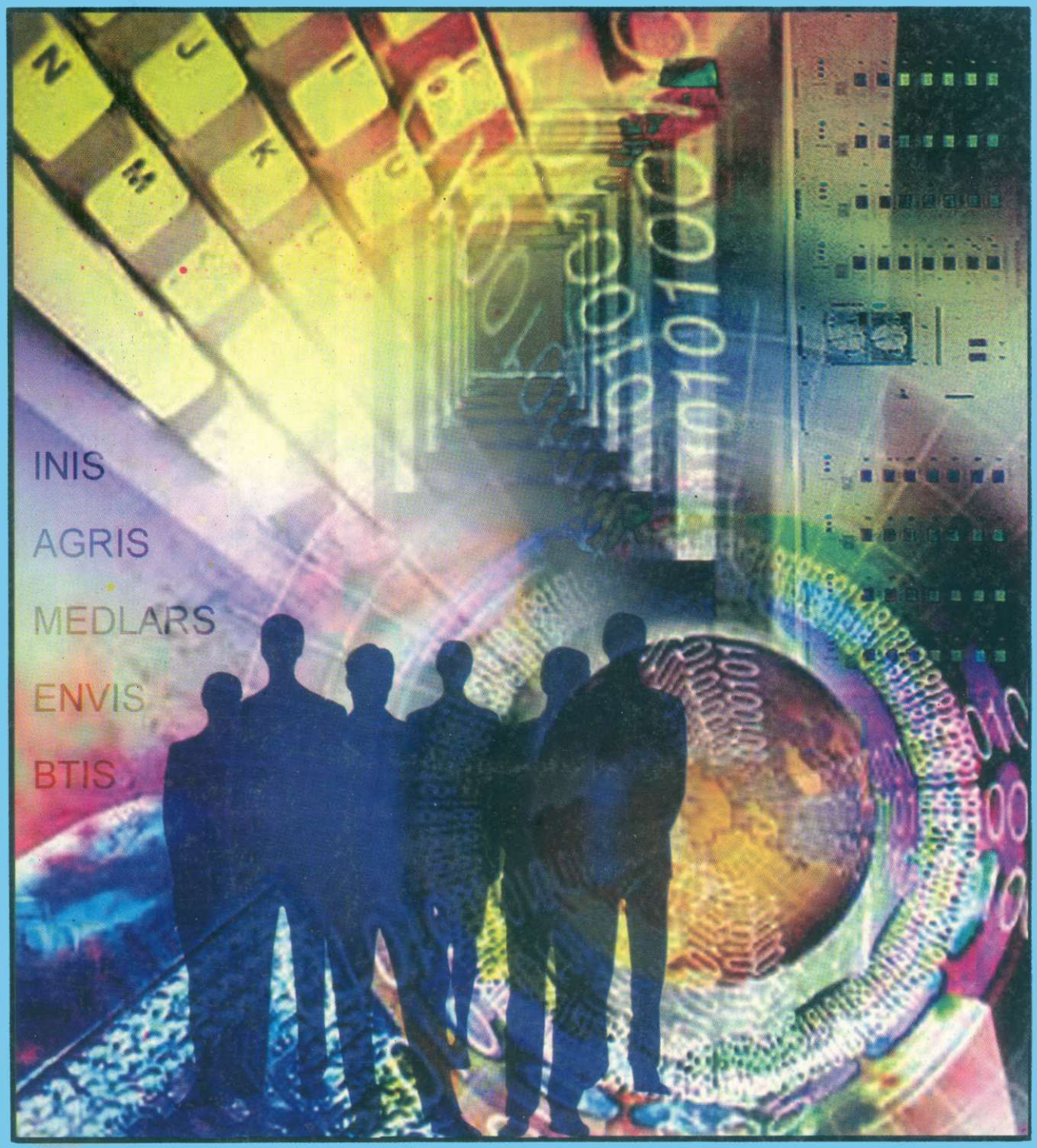
Indira Gandhi National Open University
School of Social Sciences

MLII - 101

Master's Degree in Library and Information Science (MLIS)



PART - I

"शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्र की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।"

— *इन्दिरा गांधी*

ignou
THE PEOPLE'S
UNIVERSITY

"Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances."

– Indira Gandhi

Indira Gandhi
National Open University
School of Social Sciences

MLII-101
Information Sources, Systems and Services

COURSE INTRODUCTION

Part-I

BLOCK 1 : INFORMATION INSTITUTIONS

Unit 1 : Information Institutions: Evolution, Growth, Functions and Types 11
Unit 2 : Information Centres: Types and their Organisation 45
Unit 3 : Data Centres and Referral Centres 72
Unit 4 : Information Analysis and Consolidation Centres 102

BLOCK 2 : INFORMATION SOURCES, SYSTEMS AND PROGRAMMES

Unit 5 : Information Sources: Categorisation 125
Unit 6 : Print and Non - Print Sources 154
Unit 7 : National Information Systems and Programmes 181
Unit 8 : Global Information Systems and Programmes 213
Unit 9 : National and International Information Organisations 239

Part-II

BLOCK 3 : INFORMATION PRODUCTS AND SERVICES

Unit 10 : Information Products - Part-I 283
Unit 11 : Information Products - Part-II 298
Unit 12 : Information Services - Part-I 319
Unit 13 : Information Services - Part-II 370

BLOCK 4 : INFORMATION INTERMEDIARIES AS SOURCES OF INFORMATION

Unit 14 : Library and Information Professionals 415
Unit 15 : Information Intermediaries 437
Unit 16 : Database Designers and Managers 457
Unit 17 : Database Intermediaries 487
Unit 18 : Media Persons 504
Unit 19 : Intelligent Agents 523

ignou THE PEOPLE'S UNIVERSITY

Programme Design Committee (1992)

