classification. Salton and Sparck Jones both argue that their experimental approaches on automatic classification can be widened to embrace natural language processing; there is as yet no empirical proof that this is the case.

1.1.8.2.2 Stemming and Truncation :

If we were to browse through an alphabetically ordered list of words extracted from any document we would immediately not another problem associated with the use of simple word counting as a measure of a document's 'thought content' that is the frequency with which we encountered words which are obviously related but on which the computer has performed distinct counts, for example :

COMPUTER, COMPUTERS, COMPUTING

This problems is, of course, familiar to anyone who has to search an online database. Most database search interfaces provide a truncation option which allows us to compensate for this at the stage at which we formulate our search. Truncation allows the searcher to input an arbitrary symbol at the end of part of a sought after terms to be used to indicate that any sequence of characters occurring in this position should

constitute a match if preceded by the input term. When using the DIALOG host to search the MEDLINE database, for example, the symbol '?' can be used at the end of words to indicate truncation as search command.

1.1.8.2.3 Synonyms :

Another problem raised when using frequency counts of words is that, if we simply look at words frequency, we take no account of use of synonyms, the normal method of controlling synonyms is through use of the thesaurus but even fairly basic thesauri are the product of considerable intellectual effort. To computer to generate a keyword classification, it is essential to be able to identify similar and related terms.

1.1.8.3 Clustering of Documents :

The basis for document clustering relies on examining the frequency with which terms co-occur in documents but the method of analysis of the data derived from this will obviously determine to a large extent the efficiency of the classification obtained. The methods used to measure the strength of association between documents can be very complex. Therefore, a fairly simplistic approach to the way in which keyword clustering is achieved will be given in order to introduce the issues involved in this field of study. The purpose of creating clusters of documents is to allow us to limit the number of documents we need to examine when we make an enquiry on the bibliographic file. We obviously do not wish to create as many clusters as there are documents in our collection so we have to examine the potential clusters and determine which grouping is most likely to provide a useful classification of similar documents. To do this we have to assess potential clusters with respect to two criteria. How many documents does the cluster contain ? How strong is the association between documents in the cluster ?

There is a large class of hierarchic clustering methods, the most important of which is the single link, based on a dissimilarity coefficient. The output from this method is a tree type structure (or dendrogram) in which clusters are represented by nodes on the tree.

1.1.8.4 System Smart :

One of the earliest extensive research programmes into the application of various mathematical theories related to document clustering was carried out by Salton and is embodied in his experiments using the SMART system. In the SMART system documents are represented by a set of concept numbers which refer to subject terms (reduced to a standard form by the control of word forms and synonyms). Many experimental approaches were made in various SMART projects to design an optimum clustering algorithm based on the descriptions of documents obtained from these techniques.

Salton made use of the concept of correlation to determine degree of association between concept vectors and enquiry vectors in the SMART system as this appeared

to give best retrieval performance.

Salton and many other authors have contributed towards research in this field.

1.1.8.5. Automatic Keyword Classification :

Another avenue for research in this field is the automatic classification through an examination of keywords used in indexing documents. Automatic classification of keywords does not seek as its primary objective to cluster the document collection but, through an examination of the distribution of keywords within a document collection, to derive groupings of keywords.

In particular, keyword classification would not be based on semantic properties but on shared contextual references. The classification derived should consist of 'connected words which are intersubstitutable in retrieval', that is, keywords which should be equally good in retrieving the same set of documents.

Gerard Salton (Directors of the SMART Project), and M.E. Lesk have been closely associated with this kind of work in the United States, while in Britain, the investigations of Karen Sparck Jones and her associates at the Cambridge University Language Research Unit suggest the way in which computers might be used to form groups of terms, or of related concepts, (Clups) which are shown to occur regularly together, and which function in the same way as a classification scheme does.

Some examples of key terms linked in a clump are :

1. Associative, Compound, Element, Magnetic, Memory, Recording Storage.
2. Adjective, Ending, Grammar, Phrase, Style, Text, Tense, Thesaurus, and
3. Lead, coating, Copper, Pipes

During the project, various methods of forming classes were used, but those given by strings, stars, cliques and clumps were found to be the most successful.

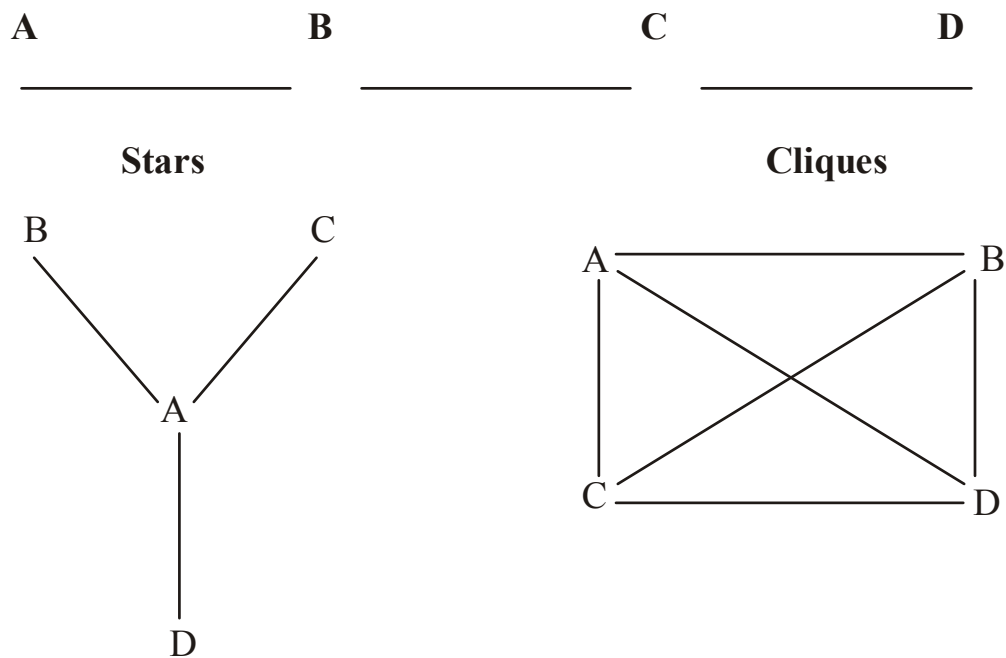
1. **String** : A string is a set of terms, each of which is most strongly associated with the next. In the event most strings terminate quickly by looping. Term A is most strongly associated with B; term B with C; term C with D ; D with E and E with terms A; thus closing the circle terminating the string.
2. **Stars** : Stars are based on one term, and those other terms which are most strongly associated with it.
3. **Cliques** : Cliques consist of a set of terms, each of which is connected to each of the other terms.
4. **Clumps** : Clumps are defined as groups in which each term was strongly associated with one, or more, terms.

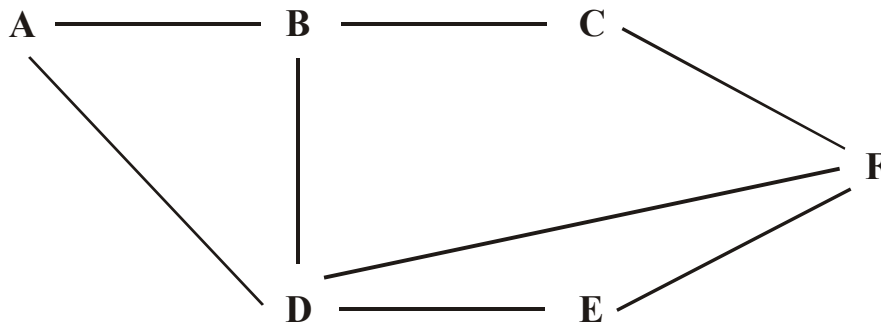
Out of a number of search methods used, the one dealing with simple class matching proved the best. In this method, classes were substituted for the search terms, either by matching straight forwardly on the classes, or by taking into account the class

frequency, given that a particular term may fall into several classes.

The results seem to indicate that computer-generated classification schemes can give better results than the use of single term alone, and that this line of research is worth pursuing. This is 'clearly and indisputably a never form of classification' which may have far-reaching effects in the future. At present such work is mainly at a theoretical level. But there is the possibility that it could well improve the search in computerized data bases. Sparck Jones interpret clearly. However the conclusion that information retrieval system can be enhanced through the use of keyword classification is clearly demonstrated.

String



Clump**1.1.8.5.1 Requirements of automatic Keyword Classifications**

1. Cluster must be stable, that is, they should not be affected drastically by the addition of new documents (this was a problem which was particularly apparent in early experiments into the formation of clusters by Needham and Sparck Jopnes). In any manual classification system the same holds true. The classification schedules must be capable of incorporating concepts represented by adding new documents and should be able to tolerate a certain level of addition of 'new' concepts before substantial revision is required;
2. Clusters must not be affect by errors in documents dexerption. Smal errors in the description of documents should not necessitate radical region of the classification scheme.
3. Clusters must not be biased by the order in which documents are processed. Likewise, in manually created scheme should be consistent irrespective of how the documnetary literature is sampled when the scheme is devised.

1.1.8.6 Conclusion :

Although research has been going on for over two decades still there is no sign that automatic procedures are sufficiently developed to replace manual classification. Certainly, a major drawback of clustering techniques based on keyword representations of documents is that they make a basic assumption that the keywords used to index a document form a mutually exclusive class of terms lends to greater numbers of matches on terms that implies closer to similarity of documents. However, in document classification it is necessary to recognize the inter-relation of terms and devise a mechanism to measure and compensate for this is algorithms designed

to computer similarly. The main barrier to successful implementation of such techniques is that we have as yet no complete understanding of the representation theory of knowledge, and it is this area of research which appears to offer most of the promises. Research in these fields, it is argued, gives richer representatives for text to provide a relational based framework in which to place documents and quarries and thus to allow the user to go 'beyond the keyword barrier'. Classification currently demonstrates relation amongst primitive concepts which these systems seeks to provide. Current schemes may not do so perfectly but there is as yet no single approach which provides a viable alternative.

1.1.9 Summary

The Library classification schemes have history of more than a century. There are many general and special library classification schemes that emerged over the period. The list starts with Dewey decimal Classification to Broad System of Ordering (BSO), Each system has its own way of structure and features.

1.1.10 REFERENCE AND FURTHER READINGS

Chand, Lois <aom et al; . *Dewey Decimal Classification; a practical guide*. 2nd ed revised for DDC21. Albany, N. Y., The Forest Press/OCLC, 1996.

Comaromi, John P. and Satija, M.P. *Exercises in the 20th Edition of the Dewey Decimal Classification*. New Delhi, Sterling, 1990.

Brown. J.D. *Subject Classification*. 3rd edition revised and enlarged by J. D. Stewart. London, Grafton, 1939.