Prof. Pandav Nayak
(Chairman)
Prof. (Ms.) A. K. Anand
Prof. J. C. Binwal
Prof. M.A. Gopinath
Prof. B. Guha
Prof. S. R. Gunjal
Prof. S. G. Mahajan
Shri N. M. Malwad
Dr. S. S. Murthy
Prof. K.S. Raghavan
Prof. T. N. Rajan
Prof. A.P. Srivastava
Prof. T. Viswanathan
Dr. (Ms.) Neela Jagannathan
(Special Invitee)
Dr. Uma Kanjilal
(Internal Faculty)
Ms. Neena Talwar Kanungo
(Internal Faculty)
Dr. R. Satyanarayana
(Convener)

Course Preparation Team (1992)

Ms. C.M.Anand
Ms.Renu Arora
Dr. A.Y.Asundi
Dr. R.P.S. Dhaka
Prof. S.B. Ghosh
Prof. M.A.Gopinath
Prof. S.R.Gunjal
Dr. B.M.Gupta
Dr. L.J. Haravu
Dr. Neena Talwar Kanungo
Shri N.M.Malwad
Dr. S.S.Murthy
Dr. T.A.V.Murthy
Prof. N.G.Naidu
Prof. T. N. Rajan
Ms. Suhasini Reddy
Prof. R. Satyanarayana
Prof.B.K.Sen
Dr. K.G. Tyagi

Course Editors : Prof. T.N. Rajan and Prof. B.K. Sen

Programme (Curriculum) Revision Committee (2003)

Prof. S.B. Ghosh *(Chairman)*
Faculty of Library & Information Science, School of Social Sciences, IGNOU
New Delhi

Dr. Jagdish Arora
Librarian
Indian Institute of Technology
Mumbai

Prof. S.R. Ganpule
Dept. of Library & Information Science
Yaswant Rao Chavan Maharashtra Open University
Nasik

Prof. B. Guha
Professor (Retd.)
Dept. of Lib. & Inf. Sc.
Banaras Hindu University
Banaras, U.P.

Prof. Uma Kanjilal
Faculty of Lib. & Inf. Sc.
IGNOU, New Delhi

Dr. Neena Talwar Kanungo
Faculty of Lib. & Inf. Sc.
IGNOU, New Delhi

Prof. C.R. Karisiddappa
Head, Dept. of Library & Information Science
Karnataka University
Dharwar

Dr. A. Lahiri
Senior Advisor
Dept. of Scientific & Industrial Research
New Delhi

Prof. P.B. Mangla
Professor (Retd.)
Dept. of Lib. & Inf. Sc.
University of Delhi, Delhi

Prof. A. Neelameghan
UNESCO Expert (Retd.)
Sarada Ranganathan Endowment for Library & Information Science
Bangalore

Prof. T.N. Rajan
Chief Coordinator (Retd.)
INSDOC, New Delhi

Dr. Pravakar Rath
Faculty of Lib. & Inf. Sc.
IGNOU, New Delhi

Prof. J. Sarkhel
Head, Dept. of Library & Information Science
Vidyasagar University
Midnapur, W.B.

Prof. R. Satyanarayana
Professor (Retd.)
Faculty of Lib. & Inf. Sc.
IGNOU
New Delhi

Prof. B.K. Sen
Head (Retd.)
Education Division, INSDOC
New Delhi

Dr. Mahinder Singh
Director
DESIDOC, Delhi

Dr. N. Vijayaditya
Director General
National Informatics Centre
New Delhi

Prof. T. Viswanathan
Ex-Director, INSDOC
New Delhi

Dr. (Ms.) Neela Jagannathan
(Special Invitee)
IGNOU, New Delhi

Programme Coordinators	:	Prof. S.B. Ghosh and Prof. Uma Kanjilal
Course Coordinator	:	Dr. Neena Talwar Kanungo
Course Editor	:	Prof. T.N. Rajan

Course Preparation Team

Unit No.	Contributor
1	Prof. R. Satyanarayana
2,8,9,17	Ms. Renu Arora
3	Dr. A.Y. Asundi, Dr. J. P. Singh
4,7,10,11,12	Ms. C. M. Anand
5,6,14	Prof. B. K. Sen
13,15	Prof. S. B. Ghosh (Academic Assistance: Mr. Anup Kumar Das)
16	Dr. N. M. Malwad, Dr. J. P. Singh
18	Prof. T. N. Rajan
19	Prof. T. Viswanathan

Material Production	Secretarial Assistance	Cover Design
Mr. Jitender Sethi Mr. S. S. Venkatachalam Mr. Manjit Singh School of Social Sciences IGNOU, New Delhi	Ms. Sangeeta Bagasi School of Social Sciences IGNOU, New Delhi	Mr. Gobind Singh

January, 2006 (Revised Edition)

©Indira Gandhi National Open University, 2006

ISBN : 81-266-2204-0

All rights reserved. No part of this work may be reproduced in any form, by mimeograph or any other means, without permission in writing from the Indira Gandhi National Open University.

Authors are responsible for the academic content of this course as far as the copyright issues are concerned.

Further information on the Indira Gandhi National Open University courses may be obtained from the University's Office at Maidan Garhi, New Delhi-110 068.

Printed and published on behalf of the Indira Gandhi National Open University, New Delhi, by Director, School of Social Sciences.

"Paper Used: Agrobased Environment Friendly"

Laser Typeset by : Rajshree Computers, V-166A, Bhagwati Vihar, Uttam Nagar, New Delhi-110059

Printed at : Dee Kay Printers, 5/16, Kirti Nagar Indl. Area, New Delhi-110015.

ignou
THE PEOPLE'S
UNIVERSITY

COURSE INTRODUCTION

The modern society is a society of institutions. Every task, whether economic performance or health care, education or protection of environment, the pursuit of new knowledge or defence is being entrusted to the care of big organisations. Therefore, on the performance of these institutions rests the performance of the modern society—if not the survival of each individual would remain unattended. In this context knowledge institutions such as, libraries, documentation centres information centres, etc. play a very vital role. The primary objective of this course is to provide necessary background information relating to different types of information institutions and the various types of information services and products to the learners of this programme.

Block 1: Information Institutions

This Block, comprising four units (1-4), deals with information institutions for various kinds that had sprung with the needs for a variety of products and services that were developed. Different institutions were necessary to be instituted at different periods with varying functions, activities and programmes. These different types of institutions are discussed in this Block.

Unit 1 gives a historical perspective of information institutions that began to take shape delineating their evolution on the basis of the information transfer process with corresponding value systems along with the significant features associated with three eras, viz. 1) Discipline-oriented Information Transfer, 2) Mission-oriented Information Transfer, 3) Problem-oriented Information Transfer. The institutions that developed with this type of information transfer are discussed with examples. Dealing with the institutions that are springing up with Knowledge Based Economy, examples are cited the way they are growing. The Indian scenario is discussed in the context of institutional development process with examples. Looking at the future prospects, the Unit places emphasis on institution building as a necessary process to handle newly developing need-based information institutions.

Unit 2 of this Block discuses Information Centres, as a distinct form of information institutions that arose with the special needs for higher levels of services. These became essential for information support for business, trade and commercial organisations, government departments and research organisations. The different kinds of information centres are described with the typical products and services they offer. Most of these products and services, which are increasingly becoming computer-based are also explained. An outline of the management of these types of information institutions with their specific functions, products and services is also given. Some illustrative examples of information centres at the local, national, regional and international levels are also given.

Unit 3 defining data as facts and figures, used as a basis of reasoning, discussion or calculation, describes data activity in wide variety of disciplines. This involves operations like gathering, compilation, processing, evaluation and dissemination. Data centres perform these activities in different subject fields. The establishment of CODATA, which is an important landmark, is indicated. Several other data centres in national and international, in scientific disciplines and social sciences are briefly described. Distinguishing referral service from reference service, explains the functions and activities of a few referral centres, at the international and national levels.

Unit 4 deals with the Information Analysis and Consolidation Centres that are subject based and offer products and services, which require high professional skills and subject knowledge. The different products of such centres are explained with examples. The planning and management processes of IAC Centres are emphasised. Information

Analysis Centres in India are examined, accentuating on the special need for an Information Policy in developing such centres.

Block 2: Information Sources, Systems and Programmes

This Block (Units 5 to 9) describes information sources and resources, their variety, their reference value, information systems that have been developed and specific programmes at the national and global levels.

Unit 5 of this Block identifies categories of information sources and resources distinguishing their differences. The former is related to library and information science and the latter to information and communication technologies. An outline of documentary and non-documentary sources is given with examples. The non-documentary sources comprise human and organisational sources. A fairly exhaustive list is given with descriptions of their skills, expertise and their reference value.

Unit 6 gives a good overview of print media, non-print media and storage media. While relative advantages of each of these media is explained, they are bound to co-exist, without displacing the other. The print-media include a variety of documents; the non-print media includes electronic, cyber media and virtual reality media. The storage media deal with optical, magnetic and microforms.

Unit 7 gives an exhaustive survey of national information systems and programmes operating in India. These pertains to systems in science and technology, social sciences, and humanities and programmes related to language-literature.

Unit 8 of this Block deals with global information systems, which include general information systems, subject oriented and specialised information systems. **Unit 9** describes both national and international organisations, which include both government and non-government organisations. The two other special organisations described in this Unit are Chemical Abstract Service (CAS) and MEDLARS. These two nationally controlled systems with international coverage of their respective subjects have been operating for a century and more in the case of MEDLARS. They are not only popular in terms of use but provide extremely well organised services respectively in Chemistry and Chemical Technology and Medical Sciences in its entirety. However, these systems have described in detail in Unit 8.

Block 3: Information Products and Services

Block 3 (Units 10 to 13) covers a wide range information products and services, briefly describing the techniques and tools in their preparation, and offering a variety of services.

Unit 10 deals with grey literature, which have been a major category of information products, which are quite often sought by users. Newsletters, House Journals, Trade Bulletins, are described giving a quick historical background, their characteristics, functions, impact of ICT, bibliographic control, etc.

Unit 11 expatiates consolidation and repackaging of information, which includes reviews and related publications, state-of-the-art reports, trend reports, technical digests, which are specifically orienting towards users needs.

Unit 12 deals with literature search services and technical enquiry services, with particular reference to ICT. Document Delivery Services (DDS) are given a fairly extensive treatment, their origin, growth, new models, challenges in the context of ICT, and the institutions that have been specialising in this service. Similarly translation services have been explained with their importance, the vicissitudes in their growth, machine translation, etc. DDS as well as the translations services are seen in the Indian context also.

Unit 13 handles a group of library and information services in relation to some of the techniques and tools required to organise them. Electronic information services, and in particular, citation-analysis–based services are described in considerable detail. Various aids to information sources are also given.

Block 4: Information Intermediaries as Sources of Information

This Block introduces specialists and experts as sources of information, a very significant and potential group involved in a variety of information systems. This source is not tapped mostly because this does not form part of a formal organised information system. Often this source refers to persons who operate in various information systems and services in designing, developing, and servicing, applying information and communication technology.

Information Intermediaries are agents acting between persons, parties, points, stages, things, and establish appropriate contacts, with a view to help and assist the two ends, viz. a user and a database. This Block draws attention to six types of intermediaries, involved in various programs and activities of information systems. As this is a somewhat veiled source, their use depends on the knowledge of different situations in which intermediaries could be effectively used, who have the requisite skills, expertise and experience. The utility of these experts depends upon the manner in which they are approached for information, which may not be available at all, in any documented form. It may indeed be a difficult source to access and use too. For, experts may not be willing to be used as sources for valid reasons of their own. Yet they constitute very effective and invaluable sources of information for areas, which are highly specialised. If the experts are sufficiently compensated or motivated for giving their expertise or skills, these sources may be of immense value. The six units (Units 14 to 19) which deal with this type of sources of this Block, are briefly summarised below:

Unit 14 highlights two categories of experts, the first being library experts, operating in different functional designs and development, operations and services in libraries. The second category is a wide variety of information professionals, constituting experts who are associated with information activities in one way or the other. These two groups could serve as useful sources when any information is required at depth in their respective fields of specialisation. The functions and activities of these experts are explained with their potential reference value.