Bliss Bibliographic Classification : 2nd edition Edited by V. Broughton, and J. Mills. London, Butterworth, 1977 in progress.

Bliss, H.E. *Organisation of knowledge in Libraries and the subject approach to books*. New York Wilson, 1993.

BSO structure and organization (FID/BSO). FID, 1978.

Dewey Decimal Classification and Relative Index. 22nd edition/edited by Joan S. Mitchell et al. Ohio OCLC online Computer Library Centre. Inc. 2003 <http://undcc.org>

Raju, A.A.N. *Decimal Universla Decimal and Colon Classification : a Study in comparison*. Delhi, Ajantha Publications, 1984.

Satija, M.P. *Exercises in the 19th Edition of the Dewey Decimal Classification*. New Delhi, Concept Publishing Co., 2001.

Universal Decimal Classification International Medium Edition. English Text (BS 1000 M) (FID 571). London, British Standard Institutions, 1985-88.

1.1.11 Self-Check Exercise

Note : (i) Use the space provided below for your answer :

1. Differentiate general classification schemes with special classification schemes.

2. Give brief account about Dewey Decimal Classification Scheme.

3. Trace the history of the development of UDC.

4. Describe the major changes in CC 7th Edition.

5. Describe the emergence of BSO.

**ACTIVITIES OF ORGANISATIONS IN CLASSIFICATION RESEARCH :
CLASSIFICATION RESEARCH GROUP (CRG), DOCUMENTATION
RESEARCH
AND TRAINING CENTRE (DRTC) AND INTERNATIONAL
SOCIETY FOR KNOWLEDGE ORGANIZATION (ISKO)**

The growth in universe of knowledge resulted in the proliferation of very detailed and complex field. More and more new subjects are being added to the sum total of universal of knowledge. The attributes of universe of knowledge viz. dynamic, infinite, continuum, manifold and multi-dimensional, segregation and systematization have greater impact and have brought pressure on the designing and development of general system of classification. Some of general systems could not withstand the pressure and began to crack. These developments have contributed for the emergence of special systems. Organisations, institutions and societies at national and international levels have been actively engaged in the design and development of special system of classification. In the present lesson three such organisations are taken for discussion.

Objectives :

After the study of this unit, you will be able to :

- (1) Understand the meaning of and need for research in the field of library classification;
- (2) know the research activities of three major organisations at national and international level.

Structure :

To achieve the aforesaid objectives the lesson is structured as under :

- 1.2.1 Introduction
- 1.2.2 Definition and scope of special systems.
- 1.2.3 Need for special system
- 1.2.4 Organizational activities in the special systems field.
 - 1.2.4.1 Classification Research Group (CRG).
 - 1.2.4.1.1 Genesis and Development
 - 1.2.4.1.2 Activities

- 1.2.4.1.3 Conclusion
- 1.2.4.2 Documentation Research and Training Centre (DRTC).
 - 1.2.4.2.1 Genesis and development
 - 1.2.4.2.2 Activities
 - 1.2.4.2.3 Conclusion
- 1.2.4.3 International Society for knowledge Organisation (ISKO)
 - 1.2.4.3.1 Genesis and development
 - 1.2.4.3.2 Objectives
 - 1.2.4.3.3 Activities
 - 1.2.4.3.4 Conclusions
- 1.2.5 Question for self-check Exercise
- 1.2.6 Reference and Further Reading
- 1.2.7 Answer to the Self Check Exercise.
- 1.2.8 Assignment

1.2.1 Introduction

Universe of subjects are dynamic, continuous, ever growing and expanding. Therefore, even on minute areas very large amount of macro as well as micro literature is being generated. The general systems of classification are not able to cope up with the output of the literature on narrower or minute subject fields. In order to meet the situations, many special systems are designed and constructed and they are very much in use in special libraries to meet various information requirements of the user community.

1.2.2 Definition and scope of Special Systems :

Special Classification systems have been defined variously by the authors theory of library classification. Ranganathan defined it as “scheme designed for depth classification of micro subjects, going only with one and only one specified subject field.” According to Harrod’s Librarian’s Glossary and Reference Book it is “a scheme of book classification which is applied to a section of knowledge.” K.G.B. Bakewell while explaining the characteristics of a special system started that, “a special classification scheme may be a general scheme designed for a particular purpose or, more usually, a scheme designed for the classification of documents within a particular subject area”. Mills made a distinction between general and special systems. According to him, “general classification embraces all knowledge in subject classes..... special classification are restricted to varying degree, viz.

- (1) Restricted to conventional subject field, e.g. physics, Labour Economics, India Music, Tropical Medicine, etc.
- (2) Restricted to an association of topics which are generally scattered in the general systems : e.g. Occupational safety and Hygiene, Building and Architecture, Civil Engineering, etc.

- (3) Restricted to certain physical forms : e.g. Picture, Illustrations, Maps, Gramophone Records, Video Casseettes, Slides, etc.
- (4) Restricted to certain form of publications : e.g. Patents, Standards, Trade Catalogues, etc.
- (5) Restricted to certain forms of thought representation e.g. Fiction Plays, Tables etc.
- (6) Restricted to certain type of readers e.g. children, Students, visually Handicapped etc.

1.2.3 Need for Special Systems :

Following are several factors which emphasis the need for special system. Concisely these are :

- (1) Most of the general systems do not provide enough and desirable details for dealing micro subjects;
- (2) Most of the general systems provide lengthy class numbers for compound and complex subjects;
- (3) General systems are not able to fully meet the special requirements of a particular special library or information centre;
- (4) Very often general classification systems lack flexibility to accommodate newly emerging subject fields;
- (5) A special collection requires all the aspects of the subject to be kept together, whereas a general system will scatter them.
- (6) The schedules in general system for a specific subject field may not be up-to-date;
- (7) The allocation of notation in general system is wasteful being spread over all the branches of knowledge and not on the relevant and specialized subject field; and
- (8) Revision of a general system is cumbersome and new edition with exception to few general systems like DDC do not appear at regular interval.

1.2.4 Organisational Activities in the Special System Field

The above factors emphasis the need and emergence of special systems, therefore, there are few organizations, institutions and societies which have been actively engaged in the design and development of special systems. These national and international organizations and associations play very important role in promoting library classification to a respectable standard. To achieve these aims and objectives these corporates form committees and organize seminars, which act as think tanks for the development of library classification. Among them classification Research Group (CRG), Document Research and Training Centre (DRTC), Banglore (India), and International Society for Knowledge

Organization (ISKO) are important and are made nucleus of discussion in the lesson.

1.2.4.1 Classification Research Group (CRG)

1.2.4.1.1 Genesis and Development :

The Royal Society Scientific Information Conference was held in 1948. It was decided to form a committee under the chairmanship of Professor J.D. Bernal to study classification. But this committee made little progress, therefore, it suggested to A. J. Wells (then editor of BNB) and B.C. Vickery (then Librarian, Akers Laboratories, I.C.I. Ltd.), that the subject be studied in detail by professional persons interested in the subject of classification. This is how the classification Research Group (CRG) was formed in 1952.

The Classification Research Group (CRG) is an unaffiliated discussion group, which meets regularly in London. Its first meeting held in February 1952. The original members were A. J. Wells, B. C. Vicery, E. J. Coates, J. Farradane, D. J. Foskett, J. Mills and B. I. Plamer. Subsequent members have included names like D. J. Campbell, R. AS. Fairthorne, Brbara Kyle, D.W. Langridge.

1.2.4.1.2 Activities :

Following are the main activities of CRG

(A) Classification Principle

At the beginning, the group came to the conclusion that the then existing schemes of classification were unsatisfactory. Thus, “discussion began from first principles and reconsideration of the nature of concepts of terms, their unique and homogeneous grouping and the expression relationship and interrelations” they also realized that the ideas and theories put forward by Ranganathan seemed to be mor acceptable than those of many others. Therefore, it was decided to adopt some of his terminology and techniques.

The early work of CRG is reflected in the *Sayers memorial volume*. Foskett has also described in brief the contributions made by the members during the first ten years of the existence of CRG. However, occasional summaries of the discussion are published as “CRG Buletin” in the *Journal of Documentation*, CRG Bulletin no. 4” was the first one to be published in the Journals.

(B) Faceted Classification

In 1953 CRG published a brief outline of facted classification and in 1955 issued a memorandum entitled “The need for a faceted classification as the basis of all methods of information retrieval. Memorandum emphasized :

- (1) Face analysis as the basis of library classification;
- (2) Farradance’s theory of relationship; and
- (3) Use of simple notation.

(C) Design of Special Scheme of Classification

From 1952 to 1960s, CRG members concentrated on the construction and use of special scheme of classification. The members formulated many schemes. Each was prepared to serve the requirements of a particular group of special users. These were faceted ones, based mainly on the principles propounded by S. R. Ranganathan. In these special schemes, members of CRG did not restrict themselves to Ranganathan's five fundamental categories; instead, they used a varying number of categories, depending upon the subject. These included categories like thing, kind, part, material, property, process, operation, agent, space and time. However, these are reducible to Ranganathan's five fundamental categories.

(D) Relation between Special and General Classification

In the 1960s the CRG turned its attention towards a study of the relation between special and general classifications schemes, and the problems relating to the construction of a new general classification scheme. The contribution made by the members is reflected in the work entitled *classification and information control*.

(E) New General Classification Scheme

In 1962, the NATO Science Foundation award the Library Association a grant of 14,000 dollars to study the feasibility of a new general classification scheme, and the Library Association appointed the CRG as its agent for this research. Helen Tomlinson worked on the project from 1964 to 1968, and Darek Austin from 1968 to 1969. Thus work of CRG on a general classification scheme was begun by Helen Tomlinson and Darek Austin. Austin later shifted to developing an alphabetical indexing system of PRECIS. CRG concentrated on : (i) determining principles of the categorization of concepts; (ii) ordering concepts within categories; and (iii) relationships between concepts.

CRG came to the conclusion that certain principles had been discovered which provide a solution to the problems faced in the formulation of a general scheme and would be necessary to construct two classified thesauri, one of the entities and the other of attributes organized according to the above mentioned principles. Classifying would consist of selecting terms from the thesauri and linking their notational elements using the set of roles developed by Austin.

In the initial stage, CRG aimed to produce a general compatible scheme to serve different purposes, like shelving, classified catalogues and information retrieval. However, this was not found feasible because different purposes are not compatibles.

(F) Theory for interrogative level for automated retrieval system

CRG believes that no general scheme existed which was suitable for computer retrieval. Therefore, it was decided to develop a general classification scheme, in association with the UK MARC project for an automated retrieval system. The theory of integrative levels is being developed, and it would possibly be used to serve as a basis for the arrangement of concepts in the general classification. The idea of

integrative levels was introduced to the members of CRG by means of a paper circulated in the form of a draft in 1959. A revised version was given in 1962 in *Sayers Memorial Volume*.