Unit 15 presents a group of experts who have conspicuously grown in the context of scientific and industrial research, business environments, in problem solving solutions for a variety of socio-economic developments, and a number of similar activities. A variety of such groups have grown which include Information Brokers, Information Consultants, Online Vendors, Technological Gatekeepers, Invisible Colleges, Information Filters, Intelligent Agents, Extension Workers, Paramedical Professionals, Block Development Officers, etc. Their roles and functions in different contexts are explained indicating the special skills they have. Some of them are operational in a commercial environment charging for their services. There are also services, which are free. Unlike the groups that are mentioned in the other units of this Block, this group is much more visible and comparatively easier to be accessed and high quality services can also be obtained. ICT-based intermediaries such as Internet, Filtering Software, Expert Systems and Electronic Brokerage are also explained. In the Indian context, the emergence of intermediaries such as gatekeepers, information consultants and extension workers, paramedical professionals is noteworthy.

Unit 16 focuses attention on intermediaries, functioning as database designers and managers. A brief description of the basic concepts of information systems, databases, etc. is given to put the discussions in a proper perspective. The different persons

involved in database designs and operations are identified with their particular part in these activities. A few categories of information system professionals are listed with explanation of their specific functions. The particular emphasis in this Unit is on the role of these intermediaries as resource persons and their value in training users of information systems. Doubtless these intermediaries would serve as invaluable sources of information in very highly specialised areas, if they are judiciously taped.

Unit 17 is specifically on database intermediaries who connect users with databases. It is the primary role of a database intermediary to translate a user's need into a query to obtain answers. The different functionalities of an intermediary as a searcher, editor and their interaction with users are explained. Touching upon the future of database intermediaries, the role of web intermediaries as computational entities is briefly discussed. Despite these technological advances, the role of persons as database intermediaries would continue to be invaluable as sources of information.

Unit 18 deals with another set of potential sources of information, viz. the media persons. Media is one of the most powerful instruments for shaping public opinion and public policy. Persons operating in the different mass media such as newspapers and periodicals, radio, television, etc. are explained with their expertise and experience as potential sources of information. Advertisements and Public Relations are inseparably interlocked with media. Both are sustained by media and vice versa. The different categories of persons are identified and their reference value is highlighted.

Unit 19 deals with another group of experts who are functioning in designing and developing intelligent agents, using agents technology. An Intelligent Agent (IA) is autonomous or semi-autonomous user-friendly software that is capable of taking decisions proactively and assist a user in an intelligent way by learning from the user. It can be in an independent or collaborative manner, move from one machine to another, and run on a wide variety of computer platforms. The two categories of IA are Industry Intelligent Agents and Internet Intelligent Agents. The object of the former is to provide intelligent inputs to improve various industrial processes and the object of the latter is to reduce information overload and reduce the tedious tasks of navigation and access. The different characteristics of IA are summarised in a table with their meanings. All IAs are put through the Turing Test. Analogous to human learning, IAs are made to learn though various procedures. The five types of Internet Agents are:

i) E-mail Agents to manage e-mail of the user; ii) Web Browsing Agents, designed to improve the efficiency of search on the Internet; iii) Information Agents, viz. Information Retrieval (IR) Agents and Information Extraction (IE) Agents, performing respectively the functions of search and listing documents and performing an advancement of IR, both have built-in learning capability; iv) Frequently Asked Questions (FAQ) Agents are specially designed to answer questions that are frequently asked, and v) Web Mining Agents that discover from websites valuable information that may be hidden in their contents. Distributed Agents are a group of intelligent agents that are located at different geographical locations via network infrastructure to solve large problems. Their designs and functions are explained briefly. Mobile Agents are those that are capable of moving from machine in a heterogeneous network environment and executing themselves on any machine. A few other IAs like Typed Messages Agents are also briefly described. Agent technology has evolved not only from Artificial Intelligence technology by also has drawn extensively from distributed computing and databases, software design and network technology. All these have been succinctly presented in this Unit with clarity for easy understanding. Persons who are associated with IAs are a potential source who constitutes a rare group of experts.

BLOCK 1

INFORMATION INSTITUTIONS

ignou
THE PEOPLE'S
UNIVERSITY

UNIT 1 INFORMATION INSTITUTIONS: EVOLUTION, GROWTH, FUNCTIONS AND TYPES

Structure

1.0 Objectives

1.1 Introduction

1.2 Evolution of Information Institutions

- 1.2.1 Growth Patterns

1.3 Types of Information Institutions

- 1.3.1 Libraries
- 1.3.2 Documentation Centres
- 1.3.3 Information Analysis Centres
- 1.3.4 Data Centres
- 1.3.5 Referral Centres and Clearing Houses
- 1.3.6 Deinstitutionalised Information Services

1.4 Indian Situation

- 1.4.1 The Three Era Framework
- 1.4.2 Research and Information System for Non-Aligned and other Developing Countries

1.5 Institution Building

- 1.5.1 Prerequisites for Building Institutions
- 1.5.2 Human Resources
- 1.5.3 Role of Institutions in Knowledge Based Economy

1.6 Summary

1.7 Answers to Self Check Exercises

1.8 Keywords

1.9 Acronyms Used in the Text

1.10 References and Further Reading

1.0 OBJECTIVES

After reading this Unit, you will be able to:

- comprehend the nature of Information Institutions and describe their growth pattern;
- identify different types of Information Institutions and their specific role in the dissemination of information to individuals, groups, as well as organisations,who might require information in different forms and formats;
- focus attention on "planned institutional building" with particular reference to developing countries;
- understand how technologies are impacting the organisation structure;
- know the characteristics of new millennium organisations;
- assess the preparation of an information institution for its role in Knowledge Based Economy (KBE); and
- identify indicators of preparation for KBE.

ignou THE PEOPLE'S UNIVERSITY

1.1 INTRODUCTION

Modern society is a society of institutions. According to Peter Drucker "every major task, whether economic performance, or health care, education or protection of environment, the pursuit of new knowledge or defence, is today being entrusted to big organisations, designed for perpetuity and managed by their own managements. On the performance of these institutions, the performance of modern society – if not the survival of each individual – increasingly depends". He further affirms that every institution comprises human beings – men and women, whose performance brings success or failure to the institution and thereby to the society.