The theory of integrative levels was first discussed by members of CRG in late 1950s mainly on the basis of "Joseph Needham's Herbert Spencer lecture at Oxford University, 1937". Joseph Needham referred to "successive forms of order in a scale in a scale of complexity and organisation" in the universe of knowledge. In this context, according to Foskett, the theory of integrative levels is that "the world of things evolves from the simple towards the complex by an accumulation of properties and that, at a succession of levels these aggregations reach new degrees of complexity and become new wholes, with individual and unique identity". This theory can be used to divide a list of things into a succession of groups, each containing members of the same level of organisation. To each group, we can add properties and process. This results in a pattern similar to those of personality and property facets of CC.

There are certain limitations in theory of integrative levels. General systems theory developed by philosophers of science such as L. Von Bertalanffy, Ervin Laszolo, Kenneth Boulding et al, has similar features to that of theory of integrative levels and also provides more elaborate rules and laws governing interaction between various elements.

The application of theory of integrative levels leads to schedule of basic classes in natural sciences and other areas. It also provides us with list of entities in different basic classes. There would be need to add activities to each of the entity obtained above. One approach in this regard would be to use relational analysis of J. E. Farrandane.

Thus, we may conclude that theory of integrative level can be used to determine entities and also to arrange concepts within categories. The theory appears to be attractive but its practical value has yet to be proved. But it cannot be used to determine properties and activities or process. For the latter, Farrandane's relational analysis is considered helpful. However, the theory of integrative levels and the idea of relational analysis need to be tested extensively to reach definite conclusions.

(G) PRECIS (Preserved Context Indexing System) :

PRECIS (Preserved Context Indexing System) is by product of the continuing research for a general classification scheme. PRECIS is a direct descendant of the faceted classification. However, the credit for developing it should go to Darek Austin. From 1971, *British National Bibliography* has been following it. It is also being used by British MARC and many other bibliographies. The ideas of Rarrandance have influenced the work of Austin.

(H) Multiple Activities :

Since year 1970 CRG has been actively engaged in the following areas :

- (a) Revision of *Bibliographic classification* of H.E. Bliss.
- (b) Formulation of broad system of ordering (BSO)
- (c) Special Classification scheme for Library and Information Science
- (d) PRECIS

CRG has also encouraged classification schemes on specialized subjects like :

- (a) Farrandance's Scheme for Diamond Technology
- (b) Foskett's Scheme for Occupational Safety and Health
- (c) Vickey's Scheme and Aeronautics.

Members of CRG have continued to produce special schemes in a wide variety of areas of specialization. However, much remains to be done.

CRG has continued to concentrate on systematic arrangement of concepts rather than alphabetical indexing. It has also not given up the idea of integrative levels.

CRG and Ranganathan

There are some basic difference between the approach of members of CRG and Ranganathan, which are given below :

- (i) Members of CRG believe that the number of categories depends upon the subject, while Ranganathan believed that there are five and only five fundamental categories and all facets and be derived from the specific application of one of the five fundamental categories.
- (ii) Members of CRG are preparing special schemes, independent of the general schemes. On the other hand, Ranganathan was sof the view that a general classification should be an all-purposse one and depth schedules or special classifications should be an extension of the general scheme.
- (iii) The CRG people have come to the conclusion that there is a need for two schemes, one for shelf arrangement and another one for computerized information retrieval. Western literature also shows that it is being increasingly realized that it is not possible to have a multipurpose universal scheme to serve the purposes of arranging documents on shelves, subject analysis of documents and as an aid to information retrieval. Ranganathan did suggest and as an aid to information retrieval. Ranganathan did suggest that a scheme like CC can possibly be used as multipurpose classification scheme.
- (iv) Ranganathan considered that the citation order of facets should be PMEST and CRT people find that this order is not always helpful. They have formulated their own citation order.
- (v) CRG members have used the non-hierarchical and retroactive notation successfully.

1.2.4.1.3 Conclusion

A study of the literature shows that members of CRG have moved too far away from the ideas of Ranganathan. But the basis of their work has been influenced considered by the work of Ranganathan and they have retained some of these influences. CRG must be given credit for presenting the ideas of Ranganathan to the international community.

There is no doubt that CRG has made significant contribution to library classification and related area of study. The work of CRG has been widely noticed. It had a tremendous impact on the research, teaching and practice of classification and information retrieval, in Great Britain and elsewhere.

1.2.4.2 Documentation Research and Training Centre (Banglore-India)

1.2.4.2.1 Genesis and Development :

The Documentation Research and Training Centre (DRETC) was established in January, 1962 as a division of Indian Statistical Institute (ISI) at Bangalore.

DRTC was developed as a result of social force. After independence the Government of India created the Indian Standard Institution (1947). In the same year its Documentation (Sectional) Committee was formed under the chairmanship of Dr. Ranganathan. A proposal was made to the union Government; Ministry of Education for the establishment of National Documentation Centre as there was a keenly felt need for documentation services to support the work done in the national laboratories that were just established. Dr. K. S. Krishan (Director of National Physical Laboratory) and Dr. Ranganathan negotiated with UNESCO for aid in setting up a national documentation centre. The establishment of the Indian National Scientific Documentation Centre (INSDOC) was the result in September 1951.

1.2.4.2.2 Activities

Development of Library Classification

(A) Since the inception of DRTC, it has been actively promoting research at different levels in the field of library classification. These levels include.

(a) Development of Research

The activities in development of research are concerned around the designing and development of depth schedules.

(b) Fundamental Research

The activities in the area of fundamental research include the development of postulates, principles and methodologies; and

(c) Systematic Testing

In the field of systematic testing, the depth schedules developed by the faculty and Students of DRTC are tested and improvements have been effected.

The staff of DRTC has been actively engaged in research on classification and related areas. S. R. Ranganathan, A. Neelamegham, M. A. Gopinath and S. Seetharama have

contributed a great deal to library classification. In addition to the areas mentioned above, the another area has been the application of computer. DRTC (Now Endowment is responsible for it) has been looking after the revision of *Colon Classification*, and bringing out depth schedules.

(B) Depth Schedules

Between 1963 and 1967, DRTC has developed fifty depth schedules on various subject fields.

During 1967-1973 seventy one depth schedules were designed and developed.

The experience thus gained in designing and developing depth schedules lead to refined explicit statement of methodologies for designing depth schedules. Until 1973 DRTC produced one hundred and twenty two schedules.

The methodology for the design of classification schemes is still being developed at DRTC. The basic methodology worked out in the 1960s remains the same, but minor improvements based on experience, have been incorporated from time to time. In this respect, truly remarkable work has been done to develop notational techniques, to implement the findings of the idea plane at the notational plane.

Now it should be possible to develop the theory for the notational system based on normative principles. It is essential that this takes into consideration the principle of the unity of notation.

The depth schedules based on Colon Classification on various subjects such as Production Engineering, Gear, Locomotives, Screw, Nut Bearings, Combustion Engines, Banking Library Science, Food Technology, Solar Energy, etc. have been published from time to time in *Library Science with slant to Documentation*, a quarterly periodical brought out by DRTC in collaboration with Sarda Ranganathan Endowment for Library and Information Science.

(C) Computerized Document Finder

Experiments were carried out to design a special purpose computerized document searching aid called Doc-finder. Use of the computer for the synthesis of class number with a freely faceted version of *Colon classification* has also been done. One information retrieval system. based on CC, has also been reported, and work is in progress.

(D) Publications

DRTC, along with the Sarda Ranganathan Endowment for Library Science started a quarterly Journal, called *Library Science with a Slant to Documentation* in 1964. This is a prestigious Journal, which concentrated on classification at one time. The *Annual Seminar of DRTC* is being organized since 1963. A number of its issues have been devoted in the above journals.

The following reports indicate the research in classification, mainly done at DRTC. S.R. Ranganathan, *Classification research, 1957-1963; trend Report (India)*.

(FID/CR report no. 1)

M.A. Gopinath, *Classification research, 1963-1967; trend Report (India)*
(FID/CR report No. 6)

M.A. Gopinath, *Classification Research, 1968-1973*
(FID/CR report no. 14).

A brief description of the major contributions is given below :

Colon Classification edition 7 (1971) : A preview was published in Library Science in 1969. Till now, a few schedules for the seventh edition, covering library science, mathematics, chemistry, history, economics and so on have been published in different issues of Library Science. The delay in the seventh edition has caused disappointment to its users, as well as its well-wishers

1.2.4.2.3 Conclusion

It is due to the efforts of the late S. R. Ranganathan and his associates at DRTC, that it has become possible to achieve an advanced version of the dynamic theory of library classification. Thus it has become possible to prepare a freely-faceted analytico synthetic scheme for library classification. This should be considered an important achievement. CC7 is being developed along these lines.

Areas regarding the study of structure and development of subjects remains one of special interest. In 1973, A. Neelameghan reactionalized the basis of modes of formation of subjects. This has important implications for the development of the theory of library classification.

Ranganathan's death in 1972 has been a big loss to classification. He organized and developed DRTC to become a major centre on classification research. Till his last days, he was closely associated with DERT. The FID/CR Secretariat was located at DRTC, at one time which shows that the work being done there has been recognized at the international level;. There is every hope that work done by Ranganathan would be carried forward by research workers at the institute.

1.2.4.3 International Society for knowledge Organization (ISKO)

1.2.4.3.1 Genesis and Development

International society for Knowledge Organization (ISKO) was founded on 22th July, 1989 at Frankfurt (Germany). Ingeraut Dahlberg was its first president. The draft for the establishment of the organization was prepared by I. Dahlberg and R Fugmann which was accepted by National and International delegates. ISKO is governed by and Executive Board with 7 members, and a Scientific Advisory Council currently with 12 member. Professional conferences are arranged every two years. ISKO has 17 national chapters, 8 of which are currently active.

ISKO cooperates with international and national organizations such as UNESCO, the European Commission, and ISO (the International Organisation for Standardization). In addition, links are established to :

- * IFLA (the International Federation of Library Associations and

Institutions) in particular the section on Classification and Indexing.

- * ASIS & T SIG/CR (The Special Interest Group on Classification Research of the American Society for Information Science and Technology).
- * NKOS (Networked Knowledge Organization System/Services), and
- * Infoterm (the International Information Centre for Terminology). ISKO offers both individual and institutional membership. ISKO has a broad and interdisciplinary scope. Its mission is to advance conceptual work in knowledge organization in all kinds of forms, and for all kinds of purposes, such as data bases, libraries, dictionaries and the Internet.

As an interdisciplinary society, ISKO bring together professional from many difference fields. ISKO counts more than 500 members all over the world, from fields such as Information Science, Philosophy, Linguistics, Computer Science, as well as special domains such as Medical Informatics.

1.2.4.3.2 Objectives

Following are the main objectives of the organization :

- (i) To work for creation of an appropriate forum for 'organization of knowledge'.
- (ii) To promote research and development in organization of knowledge in all the subjects in general and some specific subjects in particular.
- (iii) To integrate conceptual approaches and artificial intelligence towards organisation of knowledge.
- (iv) To provide personal contact and other opportunities to specialists for creation and expansion of knowledge according to conceptual point of view.

1.2.4.3.3 Activities :

1. ISKO organizes international conferences after every two years.
2. National level conferences may be held by National Chapters in respective countries.
3. Technical Conferences and training courses are usually arranged as and when need arises.
4. 'Knowledge organisation and change'. Held at Washington (U.S.A.) (1966).
5. "Structure and relations in knowledge Organisation" held at lille (France) in 1998.
6. "Dynamism and Stability in knowledge Organization" held at Toronto (Canada) in July 2000.
7. "Challenges in knowledge representation and organization held at Granada (Spain) in July 2002.
8. "Knowledge Organization and the Global Information Society" held at London (England) in July 2004.

9. “Knowledge Organization for Global learning Society” held at Vienna (Austria) in July 2006.
10. “Culture and Knowledge Organization” held at Montreal, Canada, August 5-8, 2008.
11. “Paradigms and Conceptual Systems in knowledge Organisation” held at Rome, Italy, February 23-26, 2010.

Publication :

ISKO publishes a quarterly journal ‘KNOWLEDGE ORGANISATION’ (Previously under the title; International Classification). This journals founded in 1974 is devoted to concept, theory, classification and indexing. It also publishes a News letter, ISKO News (currently incorporated in KO). Topical Publication are also brought out in the series Advances in knowledge organization (AKO) and the series knowledge organization in subject areas (KOSA).

1.2.4.3.4 Conclusion

International Society for Knowledge Organisation has been working as link between different ogranisations engaged in the research activities in the field of library classification. It has great contribution in the developmental activities in the organisation of knowledge, its processing and dissemination. The society has to play a key role in the near future.

1.2.5 Questions for Self Check Exercise

- Q. 1. What are the needs of special systems ?
- Q. 2. Mention the various publication of DRTC.

Note : Please check your answers with answer given at the end of the lesson.

1.2.6 Reference and Further Readings :

- Bliss, H. E. : *Organization of knowledge in libraries and subject approach to books*. 2nd edition. New York : H. W. Willson, 1939.
- Brown, J. D. : *Maunal of Library Classification, and Shelf Arrangement*. London : Library Supply company, 1906
- Foskett, D. J. : *Classification Research Group in Kent, Allan Encyclopedia of Library and Information Science*. V. 5. New York : Marcel Dekker, 1952-68.
- Hunter, E. J. : *Classification made simple*, U. K. : Gower, 1988.
- Krishan Kumar : *Theory of classification*. 4th edition, New Delhi; Vikas 1988.
- Ranganathan, S. R. : *A descriptive account of the Colon Classification*. Bombay by: Asia, 1969.
- Ranganathan, S.R. : *Colon Classification 7th ed : A preview*. Library Science, NO. 6, 1969.

Sayers, W.C.B : *Introduction to Library Classification*, 8th edition. London : Grafton, 1958.

1.2.7 Answer to Self Check Exercise

Q.1 Need for Special Systems :

Following are several factors which emphasis the need for special system. Concisely these are :

- (1) Most of the general systems do not provide enough and desirable details for dealing micro subjects;
- (2) Most of the general systems provide lengthy class numbers for compound and complex subjects;
- (3) General system are not able to fully meet the special requirements of a particular special library or information centre;
- (4) Very often general classification systems lack flexibility to accommodates newly emerging subject fields;
- (5) A special collection requires all the aspects of the subject to be kept together, whereas a general system will scatter them;
- (6) The schedules in general system for a specific subject field may not be up-to-date;
- (7) The allocation of nation in general system is wasteful being spread over all the branches of knowledge and not on the relevant and specialized subject field; and
- (8) Revision of general system is cumbersome and new edition with exception to few general system like DDC, do not appear at regular intervals.

Q.2. Publication

DRTC, along with the Sarda Ranganathan Endowment for Library Science, started a quarterly Journals, called *Library Science with a Slant to Documentation* in 1964. This is a prestigious journal, which concentrates on classification at one time. Now Endowment is bringing it our. The *Annual Seminar of DRTC* is being published since 963. A number of its issues have been devoted to classification and allied areas. Research work carried out at DRTC is covered in the above journals.

The following reports indicate the research in classification, mainly done at DRTC. S.R. Ranganathan, *Classification research, 1957-1963; Trend Report (India) (FID/CR report no. 1)*.

M.A. Gopinath, *Classification Research, 1968-1973*.

(FID/CR. report no. 14).

A brief description of the major contributions is given below : *Colon Classification edition 7 (1971) : A preview was published in Library Science* in 1969. Till now, a few schedules for the seventh edition, covering library science, mathematics, chemistry,

history, economics and so on have been published in different issues of *Library Science*. The delay in the seventh edition has caused disappointment to its well wishers.

**ANGLO-AMERICAN CATALOGUING RULES (AACR) :
DEVELOPMENT AND TRENDS**

Structure :

- 1.3.0 Objectives
- 1.3.1 Introduction
- 1.3.2 Anglo-American Cataloguing Rules (AACR)
 - 1.3.2.1 AACR 1 (1967)
 - 1.3.2.1.1 AACR 2 (1978)
 - 1.3.2.2 AACR s (1978)
 - 1.3.2.2.1 Options
 - 1.3.2.2.2 Structures of AACR 2
 - 1.3.2.3 AACR 2, 1988 Revision
 - 1.3.2.3.1 Structure of the Rules 1988 Revision
 - 1.3.2.3.2 Comments
 - 1.3.2.4 AACR 3/RDA
- 1.3.3 Summary
- 1.3.4 Glossary
- 1.3.5 References
- 1.3.6 Self Check Exercise
- 1.3.7 Answer to Self Check Exercise

1.3.0 Objectives

The objective of this lesson is to make the learner familiar with :

- (i) The emergence and development of AACR.
- (ii) The salient features of different editions of AACR.

1.3.1 Introduction :

The catalogue code means as set of rules with defined terminology designed for cataloguing purposes and rule means a single provision to carry out cataloguing. The catalogue codes and rules guide the cataloguer as to how the entries for books are to be prepared so that one and the same system and pattern might exist for ever who so ever has done it.

Since the middle of the nineteenth century, a series of cataloguing codes has been

developed. Each new code sought to improve on the preceding ones. Most of the earlier codes represent the efforts of individuals, and the later ones result from corporate undertaking. In this lesson, the discussion will be confined to two important codes i.e. AACR and CCC.

1.3.2 ANGLO-AMERICAN CATALOGUING RULES (AACR)

Background

The seeds of AACR were shown in 1906 with the development of ALA code. The code was the result of joint efforts of American Library Association (ALA) and Library Association (LA). By the 1920's AAA code was under criticism. The need for revision was repeatedly expressed. In the 1930's, the committees of ALA and LA began revision. The LA dropped out at the outbreak of the II World War. The ALA continued along producing a draft code in 1941. The final version appeared in 1949 covering author and title heading, the rules for description being separately published by Library of Congress under the title "Rules for Descriptive Cataloguing".

ALA 1949 and LC 1949 served as the standards for descriptive cataloguing for American libraries until the appearance of the Anglo American Cataloguing Rules in 1967.

1.3.2.1 AACR 1 (1967)

"Anglo American Cataloguing Rules, Northern American Text, Chicago, 1967".

"British Text, London, Library Association, 1967".

Due to dissatisfaction with the 1949 code, Samule Lubetzky, the then bibliographic consultant of Library of Congress was asked by the Board of Cataloguing Practice and Research of ALA to make a detailed analysis of 1949 code. His findings were published in a pamphlet entitled "Cataloguing Rules and Principles : a critique of the ALA rules for entry and proposed design for their revision, 1953", Later on in 1956, he was invited by ALA to add revisions of 1949 code and the result was Code of Cataloguing Rules, Author and Title Entry : an unfold draft 1960.

In 1961, International Conference on Cataloguing Principles (ICCP) was held in Paris. The influence of Lubetzky is closely to be seen in ICCP principles. Lubetzky edited AACR from 1956-64. But later on due to differences of opinion on rules of institutions, he resigned and C. Summer Spalding completed the work from 1964-66. The new code was published in 1967 in two editions the North American edition and the British edition. The code was prepared by the AIA, the LC, the LA and the Canadian LA. Both the editions are essentially based on the same principles but with a few alternative rules for choice and rendering of headings.

The salient features of AACR1 are given below :

1. The rules in AACR1 are based on 'Statement of Principles' adopted by ICCP in 1961. These rules depart very little from the Paris Principles.
2. The code includes rules for author/title main entry headings, added entry headings and references, uniform titles for both title and author

entry, description and all these in relation to any type of material. The code-like and non-book materials.

3. Sufficient number of entries and references for documents catalogued have been prescribed to provide for meeting various approaches which can be anticipated reasonably from the users. All the entries. All the entries for particular person or corporate bodies are supposed to be given under a uniform heading or rare to be related by means of reference, thereby meeting the requirements of multiple entry alphabetical catalogues.

1.3.2.1.1 Structure of AACR1

AACR1 contains 15 chapters arranged in three parts :

- Part 1 : Entry and Heading
- Part 2 : Description
- Part 3 : Covers entry and description of non-book material.

Then there are six appendices which provide a glossary of cataloguing terms, rules for capitalization, abbreviations, punctuations and diacritics, rules for entry and heading that differ in the British text.

1.3.2.3 AACR 2 (1978)

Since the publication of AACR 1 in 1967, certain significant developments pointed to the desirability of complete overhauling of the code. The factors which necessitated the development of AACR 2 are as under :

- (i) The formation of international standards for the description of monographs, serials and others media indicated the need to redraft the AACR provisions for bibliographic description so that the code would facilitate the effort to promote international exchange of bibliographic data.
- (ii) Rules for non-book materials in AACR (1967) had been considered inadequate from the beginning, situation which resulted in the proliferation of various cataloguing codes for non-book materials.
- (iii) The points of divergence between the separate North American and British text of AACR had been gradually reconciled, leading to the prospects of a unified code.
- (iv) There had been numerous piecemeal revisions and changes in the rules since 1969 (revision of chapters 6, 12 and 14) which rendered the code rather inconvenient to use.
- (v) Increasing mechanization, the growth of centralized and cooperative bibliographic services and networks, introduction of number of new media necessitated to make a code in tune with the computer possibilities.