Modern society is rapidly transforming into a "Knowledge Society" and the concept of "Knowledge Based Economy" (KBE) has generated tremendous interest in recent years. As a result, a paradigm shift is taking place for information institutions. In fact, organisations, companies and workers are continuously urged to prepare for the new era of "Knowledge Based Economy (KBE)". Effective exploitation of information in organisations appears to be a distinguishing feature of this new socio-economic model. Since formal provision of information and knowledge has been the crucial responsibility of information institutions, it is imperative that to stay relevant in the new environment they respond quickly and appropriately to the challenge posed by KBE. Many writers have stressed that information institutions must find a role in KBE by adopting new methods and tools, remarketing and repositioning themselves; furthering their knowledge of customer needs, and embedding themselves in the organisations they work for. Libraries and information centres have also been advised to focus more on evaluating; analysing, synthesising, qualifying and delivering externally created contents. The information professionals in the Knowledge Economy are also expected to be aware of the changes in the organisational structure in order to make themselves as integral part of new organisation. They should be willing to refine their roles to function as information managers, research analysts, and knowledge facilitators.

In this Unit an attempt has been made to examine and discuss a variety of organisations, whose main stock in trade are knowledge, literature and information evolved out of user needs and demands. The Unit also presents the existing information transfer patterns, which have resulted in the creation of information institutions with varying functions.

1.2 EVOLUTION OF INFORMATION INSTITUTIONS

If we examine the institutions that have come up during the 20th century especially in the latter half, we can discern a typical pattern of growth. Although this pattern of growth could be perceived only in the industrially advanced countries of the west, their influence could be felt even in the developing countries. In fact, many of the developing countries have accepted the Western model in designing and developing their own institutions. This is not something unusual. The report entitled "Into the Information Age: A Perspective for Federal Action on Information" by Arthur D Little, Inc. describes the development of Information Institutions in the USA. In doing so, the report identifies three basic modes of information transfer. The report contends that the process of transfer of information / knowledge consists of a chain of activities, the main links being generator, editor, publisher of primary publications, indexing and abstracting journal producers, libraries, documentation and information centers, on-line services, information companies and the end user as indicated in the Fig. 1.1. The institutions that normally perform these activities can broadly be grouped into three categories as under:

i) Knowledge Creating Institutions (under this category fall: research laboratories, R&D institutions, institutions of higher education and research attached to universities, etc.).

ii) Knowledge/Information Processing and Disseminating Institutions such as: publishers of books and journals, statistical data organisations, S&T data centres and the like.

iii) Institutions that collect, store, process, disseminate and service knowledge/ information recorded in various forms.

A careful study in this regard reveals that over the years, there has been an increasing interaction and cooperation among all these categories of institutions. It may also be noted; that with the application of modern technologies to information generation, processing, dissemination, distribution and use, many of these functions are getting blended, reducing the distinction between different link elements of information chain. At this point of time, however, the different types of institutions mentioned above operate with their distinct identity.

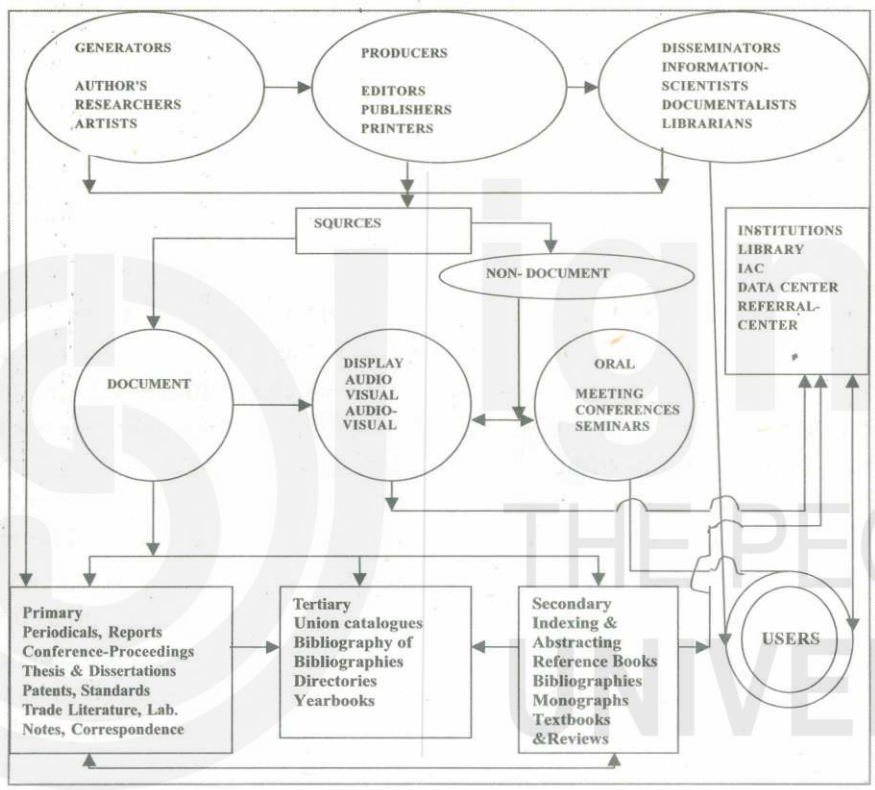


Fig. 1.1: Information Transfer Chain

1.2.1 Growth Patterns

An examination of Library and Information Science Literature reveals that there have not been many studies devoted to the discussion of Information Institution growth. One useful effort in this direction has been that of Vincent Giuliano's report, for the consulting firm Arthur D Little, Inc. This study presents a historical perspective of information transfer pattern and institutional framework, and discusses three basic modes of information transfer, each corresponding to a different value system. The three modes are:

i) Disciplinary Information Transfer corresponding to the value system of pure science, academic and basic, research-called Era I.

ii) Mission-oriented Information Transfer corresponding to the value system of government sponsored missions (such as AEC, NASA in the 1960s)–called Era II.

iii) Problem - oriented Information Transfer corresponding to the value system of solving societal problem- called Era III.

Some of the essential features associated with these Three Eras are discussed in the following sections.

Discipline-oriented Information Transfer (Era-I)

The fundamental ethic associated with this Era-I is *knowledge for knowledge.* The institutions that came into existence during this era are primarily meant to support education, research and development. Information is generally disseminated through primary journals, monographs, seminars and meetings usually associated with academic and research institutions, learned societies, professional bodies and the like. Access to primary information is through indexing, abstracting and bibliographical publications. Institutions facilitating access to documents and use are largely the academic and other institutional libraries though direct access to primary information is also possible. Normally, the user communities are students, academicians, scholars, research workers and others. Financial support to the system is through budgetary provisions, grants and government subsidies. The services are free. This traditional system has been in vogue since a long time in spite of its constraints and limitations.

Mission-oriented Information Transfer (Era-II)

The basic principle behind the development of Information Transfer Organisations during 1950s and 1960s has been '*Organise to do a job'*. In other words, mechanisms have been created to provide information support to mission-oriented agencies like AEC, NASA and such others. In these cases, information transfer process is characterised by a need for coordinating and using knowledge simultaneously from a variety of disciplines, as in the case of NASA mission, where input of information from diverse fields such as electronics, biology, medicine, aeronautics, chemistry, physics, etc. are required. Information is disseminated through primary publications like technical reports, besides journals and other conventional publications. Secondary services providing access to primary information function are through different interpretive and abstracting tools. The technical Information Centres which provide these services form part of the agency and get their budgetary allocation from the concerned agency. The services offered by these Information Centres are utilised by scientists, engineers, technologists and other managers belonging to the agency entrusted with the mission. The feedback mechanism for controlling the information system and using to determine the need for information are ensured in a manner similar to that adopted by Era-I organisations. One of the aspects that gained significance during this period is the concept of *market-oriented information transfer mechanism.*

Problem-oriented Information Transfer (Era-III)

The organising principle that paved the way for the establishment of information organisations in Era-III is *'solving societal problems'* by harnessing appropriate information. Systems that have emerged during this period represent a context in which information is utilised in problem solving such as economic development, industrial planning, agricultural productivity, and environmental protection, etc.

Institutions that can handle the specific type of information and are capable of providing new products and services have not yet completely evolved with appropriate structures. In other words, although systems that exhibit some of the characteristics essential to meet the information requirements of this era have emerged, they need to be properly developed and legitimised. The user community for problem-oriented information systems is somewhat amorphous and ill defined involving a variety of groups such as elected officials, and judiciary, technologists, media people, and the general public.

Apart from the information required from a large number of disciplines-a major portion of non-STI, some of the information required is of local nature, mostly ill-organised, sometimes proprietary or value-oriented, necessitating value judgements.

This type of information services are not rendered normally by the already existing Information Institutions of the earlier eras. The demand for such services has given rise to the emergence of professionals such as Information Brokers, Consultants and Intermediaries, who constitute a new type organisation specialised in quality of information service. Some of these information organisations indulge in repackaging of information collected from a variety of sources with validated and authentic data and serve the groups of clientele who may require such specialised services.

It must be mentioned here that expanding the context of usage of information to societal problem solving gives rise to problems of interpreting technical results in an appropriate manner to suit the needs of non-technical users so as to enable them to take well informed and responsible decisions in matters of public interest and promotion of private business. Naturally, information of this type is not available without a price. Therefore, a private enterprise and highly market-oriented organisational set-up willing to take risk by investing large amounts of money, to cater to the information needs of the consumers, has emerged paving the way for the information industry.

Individual-oriented Customised Information Service (Era -IV)

This era has introduced new challenges to information professionals in the form of identification of individual users need, and development of new products and services that could be marketed. Delivery of information to homebound citizens and consolidation, condensation and repackaging of information to scientists and engineers in industry became the *prime organising principle* behind the development and growth of information institutions of this period. Fee-based Information Services, On demand Companies, Information Consultancies, Information Intermediaries, Information Brokers, etc. sprang up in countries like United States of America, U.K., France, Germany, Austria and Belgium.

It may be noticed that while the major organisations such as PREDICASTS, Arthur D Little Co. Inc, Lockheed Information Services, SDC, BRS, New York Times Information Bank, etc. have been operating since a long period, many of the other set-ups came up during 1970s and developed in the 1980s.

The large firms are founded by people with a background in journalism, law, business administration, etc. and are generally staffed with subject specialists. The medium sized organisations are run by Information Specialists with a background in Library Automation, Information Retrieval, and Systems Analysis and Design. Some of the small commercial services are managed by Information Specialists with or without advanced degrees in subject fields.

New Millennium Organisations

The decade of 1990s has witnessed a great many changes. One such change is the way organisations are viewed and managed. Organisations may no longer be considered as production-oriented entities, divided by function (human resource management, accounting, research and development, marketing service, etc.). Management experts view modern organisations as flexible structures characterised by geographically dispersed workforce in which client-oriented work groups or teams based around organisational processes, act autonomously to meet the goals of the organisation. (Drucker, 1988.)

Many terms have been employed to describe the new type of organisations. Each of these descriptions conveys a vivid impression of new millennium organisation. For instance, one of the descriptions conceives it as a 'knowledge-based' organisation in which employees' knowledge is the organisation's primary asset. Another perception of new millennium organisation is that it will be a 'learning organisation' in which the individuals, teams, and the organisation itself continuously learn from the environment and from their activities, and act on what they have learnt. A third view is that it will

be a knowledge-based organisation in which the products and services are customised and continually enhanced or changed to indicate what has been learnt from customers. In other words, it will be an extended enterprise, in which customers, clients, suppliers, governments and other stakeholders are included explicitly in the definition of organisation itself. Yet, another view is that it will be a networked organisation in which computer-based communication networks enable wide spread and rapid communication among all groups in the extended enterprise. Network technologies like the Internet will enable "any time" "any place" communication and access to information.