In order to respond to all these problems, changes and development, the second edition of Anglo-American Catalogue Rules (AACR 2) was brought out in 1978. It was prepared by the American Library Association, the British Library the Canadian Committee on Cataloguing, the Library Association and the Library of Congress. AACR 2 represents a more radical break with the past practice. This is quite evident from the following objectives established at the meeting of Joint Steering Committee for revision of AACR 1 in 1974 :

- (i) To reflect developments in machine processing of bibliographic record.
- (ii) To reconcile in a single text the North American and British Text, including official changes since 1967.
- (iii) To consider for inclusion of amendments and changes and work currently in progress, with attention paid to international interests.
- (iv) To maintain general conformity with the Paris Principles of 1961, and the ISBD as a basis for the bibliographic description of monographs and to the principle of standardization in the bibliographic description of all types of material.

1.3.2.2.1 Options

AACR 2 contain a number of options indicated by 'Optional addition', 'Alternative rule', or 'Optionally'. These allow individual libraries or cataloguing agencies to make decisions based on individual considerations in cases where more than one provisions are equally valid.

1.3.2.2.2 Structure of AACR 2

AACR 2 consists of two parts. Part 1 covers rules for a standard description of all kinds of library material. This part is closely based on International Standard Bibliographic Description (ISBD) for general materials and those for special types of material. Part II deals with the determination and establishment of headings, or access points in the catalogue, under which the descriptive information is to be presented to catalogue users and with the making of references to those headings. This part contain rules for choice of main and added entries (Chapter 21), form of headings and uniform titles (Chapters 22-25) and references (Chapter 26).

The above division is based on ISBD approach. ISBD make a distinction between bibliographic description and access points. AACR 2 has taken into consideration, the present day requirements. It is based on the assumption that bibliographic records are meant to be put to multiple uses. In the application of rules of AACR 2, first of all a cataloguer is expected to establish in a standard from as set of descriptive data relating to physical object being catalogued at a particular time. Next he is supposed to provide name and title access points by means of headings and uniform titles to enable the user of a catalogue to find standard description of the concerned physical objects.

1.3.2.3 AACR 2, 1988 Revision

The implementation of AACR 2 disclosed certain inconsistencies in the rules. This led to further clarification and modification in the rules. As a result, Joint Steering Committee (JSC) was constituted by the Library of Congress, ALA, LA, Canadian LA and Australian LA to take further steps for revision and improvements. As a result, three sets of revisions of AACR 2 comprising of Geographical corrections, Textual amendments, and altered and additional rules were issued in 1982, 1984 and 1986. A draft revision of chapter 9 from computer files was also prepared and published in 1986 in response to the ever-changing nature of computer files. With these changes, it was considered appropriate to issue a revised edition of AACR 2. The JSC decided to call the new edition Second Edition 1988 Revision instead to the 'third edition' due to the fact that the rules have not been radically recast.

The revision, therefore did not result either in the changes of basic concept, principles or structure. The changes in AACR, 1988 revision include revisions of rules approved since the publication of AACR 2 (1978); incorporation of the revised chapter on computer files; revision of a number of rules regarding music; rethinking of the concept of separate bibliographic identities, the treatment of titles, author headings, geographic names, and corporate bodies; and provisions for describing material for the blind and otherwise visually impaired. In addition, many existing rules and examples were corrected or clarified.

1.3.2.3.1 Structures of the Rules 1988 Revision

The structure of the rules is same as that of AACR 2 (1978). The code is divided into two parts :

- Part 1 : Description
- Part 2 : Headings, Uniform Titles and Reference.

Part 1 consists of 13 chapters. Chapter 1 gives the general rules describing all materials. Chapter 2-12 give the rules in greater detail for specific types of materials and chapter 13 gives special rules for preparing analytical entries and multi-level description. These are as follows :

- Chapter 1 : General rules for description
- Chapter 2 : Books, pamphlets and monographs
- Chapter 3 : Cartographic material
- Chapter 4 : Manuscripts
- Chapter 5 : Music
- Chapter 6 : Sound recordings
- Chapter 7 : Motion pictures and video recordings
- Chapter 8 : Graphic materials
- Chapter 9 : Computer files
- Chapter 10 : Three-dimensional artifacts and realia

Chapter 11 : Microforms

Chapter 12 : Serials

Chapter 13 : Analysis

Part 2 consists of 6 chapters as follows :

Chapter 21 : Choice of access points

Chapter 22 : Headings of persons

Chapter 23 : Geographic names

Chapter 24 : Headings for corporate bodies

Chapter 25 : Uniform titles

Chapter 26 : References

It also provides four appendices i.e. A. Capitalization, B. Abbreviations, C Numerals, D. Glossary, and an Index.

In both are parts, the rules proceed from the general to the specific. In part 1 the specificity rates to the physical medium of the items being catalogued, to the level of the detail required for each element of the description and to the analysis of an item containing separate parts. The code also has the provision for optional and alternative rules enabling the libraries to choose the appropriate option as per their requirements.

1.3.2.3.2 Comments

Though AACR 2, 1988 is a big step towards the idea of international bibliographic exchange of cataloguing data and the framers of the code have tried their best to provide detailed rules for the new emerging media, yet it has not succeeded fully to take into account the advances in library automation. This is so because the rules cannot be static. These must respond to the changing needs. This means that fast developments in the field of cataloguing due to technological advances demand that there must be continuous revision of the code to keep it responsive to the demands of the libraries.

1.3.2.4 Resource Description and Access (RDA)

“RDA emerged from the deliberation at International Conference on the Principles and Future Development of AACR” held in Toronto in 1997. It prompted substantial revision of AACR 2, which came out under new title “Resource Description and Access” as a third edition of AACR in 2010.

RDA is a set of instructions for the cataloguing of books and other material held in libraries and other cultural organisation such as museums and galleries RAD as earlier told is successor and the second edition and AACR released in summer 2010. The primary distinction between RDA and AACR 2 is structural. RDA is organised on the lines of functional requirements for Bibliographic Records (FRBR). Its wider acceptability, and however, is yet to be tested.

1.3.3 Summary

This lesson discusses the development of Anglo American Catalogue Rules (AACR). It

also describes in detail the salient features of AACR.

1.3.4 Glossary

- Gesalt alphabetization : In Gesalt alphabetization, ordinal values are given to “word space”, “sentence space” and “paragraph space”. Different values are also given to “capital letters” “small letters” and “letters in italics”.
- ICCP : It stands for International Conference on Cataloguing Principles. It stands for International Conference on Cataloguing Principles. It was held in Paris in 1961.
- ISBD : It stands for International Standard Bibliographic Description.

1.3.5 References :

1. Anglo American Cataloguing Rules (1978) 2nd edition. London : Library Association.
2. Chan, Lois Mai (1994). Cataloguing and Classification : An Introduction. 2nd edition New York : McGraw Hill.
3. Hanson, ER and Daily, JE (1974). Catalogs and Cataloging. In Encyclopadea of library and Information Science. Volume 4. London : Marcel Dekker, pp. 242-305.
4. Krishan Kumar (2000). Theory of Cataloguing. 5th revision edition, 2nd reprint., New Delhi : Vikas.
5. Tripathi, SM. (1978). Modern Cataloguing. Theory and Practice. 2nd edition Agra : Shiva Lal Agarwala and Co.

1.3.6 Self Check Exercise

Note : Write the answers in the space given below each question and check your answers with the answers given at the end.

1. Define a library catalogue code.

2. Discuss briefly structure of ACCR2.

1.3.7 Answer to Self Check Exercise

1. The catalogue code means a set of rules with defined terminology designed for

cataloguing purposes and rules means a single provision to carry out cataloguing. The catalogue codes and rules guide the cataloguer as to how the entries for books are to be prepared so that one and the same system and pattern might exist for ever who so every has done it.

2. AACR 2 consist of two parts. Part 1 covers rules for a standard description of all kinds of library material. This part is closely based on International Standard Bibliographic Description (ISBD) for general material and those for special types of material. Part II deals with the the determination and establishment of headings, or access points in the catalogue, under which the descriptive information is to be presented to catalogue users and with the making of references to those headings. This part contain rules for choice of main added entries (Chapter 21), form of headings and uniform titles (Chapters 22-25) and references (Chapter 26).

DEVELOPMENT AND RECENT TRENDS IN CATALOGUING

Structure

- 1.4.0 Objectives
- 1.4.1 Introduction
- 1.4.2 Attempts towards Universal Code of cataloguing Rules
- 1.4.3 Standards for Cataloguing
 - 1.4.3.1 ISO 27-9
 - 1.4.3.2 MARC
 - 1.4.3.3 UNIMARC
 - 1.4.3.4 CCF
 - 1.4.3.5 ISBD
 - 1.4.3.6 ISBN
- 1.4.4 Networks and Co-operative Automation Groups
 - 1.4.4.1 OCLC
 - 1.4.4.2 The BLAISE Cataloguing System
 - 1.4.4.3 UTLAS
 - 1.4.4.4 BLCMP
 - 1.4.4.5 The Ballot Cataloguing System
- 1.4.5 OPACs
- 1.4.6 Cataloguing of Interest Resources
- 1.4.7 Cataloguing in the Digital Environment
- 1.4.8 Summary
- 1.4.9 Glossary
- 1.4.10 References
- 1.4.11 Self Check Exercise
- 1.4.12 Answers to Self Check Exercise

1.4.0 Objectives

This lesson discusses the developments in the field of cataloguing. After reading this lesson, the learner will become familiar with the following :

1. Development of International Code of Cataloguing Rules
2. Development of Standards in the field of cataloguing.

3. Emergence of networks and co-operative automation groups in the field of cataloguing.
4. Cataloguing of Internet and digital library resources.

1.4.1 Introduction

The history of cataloguing is very fascinating one. It is one of the oldest library crafts. In the early days of library services, cataloguing was largely an individual activity for each library. Each library constructed its own catalogue in a way deemed most suitable for its purposes. Bibliographic records were presented in forms and styles that varied from library to library. Gradually, librarians realized the advantages of standardization of practice and cooperation among libraries. The need for codification of cataloguing practice became increasingly apparent, especially for cooperative or shared cataloguing. Since the middle of the nineteenth century, a series of cataloguing codes have been developed. Each new code sought to improve on the preceding ones. Most of the earlier codes represent the efforts of the individuals and the later ones result from corporate undertakings. The technique of cataloguing has been uniformed to a large extent at least in the English Speaking world. The old methods of cataloguing which depended on the flair of the individual cataloguers without any idea of sound canons and principles have been completely put aside. The recent developments in the literature has made the traditional catalogue system inadequate. Current research in cataloguing is directed towards applying existing computer technology in systems. Computer technology holds promise to revolutionize many aspects of library operations in the near future. Some of the recent trends in cataloguing are as under :

1.4.2 Attempts towards Universal Code of Cataloguing Rules

Towards the beginning of the 20th century, attempts were made to devise a common code for the English speaking countries. As a result of co-operative efforts of the American Library Association (ALA) and Library Association (LA), AA Code 1908 was devised. In the 1930's the committees of ALA and LA began revision. The LA dropped out at the outbreak of the II world war. The ALA continued along producing a new code, the ALA rules in 1949. Due to dissatisfaction with the ALA code, Samuel Lubetzky, the then bibliographic consultant of Library of Congress was given the responsibility of making a detailed analysis of 1949 codes. In 1960, Lubetzky's Code of Cataloguing Rules, Author and Title Entry : An Unfinished Draft appeared. In 1961, one of the most important events in the evolution of cataloguing codes took place. The International Conference on Cataloguing Principles was held in Paris. As a result of the conference, a statement of principles, which has become known as the 'Paris Statement' or 'Parsi Principles' was issued. It drew heavily on Lubetzky's draft code of 1960. It formed the basis of Anglo American Cataloguing Rules (AACR 1) published in 1967 in two texts North American text and the British text.