Two important aspects shape the modern organisations. One is the focus on the role of the learning and knowledge in organisations and the other is the convergence of information technology, telecommunications, and information resources in networked information resources. This demand is necessitated with the rise of knowledge management as the focus of organisational improvement efforts. In such organisations, the information managers may be called "knowledge managers". Knowledge management has certain *implications for librarians* as information providers, and information managers in organisations, for the profession of librarianship, to the field of information science and for the educators of the profession. To know these implications, we need to understand what is meant by knowledge management, to identify knowledge management processes to which librarians and informational professionals contribute.

Knowledge management is concerned with the acquisition, transfer and use of knowledge in organisations. We are now in an information age, in which the primary role of management is to develop the "intellectual capital" of the organisation. According to this view, the knowledge of its workers is the foundation of the organisation's intellectual capital. Knowledge management aims to improve the organisation and its contribution to the economy, by increasing the intellectual capital of the organisation. (Stewart, 1997).

Knowledge management involves three professional domains. They are: i) the business domain, ii) the information content domain, iii) the information technology infrastructure domain (Choo, 1997). Members of organisations drawn from each of these domains play their respective roles in knowledge management. Information content experts include librarians, record managers, and database managers. They are concerned with the acquisition, organisation, and transfer of data, information, and knowledge that may be used by people in business domain. Their primary responsibility is transfer of organisational knowledge. The role of information technology experts is to provide technical infrastructure that enable knowledge management processes which meet the requirements of the organisation.

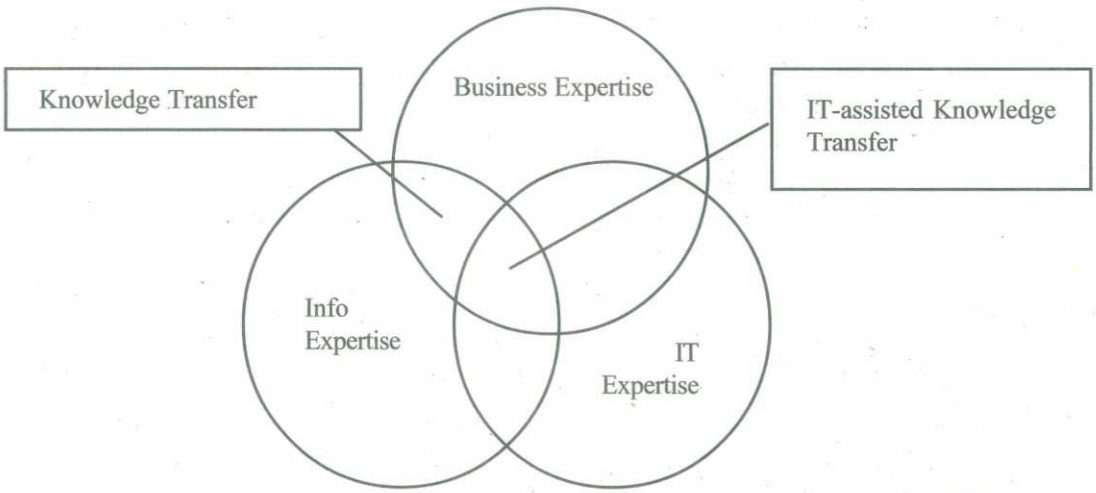


Fig. 1.2: Three Necessary Domains of Expertise for Knowledge Transfer

In the foregoing sections, the perceptible growth patterns relating to Information Institutions has been briefly described. In the next section, let us attempt to identify the various types as they exist at present.

Self Check Exercises

1) Describe in brief the growth pattern of Information Institutions.

2) Explain the nature of 'New Millennium Organisations'.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

1.3 TYPES OF INFORMATION INSTITUTIONS

As per the literature, there are different traditional types of Information Institutions. By far the most popular types are: Libraries, Documentation Centres, Information Analysis Centres, Data Centres, etc. Apart from these traditional institutions, which have been in existence since long, providing information support to individuals as well as to other institutions, many deinstitutionalised information services have sprung up lately. Some of the important types of Information Institutions are discussed in the following sections of the Unit.

The concept of Knowledge Based Economy (KBE), and the consequential changes necessary on the part of Information Institutions to prepare for the new competitive era, have been mentioned. Chase's (1998) prediction that the new Knowledge Economy as a period of rapid change—a paradigm shift for Information Institutions has also been discussed.

1.3.1 Libraries

'Reports of my death are greatly exaggerated', with that brief rejoinder Mark Twain squelched the stories of his death that appeared in the New York papers when he was living in London in 1897. Unfortunately, it is not easy to squelch the equally false reports of death of libraries that have been appearing in the press since 1960s. The truth is that libraries are alive and well and adapting to a changing world. They continue to serve millions of grateful users in both old ways and new, despite the ravages of inflation and budget cuts. It is true that a variety of new and expensive commercial information services are mushrooming to serve the special needs of business and industry, but for most of us, libraries are, and will be for years to come, the only affordable information game in town or on campus (Richard De Gennaro).

The current wave of predictions that electronic technology will soon replace books and libraries, is inspired by a rapidly accelerating series of developments, in that technology which multiplies its power while drastically reducing its costs. Among these developments are communication satellites, cable TV, inexpensive mass-storage in the form of optical and digital videodiscs, and powerful microcomputer on chips.

With them we are acquiring a level of technology, which fires the imagination and gives credence to even the most fanciful forecasts! In this heady environment, there is a danger that those responsible for the financial support of libraries will neglect or prematurely abandon traditional libraries in favour of more glamorous alternatives in promising but as yet untested technologies.

The experts who are predicting the early demise of books and libraries have impressive credentials. They include management consultants, information entrepreneurs, government officials, university professors, and popular futurists. Their forecasts of things to come are based on insights that come from solid knowledge and years of experience. They can neither be ignored nor accepted uncritically.

The insights and perspectives of theoreticians and futurists are useful; they help us to see and understand the complex social, economic, and technological forces that are at work in our larger environment, but only those with authority and responsibility can decide how and when those forces might affect any particular enterprise. Futurists can tell us what the future may be like, but they cannot tell us how to get there or when to make our moves. The really important decisions about any organisation or institution must, in the end, be made by those responsible for it, based on their best judgement and as much practical wisdom as they can muster.