The next step towards greater International agreement was taken at the International

Meeting of Cataloguing Experts held at Copenhagen in 1969. At this meeting, an international working group was established with the purpose of developing a standard order and content for the description of monographic material. As a result, International Standard Bibliographic Description (ISBD) (M) was issued. It was followed by ISBD (G) in 1977. Since then a number of ISBDs have been developed. All this was incorporated into unified text known as AACR2 to promote international exchange of bibliographic data.

The implementation of AACR2 disclosed certain inconsistencies in the rules which led to further clarification and modification in the rules and resulted in new edition called AACR2R.

AACR II with all its revisions is thus a big step towards the idea of international bibliographic exchange of cataloguing data.

1.4.3 Standards for Cataloguing

1.4.3.1 ISO 2709

It is an international standard that specifies the requirements for a generalized machine format that will hold any type of bibliographic record. The universal acceptance of ISO 2709 on record structure as a basis for exchange formats (2nd ed. 1981) has enormously benefited the information community. It is accepted for the exchange of bibliographic data on magnetic tape, and also used for the formatting of bibliographic data sent online not stored on other media such as floppy disk and CD-Rom.

1.4.3.2 MARC

MARC which stands for machine readable cataloguing was started as a pilot project in 1966 at Library of Congress. The main aim of this project was to distribute Library of Congress cataloguing data in a machine readable form to various libraries for the reading material received by them so as to facilitate them to meet the explosion of knowledge and the increasing demand for easy and quick provision of required information. At that time, there were no established MARC formats available. Libraries had reached no consensus as to which access points were required to take full advantage of an automated cataloguing system. During Nov., 1966 to June 1967, sixteen libraries took part in developing early MARC format for English language monographs/books only on experimental basis.

MARC II : MARC II was started in 1968 with the development of a new format capable of transferring bibliographic data to the receiving libraries. The new format was intended to be hospitable to all kinds of library material sufficiently flexible for a variety of application in addition to catalogue production and usable in a range of different computer systems. There were two versions of MARC II i.e. LC MARC and BNB MARC.

MARC 21 : The Library of Congress and the National Library of Canada

harmonized the USMARC and CAN/MARC formats in a single edition in early 1999 under a new name MARC-21. The British Library in 2001 decided to discontinue the UK MARC format and adopt MARC 21. MARC 21 format is a set of codes and content designators for encoding machine readable records

1.4.3.3 UNIMARC :

Since the early 1970, several versions of MaRC formats emerged, whose paths diverged owing to different cataloguing practices and requirements. The differences in data content in these formats means that editing is required before records can be exchanged. One solution to the incompatibility was to develop a Universal MARC format that would accept records created in any MARC format.

In 1977 IFLA brought out UNIMARC with the purpose of facilitating the international exchange of data in machine readable form between national bibliographic agencies. This was followed by a second edition in 1980 and a UNIMARC handbook in 1983.

1.4.3.4 CCF

The proliferation of the international bibliographic exchange formats on the one hand and the lack of compatibility amongst them on the other led to the convening of the International Symposium on Bibliographic Exchange Formats in 1978 by UNESCO, to study the desirability and flexibility of establishing maximum compatibility among existing formats. Following the deliberations of the symposium, UNESCO/PGI formed the Adhoc Group on the Establishment of a Common Communication Format (CCF). The first editions of the CCF was brought out in 1984, 2nd in 1988 and 3rd in 1992 with the following objectives :

- * To permit the exchange of records between groups of information agencies, including libraries, abstracting and indexing services, referral systems and other kinds of information agencies.
- * To permit the use of a single set of computer programs to manipulate records received from various agencies regardless of their internal record creation practices.
- * To serve as a basis of a format for an agency's own bibliographic or factual database by providing a list of useful data elements.

1.4.3.5 ISBD

In order to achieve successful and convenient international exchange of bibliographic information in written as well as in machine readable form, a need was felt for standardization. In view of this need, an International Working Group was set up by the International Meeting of Cataloguing Experts in Copenhagen in 1969 to study the possibilities for ISBD. The working Group published its final recommendations in 1971 under the title International Standard Bibliographic Description. In the following years, this format was accepted and adopted by many national bibliographies. In the course of its applications many ambiguities were brought out. These were discussed

at the IFLA Conference held in Gzenoble in 1973. As a result of this conference, two documents were published in 1974, the first standard edition of ISBD (M) and a set of recommendations for ISBD (S) which was finally published in 1977. The rules for description provided in Part 1 of AACR2 are based on the general framework for the description of library material (ISBD) (G) published in 1977. ISBD standards serve as a good example of an attempt towards uniform cataloguing practices.

1.4.3.6 International Standard Book Number (ISBN)

ISBN is a system of giving a unique and non-changeable number to every book, which identifies each of these. It facilitates machine handling of bibliographic information. Such a system is extremely useful for international exchange of bibliographic data. The numeric code representing ISBN is based on Standard Book Numbering Agency's Standards book numbering.

ISBN is complemented by International Standard Serial Number (ISSN). ISSN is looked after by International Centre of International Serial Data System in Paris. It is a unique number which identifies a particular serial title.

1.4.4 Network and Co-operative Automation Groups

1.4.4.1 OCLC (Online Computer Library Center)

OCLC was established in 1967 as the Ohio College Library Center to serve as an association of college, universities and other educational institutes within the state of Ohio. Its services were extended to any kind of library in any part of the country and finally to countries outside North America. It has emerged as the world's largest library information network. It now links 47,669 libraries in 84 countries and territories. Its services help libraries locate, acquire, catalogue, access and lend library materials. It is offering the following services :

- (a) **World Cata (The OCLC Online Union Catalog) :** It is the world's largest and most comprehensive bibliographic database. It contains 55 million records in 458 languages with holding information. Libraries use the World Cat databases and OCLC computerized telecommunication network to process material and share information.
- (b) **Open World Cat pilot :** In June 2003, OCLC started Open World Cat pilot to determine the feasibility of providing a new service that would integrate the collection of OCLC member libraries into heavily used websites. The pilot service is now available from a variety of services on the web including Abebooks, Alibris, ABAA, Book Page and HCI Bibliography. Through this service, OCLC has made World Cat's unique resources available from outside the library environment.
- (c) **OCLC First Search Service :** It provides flexible searching and subject access to over 70 databases for end users.
- (d) **OCLC First Search Electronic Collections Online Service :** It provides

remote access to large collection of journals through the Web.

- (e) **OCLC Access Services** : These facilitate online and cataloguing, resource, sharing, reference and selection services.

1.4.4.2 The BLAISE Cataloguing System

The British Library Automated Information Service (BLAISE) which was introduced in 1977 is now one of the world's largest commercial services. It is using a combination of online and offline computer processing techniques BLAISE has two major functions - providing automated information retrieval service, and facilitating general library house-keeping routine from catalogue production to bibliographic checking. Catalogue production is made through LOCAS (Local Catalogue Service) which is an integral part of BLAISE. BLAISE also contains the UK MARC files, current and retrospective. Together the files contain over two million records of books and serial. The subject coverage is comprehensive and broad based. All information is searchable online.

1.4.4.3 UTLAS

The University of Toronto Library Automation System (UTLAS - now UTLAS International Inc.) developed from a local academic into a worldwide system. From supplying its own large campus it expanded to serve other libraries and by the mid 1980s it held MARC records from Canada, United States, France, Great Britain and Japan, together with updated authority files of LC name and subject headings. It provides a variety of automated systems for both large and small libraries.

1.4.4.4 BLCMP

BLCMP Library services Ltd. was begun experimentally in 1969 by the university of Birmingham, and the Birmingham City Libraries as the Birmingham Libraries Co-operative Mechanization project (BLCMP). It has been fully operational from 1973, and serves a variety of libraries. It makes use of BNB and LC MARC tapes and of locally generated records to produce a union catalogue database from which catalogues can be generated for each of the subscribing libraries in the form and frequency individually chosen.

1.4.4.5 The Ballot Cataloguing System

The Bibliographic Automation of Large Library Operations using a Time sharing System (BALLOTS) is an effective online system in the area of academic libraries. It was set up in 1972 as a fully integrated library system. The online file of MARC records is the main source of bibliographic data. The sharing of cataloguing records has been made easier in this system. BALLOTS has expanded much and various regional networks affiliated with this system are also sharing in the cataloguing programmes.

1.4.5 OPACs

Online Public Access Catalogues (OPACs) are the interfaces that help users communicate with the collection(s) of a library. Typically OPACs allow users to search

the library's catalogue, and also provide some other facilities, such as checking borrower records, reserving reading materials, library news bulletins etc. Although OPACs were first used in the mid 1970s, it was only at the beginning of the next decade that a significant number of libraries switched from card catalogues to automated catalogues. However, those first catalogues were usually modules linked to the automated circulation system and had brief catalogue records and very limited functionality. Several changes have taken place and OPACs have improved significantly since then. The later breed of OPACs is made more like a bibliographic information system providing access to a range of databases and tools and information services of which the library catalogue may be one item as an introductory menu. In OPAC databases a user can use any one or more search parameters, such as the author, title, keywords, ISBN and so on to search the catalogue, and the complete catalogue entry may be displayed as a result of the search.

Modern day OPACs also include internet resources. Catalogue codes were not originally devised to deal with Internet resources, which have some characteristics that are unique and different from conventional information resources, so cataloguing of Internet resources has become an important issue these days.

1.4.6 Cataloguing of Internet Resources

Internet resources have some specific characteristics that call for some special rules for cataloguing. AACR 2 provides some guidelines for cataloguing computer files but they are not sufficient, for several reasons. Internet resources vary significantly in terms of their context (text, numeric, audio, images, video, etc.), file format, availability, URL (uniform resources locator) or the address of a web page. Realizing the need of developing new rules and guidelines for cataloguing internet resources, OCLC produced a manual for cataloguing internet resources in 2003. The guidelines follow the Anglo-American cataloguing rules, 2nd revised edition, as well as the International Standard Bibliographic Description for Electronic Resources ISBD (ER). In addition to the file type and format description internet resources need specific information for access. Some information is carried in special MARC fields. MARC field 856 has been developed especially for electronic location and access.

1.4.7 Cataloguing in the Digital Environment :

A digital library provides access to different types of information sources in a variety of formats such as OPACs, electronic databases (online search services or CD-ROM databases), e-journals, web resources. These information resources may reside on a number of different servers - local as well as remote. There are many problems in cataloguing digital information resources. First, digital especially internet-resources are so huge in number and grow so rapidly that it is practically impossible for human cataloguers to cope with each and every item. Second, the characteristics of digital information resources demand that a different standard be followed for each major

type of documents. Bibliographic formats such as the MARC family and others and catalogue codes such as AACR2 are not adequate for representing all the useful characteristics of digital resources. Various metadata standards such as the Dublin Core Metadata Editors, Encoded Archival Description (EAD) have been developed over the past few years for representing different type of digital information resources. Dublin Core Metadata Standards are general in nature and can accommodate descriptive information about digital information resources of different types coming from different disciplines but EAD is specialized and apply to information in a specific discipline or domain.

In 1998, the International Federation of Library Associations and Institutions (IFLA) announced a proposal to streamline cataloguing and simplify resource discovery for library users known as the Functional Requirements for Bibliographic Records (FRBR). FRBR is an “entity-relationship model” of metadata for information objects, rather than a single, flat record conceptualization underlying current cataloguing standards. It restructures catalogue databases based on particular works rather than on the various forms in which the works are expressed. It groups all versions of a given work together using a high-level record that links to numerous lower level records, thereby collapsing near duplicate items into a single entry point.

FRBR algorithm developed by OCLC makes it possible for users to write computer programs to generate sets of records that can be grouped for display as single works, making it easier for information seekers to find what they are looking for.

The Joint Steering Committee for revision of AACR is actively working on incorporating the FRBR terminology and concepts into the next edition of AACR.

1.4.8 Summary

This lesson discusses the development of AACR 2, various standards for cataloguing such as MARC, UNIMARC, CCF, ISBD, ISBN and the emergence of various networks and co-operative automation group in the field of cataloguing.

Cataloguing of Internet’ digital resources has become a big challenge these days. Several metadata standards such as Dublin-Core, EAD, FRBR have been developed since the past few years for representing different types of digital information resources.

1.4.9 Glossary

- BALLOTS : It stands for Bibliographic Automation of Large library Operations using a Time-Sharing System. It was set up in 1972 as a fully integrated library system.
- BLAISE : It stands for British Library Automated Information Services. It was introduced in 1977 for providing automated information retrieval service and facilitating general Library housekeeping routine from catalogue production to bibliographic checking.

- BLCMP : It stands for Birmingham Libraries Co-operative Mechanization Project. It was started by the University of Birmingham in 1969.
- CCF : It stands for Common Communication Format. It was brought out in 1984 by UNESCO to permit the use of a single set of computer programs to manipulate records received from various agencies regardless of their internal record creation practices.
- Digital Library: It is a virtual library on the Internet having all the information available in the digital form.
- Dublin Core : It stands for metadata standards developed in 1995 for accommodating descriptive information about digital information resources of various disciplines.
- EAD : It stands for Encoded Archival Description. It was developed in 1998 for accommodating descriptive information about digital information resources in a specific discipline.
- FRBR : It stands for Functional Requirement for Bibliographic Records. It is an 'entity relationship model' of metadata for information objects. It has been developed by IFLA in 1998.
- Internet : A network of networks. It is an amalgamation of interrelated computer networks allowing electronic communication on a global scale.
- ISO 2709 : It is an international standards that specifies the requirements for a generalized machine format that will hold any type of bibliographic record.
- ISBD : It stands for International Standard Bibliographic Description.
- ISBN : It stands for International Standard Book Number. It is a system of giving a unique and non-changeable number of every book.
- MARC : It stands for Machine Readable cataloguing. It was primarily designed by Library of Congress in 1967 to serve the needs of libraries as convenient ways of storing and exchanging bibliographic information.
- OCLC : It stands for Online Public Access Catalogue. It helps users to communicate with the collection of a library.
- UTLAS : It stands for University of Toronto Library Automation System.
- UNIMARC : It stands for Universal MARC. It was developed by IFLA in 1977 with the purpose facilitating the international exchange of data in machine readable form.

1.4.10 Reference :

1. Chowdhury, G. G. (2004). Introduction to modern information retrieval. 2nd edition London : Facet Publishing.

2. Chan, Lois Mai (1994). Cataloguing and classification : An introduction. 2nd edition New York : McGraw Hill.
3. Girja Kumar and Krishan Kumar (2000).Theory of cataloguing 5th revision edition New Delhi : Vikas.
4. OCLC Newsletter Nos. 262, 2003 and 263, 2004.
5. Oddy, Pat (1997). Future libraries and future catalogue. London : Library Association
6. Piggott, Marry (1998). A topography of cataloguing showing the most important landmarks, communications and perilous places. London : Library Association.

1.4.11 Self Check Exercise :

Note : Write the answers in the space given below each question and check your answers with the answer given at the end.

1. Name important standards.

2. What is UNIMARC ?

3. What is ISBD ?

4. what are OPACs ?

5. Name the services rendered by OCLC.

6. Name the resources available in a digital library.

7. Name two metadata standards.

1.4.12 Answers to Self Check Exercise

1. The important standards related to cataloguing activities are :
ISO 2709
MARC
CCF
ISBD
Dublin Core
2. UNIMARC was brought out by IFLA in 1977 with the purpose of facilitating the international exchange of data in machine readable form between national bibliographic agencies. This was followed by a second edition in 1980 and UNIMARC handbook in 1983.
3. ISBD is a standard format for bibliographic description. In order to achieve successful and convenient international exchange of bibliographic information in written as well as in machine readable form IFLA's working group published International Standard Bibliographic Description in 1971 which led to the convening of IFLA conference in 1973. As a result of this conference ISBD (M) was published in 1974 and ISBD (G) in 1977. ISBD (M) serves as the basis for the rules of descriptive information for monographic materials and ISBD (G) for the description of all types of publications in all types of media in AACR 2.
4. Online Public Access Catalogues (OPAC) are the interfaces that help users communicate with the collection(s) of a library. Typically OPACs allow users to search the library's catalogue, and also provide some other facilities, such as checking borrower records, reserving reading materials, library news bulletins etc. Although OPACs were first used in the mid 1970s, it was only at the beginning of the next decade that a significant number of libraries switched from card catalogues to automated catalogues. However, those first catalogues were usually modules linked to the automated circulation system and had brief catalogue records and very limited functionality. Several changes have taken place and OPACs have improved significantly since then. The later of

OPACs is much more like a bibliographic information system providing access to a range of databases and tools and information services of which the library catalogue may be one item as an introductory menu.

5. The services rendered by OCLC are as under :

World Cat (The OCLC Online Union Catalog) : It is the world's largest and most comprehensive bibliographic database. It contains 55 million records in 458 languages with holding information. Libraries use the World Cat database and OCLC computerized telecommunication network to process material and share information.

Open WorldCat pilot : In June 2003, OCLC started Open World Cat pilot to determine the feasibility of providing a new service that would integrate the collection of OCLC member libraries into heavily used websites. The pilot service is now available from a variety of services on the web including Abebooks, Alibris, ABAA, Book Page and HCI Bibliography. Through this service, OCLC has made World Cat's unique resources available from outside the library environment.

OCLC First Search Service : It provides flexible searching and subject access to over 70 databases for end users.

OCLC First Search Electronic Collection Online Service : It provides remote access to large collection of journals through the Web.

OCLC Access Services : These facilitate online and offline cataloguing, resource sharing, reference and selection services.

6. The resources available in a digital library are OPACs, electronic databases (Online searches or DC-Rom databases) e-journals and web resources.
7. The two important metadata standards are :
1. Dublin Core Metadata Editors.
 2. Encoded Archival Description (EAD)

OPAC AND SUBJECT CATALOGUING FOR ONLINE SEARCHING

LEARNING OBJECTIVES :

After studying this lesson you will be able to

- (a) Understand the concept of OPAC
- (b) Gain knowledge about online searching, services, techniques, use etc.

OUTLINES

- 1.5.1 Introduction
- 1.5.2 Online Public Access Catalogues (OPACs)
 - 1.5.2.1 OPACs Generations
 - 1.5.2.2 Web OPACs
- 1.5.3 Online Searching
 - 1.5.3.1 Growth and Development of Online Searching
 - 1.5.3.2 Elements of an Online Search
 - 1.5.3.3 Preparation of Search Strategy
 - 1.5.3.4 Search Techniques
- 1.5.4 Summary
- 1.5.5 Key Words
- 1.5.6 Reference and further readings
- 1.5.7 Self check exercises.

1.5.1 INTRODUCTION :

Online searching of bibliographic information was initially carried the industrial and commercial sector by information scientists on librarians. Now many organizations have a well established system for online searching. Academic, government and public libraries also provide a access to remote online search services. The use of such service by public libraries in Birtain developed from initial funding by the British Library Research and Development Department (BLR & DD) in the late 1970s. The popular online services such as Dialog, PFDS, BLAISE, and ESA-IRS and that the most used databases.

1.5.2 ONLINE PUBLIC ACCESS CATALOGUES (OPACs)

OPAC is an acronym for 'Online Public Access Catalogues (OPACs)'. It is an access

tool and resources guide to the collection of a library or libraries which provides bibliographic data in machine-readable form and can be searched interactively on a computer terminal by users. Such OPACs may be searched from a terminal within the originating library, at a terminal elsewhere in the organisation or remotely via communication networks. Obviously searching a library catalogues at a remote place is a notable development in the use of library catalogues.

The library catalogue as a tool exists primarily to indicate the materials available in a particular library or group of libraries. The objectives of library catalogues are well recognized and stated, in order to meet these objectives a series of widely used standards or rules about the content of catalogue entries and access points within the catalogues to those entries have emerged.

Before the development of OPACs catalogues had appeared in a number of physical forms, including book, card, and Computer Output Microform (COM). These formats were generally unpopular and library users avoided them wherever possible in the present era.

OPACs differ from more conventional bibliographic information retrieval systems in a number of ways. The most fundamental difference concerns the characteristics of those who use them. Thus it could be assumed that the searchers would have knowledge of the principles of information retrieval and would be prepared to learn often several commands languages. No such assumptions may be made about the searchers of OPACs. Indeed, it must be assumed that the catalogue will be searched by users with a wide range of skills and aptitudes. The users have a competence in the use of computers, knowledge in catalogues and cataloguing information retrieval system, and knowledge of the subject on which seeking information. The second major difference between OPACs and conventional bibliographic information retrieval systems is the subject coverage of the database. Bibliographic databases are limited in subject scope either to a single subject or a range of disciplines; in contrast nearly every library catalogue will cover all fields of knowledge.

1.5.2.1 OPAC'S Generations

OPACs can be categorised into three generations on the basis of the evolutionary changes to incorporate novel features in data content, access points and user interface. The OPACs of the first generation are referred as 'phrase indexed or pre-coordinate OPACs. They were derived from circulation or cataloguing system as being know time finding tools which providing a few access points like author, title, class number, sometimes subject headings, the search pattern is more or less same to that of traditional catalogue and provide little assistance to the users.

The second generation OPACs are referred to as 'keyword or post-coordinate OPACs'. It has improved capability of word searching. The access points are word from title like fields, author and other names, and word from subject headings. These enable

the users to have access to two or more search modes such as menu and command. They provided keyword or free text access. The second generation OPACs resembles to online bibliographic IR systems.

The third generation OPAC systems have combined features of the first and second generations by providing both phrase searching and keyword searching. In terms of interface, this is often achieved by a simplified command language which facilitates user interaction. The interface has improved help screens so that the operations are simplified, partial matching, stemming of keywords, ranking retrieved output, coordination level matching, automatic mapping are implications to the third generation OPACs.

1.5.2.2 WEB OPACS

The Internet and World Wide Web (WWW) have revolutionized the way information accessed and retrieved. Many academic and special libraries are moving towards web-based OPACs. Web OPACs are having access to the resources through WWW. One of the advantages of these web based online catalogues is that these will act as gateways to the resources not only of the respective libraries but also to the holding of other participating libraries without limiting to local but going beyond further to regional, national or international levels. It allows users to interact with documents stored on computer all over the world.

The usual features of OPACs like, bibliographic and full text databases; Internet search engines; and other linked resources from the OPAC are available in the web-based OPAC also.

1.5.3 ONLINE SEARCHING

Online searching means process of directly interrogating computer systems to resolve particular request for information; the search will usually be conducted by means of keyboard or screen, that communicate with a computer system, possibly remote, which contains files of data. The main types of online search system can be grouped and categorized in several ways, but four main types are : external search services, CD-ROMs search systems, search systems in which the databases are stored locally such as OPACs, and videotext teletext systems.

1.5.3. GROWTH AND DEVELOPMENT OF ONLINE SEARCHING

The concept of online retrieval originated in the sixties by the US National Library of Medicine applied computers in the production of the printed Index Medicus and used in DEDLARS files. The first online dialup service was MEDLINE which was followed in 1972 by the DIALOG and ORBIT (SCD). Since then many organizations have switched over to online database and search services. Initially the majority of online databases only bibliographic or reference databases. However, for the past few years, more and more databases are becoming available not only having bibliographic information but also content of documents. These databases are either full text, where the full texts

of documents or databanks which contain machine-readable numerical (often combined with textual and graphical) data. The online databases and records are tremendously increased over the period of time.

The first remote online search service vendor was DIALOG which started to offer a service based on six databases in 1972, and has remained a major player in the field with more than 450 databases to offer; others include Data-star, BRS, ORBIT, STN and so on.

1.5.3.2 ELEMENTS OF AN ONLINE SEARCH

An online search comprises of nine basic elements; searcher, search formulation, input search formulation, workstation, link to computer system, search software, store of information, retrieved item, and the printer.

Searcher is the person who actually carries out the search may be the person with the information need (often referred to as the end-user) or it may be an intermediary. Search formulation is the search request may be formulated in a particular manner in which the system understands. The formulated search is usually input into the system using a device. That is input search formulation. Workstation is used to connect to remote computer system special software is required to make the workstation act as a terminal so that it will send and receive data appropriately. Link to computer system : a remote computer system can be accessed by directly using telecommunication facilities designed for transmitting digital information. Search software is the program or set of programs which processes the request and carries out a search is known as search software. Much of the software used for online searching is of the free text retrieval type. The store of information which is structured into collections (known as databases) of individual items (known as records) which are made up of different parts (known as fields). As the start of the search one or more databases may be chosen; the search is carried out on search terms derived from the fields and the retrieved records are displayed. When search software retrieved items, it is to view by searchers. The bibliographic retrieval system retrieved the items with bibliographic information such as author, title, abstract, languages, year of publication, etc.. Any workstation used for online searching usually has a printer linked to it so that a hard copy of the search can be obtained, otherwise the other means of storage devices can be used in this purpose.

1.5.3.3 PREPARATION OF SEARCH STRATEGY

Conducting a useful search strategy involved the following :

- (i) Necessary search aides, such as system manuals and search aids, system database information, vocabulary control devices and classification schemes, dictionaries, glossaries, etc.
- (ii) Information about the query obtained by conducting pre-search interviews by an intermediary, consulting different tools to get a clear

understanding of the information requirements and determination of exact requirement.

- (iii) Choice of databases can be governed by coverage of subject, document, accessibility, period, search fields and search devices/tools, performance, etc.
- (iv) Analysis of the query and selection of search terms through; knowledge of the systems and files, and use of reference tools.
- (v) Planning and carrying out the search through using search operators such as Boolean, Proximity, etc.
- (vi) Obtaining results using the most suitable display/print formats and modifying search term(s) or strategy if the results are not satisfactory.
- (vii) Keeping a record of the steps followed in the search, and search output in printed form or disk.

1.5.3.4 SEARCH TECHNIQUES

Many of the online service software packages have a wide variety of search and retrieval provisions. However, most software is limited to Boolean and proximity searching. With the introduction of World Wide Web (WWW), a number of retrieval systems, called web search engines have been developed that help users search and retrieve information from WWW. The following are the common search facilities available in all text retrieval packages.

Boolean query formulation : A text retrieval system is provided for query formation by using Boolean AND, OR and NOT operators, and also nested Boolean searching. Boolean search facilities allow user to combine search terms in a given search prescription. Nested Boolean search facilities allow more complex conditions to be imposed along with the search terms. The following search statements permitted in BRS/search software illustrate the use of Boolean operators.

FISH AND CHIPS

will retrieve all records with the search terms FISH and CHIPS occurring in the same record ;

FISH OR CHIPS

will retrieve all those records where either of the search terms occurs;

FISH NOT CHIPS

will retrieve all those records where the search term FISH occurs and at the same term CHIP does not occur;

FISH XOR CHIPS

will retrieve all those records where either of the search terms occur but not both. Text retrieval software may use different conventions for denoting the different Boolean operators.

Proximity Searching : This search facility allows the user to specify whether two

search terms should occur adjacent to each other, whether one or more words occur in between the search terms, whether search terms should occur in the same paragraph irrespective of the intervening words, and so on. The following are some examples of proximity searches accepted in BRS/Search :

FISH **SAME** CHIPS

will retrieve all records where the search terms occur in the same paragraphs;

FISH **WITH** CHIPS

will retrieve all records where FISH and CHIPS occur in the same sentence;

FISH **ADJ** CHIPS

will retrieve all records where FISH is followed by CHIPS or CHIPS is followed by FISH in the same sentence. Text retrieval software differs in its use of notation for representing various proximity operators.

Range searching : This is important in selecting range of records in set of records of database. The following options are usually available for range searching :

- * greater than (>)
- * less than (<)
- * equal to (=)
- * not equal to (/ = or < >)
- * greater than equal to (> =)
- * less than equal to (< =)

These operators are used to prescribe condition in a given search statement.

Limiting searching : The database in a text retrieval system comprises different fields containing different items of information. The text retrieval system should provide facility of limit the search in one or more fields by the users. The following examples from BRS/Search :

BIRD . PET

will retrieve all records where the search terms BIRD occurs in the field named PET.

Truncation : Truncation allows a search to be conducted for all the different forms of a word having the same common root. For example, the truncated terms COMPUT* will retrieve items on COMPUTER, COMPUTING, COMPUTATION, COMPUTE, etc. Different options of truncations are available : right truncation, left truncation, and masking of letters in the middle of the word. Left truncation retrieves all words having the same characters at the right hand part, i.e., '*hyl' will retrieve words link methy, ethyl, etc. Similarly, middle truncation retrieves all words having the same at the left and right hand part. For example, a middle truncated search term 'col*r will retrieve both the terms 'colour' and 'color'.

A 'wild card' is used to allow any letter to appear in a specific location within a word.

String searching : String searching allows the user to search on character strings within the body of the text in a record, which is usually available for those fields whose

text has not been included in an inverted file or pre-indexed. In other words, string searching allows one to search those terms have not been indexed. Some text retrieval system provide a facility for string searching.

1.5.4 SUMMARY

Online searching of bibliographic services initially carried out by the commercial and business organisations. Information Communication Technologies (ICT) made the information society easier in usage. Many non-commercial organisations are ready to provide online databases for their users. National library of Medicine of U.S. started first online services to their users. Number of commercial vendors are providing online services. OPAC is a tool for searching resources of a particular library or group of libraries. OPAC provides facility to search resources by remotely available terminal via telecommunication technology. OPACs search facilities are categorised into three generations: first, second and third generations. Now-a-days many libraries are providing web-based OPACs, generally called 'Web OPACs'.

There are many commercial vendors such as DIALOG, ORBIT, BRS, etc playing basic elements: searcher, search formulation, input search formulation, workstation, link to computer system, search software, store of information, retrieved time, and the printer. Bibliographic text retrieval software are providing number of search facilities for search of the online databases; Boolean query formulation, proximity searching, range searching, string searching, truncation, etc.

1.5.5 KEY WORDS

1.5.6 REFERENCES AND FURTHER READINGS

Armstrong, C. J. and Large, J.A. (eds). *Manual of online search strategies*. Adeershot, Gower, 1988.

Chowdhry, G. G. *Introduction to modern information retrieval* London : Library Association Publishing, 1999.

Hartley, R. J. and Large J. A. *Online searching : principles and practice*. London Bowder-Saur, 1990.

Lancaster, F. W. *Information retrieval systems : Characteristics, testing and evolution*. Ed. 2. New York : John Wiley, 1978.

Vickery, B. C. *Techniques of information retrieval*. London : Butterworth, 1970.

Walker, G. and Janes, J., *Online retrieval : a dialogue fo theory and practice*. Englewood, Libraries Unlimited, 1993.

1.5.7 SELF-CHECK EXERCISE

Note : (i) Use the space provided below for your answer.

1. Define OPAC.

2. Describe the various generations of OPAC.

3. Enumerate the historical perspective on Online search services ?

4. Describe the various searching facilities available in the bibliographic text retrieval system.