Prominent among and representative of those who are predicting an early end to books and libraries are: Dr. F.W.Lancaster and Dr. Vincent E. Giuliano. Lancaster sums up his views as follows:

"We are moving rather rapidly and quite inevitably towards a paperless society. Advances in computer science and in communications technology allow us to conceive of a global system in which reports of research and development activities are composed, published disseminated, and used in a completely electronic mode. Paper need never exist in this communication environment. We are now in an interim stage in the natural evolution from print on paper to electronics."

In the event, if the paperless society comes as envisioned by Lancaster, it will be but a small part of a massive transformation of our society and our way of life. Obviously, in that society not only libraries, but also the institutions and scholars they serve, may also become obsolete. The best we can do is to try to cope with the changes that are coming now and in next few years, and try to plan for those that are coming in the next 10 or 15 years when books and paper may surely coexist with electronic media.

Giuliano starts by drawing our attention to the changes taking place in the allocation of library budgets by way of cuts and retrenchment of library staff in the context of USA, and contends that the situation is indicative of the beginning of the end of the libraries and librarians, as we know them today. He opines that we cannot save traditional libraries, which have out lived their usefulness, but it is not too late for librarians to save themselves. They can do it either by transforming their libraries into centres for contemporary information which serve their constituents by any and all appropriate means and media, or by abandoning libraries completely and setting themselves up as independent information professionals or moving into other information age jobs. In his lengthy report, Giuliano has put forward many arguments, which in effect plead for the abandoning of traditional libraries. Of all the statements that Giuliano made about the declining role of libraries in our society, the one that is most important and demanding of a careful consideration is the one: "as far as the information institutions in our society go, libraries are of minor importance. Technology has already evolved to a point where access to most of the world's literature can be obtained with in a couple of days through combination of online bibliographic searching

utilities and vendor-supplied computerised order fulfilment system for books, documents, and periodical articles."

If Giuliano is right on this point, then libraries would have indeed served their purpose and may fade away. But, the truth is that most of the new technology based information business, are still largely dependent on the library market for their survival and the information brokers ultimately rely on libraries as the source for most of the documents they supply to their clients. It is still true that most of the libraries – public, academic, governmental and special provide the only means of access in our society to any book, journal, or document that is out of print or more than a few years old Bookstores, even in the major cities, carry only a small collection of books; the rest have to be ordered from publishers. Most books and journals go out of print with in a few years or even months of their publication and are no longer available except in libraries. The time that books are in print is decreasing rapidly as the cost of warehousing books increases.

Most foreign books and journals and specialised documents are not obtainable at all through regular book trade channels. Only a few major research libraries manage to acquire and preserve them. Such materials are dispersed among a number of libraries in every country of the world. Older out of print books can be obtained from libraries.

Another point much debated upon, is whether libraries should charge for their services. Here again, opinion is divided. While one school of thought advocates that libraries must be self-supporting, another school affirms that libraries should not try to transform their libraries into business and businessmen should not try to get into library business. Libraries are by their very nature unprofitable. The use of new technology will not change the basic function of libraries: to acquire, preserve, organise, and make available the records of human achievement. They also serve as powerful and visible symbols of our culture – a function that is frequently overlooked or undervalued. We need to lay to rest, the simplistic idea that electronic technology in the hands of information entrepreneurs is going to put an end to libraries. Libraries are here to stay, but by no means are they going to stay the same. Their basic functions will remain, but the ways and means they used to perform those functions will change in varying speeds for different kinds of libraries in different countries.

As per current thinking, there are many highly valued roles that libraries are expected to play in the 21st century. But, by far the most important one will be that of "Community Information Intermediary", a body that understands and has empathy with its community of users and has a deep understanding of the "Universe of Information" and its organisation. It must actively develop and promote mechanisms that bring together the user and information resources.

Another point worth noting is that the World Wide Web (WWW) is changing the face of libraries – the way we use them and value them. The WWW will impact greatly upon the library, whether the library wants it or not. This impact, to a large extent, would be dictated to the library by forces based both technologically and socially. As a result of Internet and WWW technology, libraries are now presented with software tools, which allow them to solve some of their limitations associated with lack of linkage between the general user main frame environment and having library resources on a separate machine or machines. The WWW can overcome the general user main frame environment's lack of features for information discovery, as well as provide the ability to create virtual "Site", where they can create an electronic presence that patrons (users) can easily locate — a starting point for library services. In fact, the WWW provides the tool for integrating other systems of library such as

online catalogues, and searchable text databases, as well as allowing new resources and services. It may be noted that WWW is a technology, which could spell the end of library, as we know it to-day or be the beginning of a great transformation. It will surely have influence with or without libraries' participation. What will become of the library is not clear yet, as it often takes many years for a technology to come into its full stride. Library users are already expecting many different things from their libraries, of these, the most important one being increased access to information of all kinds plus much more in the way of self-services. Given the rapid pace of technological and social changes that we are experiencing today, it might be inferred that technological change can force social change upon society and its institutions. Viewed from this point, the library of the next few decades will be; i) a place where people won't come as a physical location of information resources; ii) will become an access facilitator; iii) will coordinate access to locally built digital resources.

In concluding the section on libraries it must be emphasised that the stereotype of libraries as static, unchanging institutions is no longer valid, they have to demonstrate a remarkable ability to grow, to adapt to changing conditions to meet new demands, and to implement new technologies. If these aspects are taken care of, then one need not give that much weightage to the predictions made about their future existence.

1.3.2 Documentation Centres

Among the varied forms of organisation for the collection and dissemination of documentary information, Documentation centres are quite important. Traditionally, libraries have been fulfilling the basic function of collecting every kind of publications and maintaining them in a condition ready for use. After World War II, the impetus for provision of documentation services to specialist users has arisen, mainly as a consequence of exponential growth and complexities of information sources. This situation led to the demand of services, involving analysis of the content of the holdings of the libraries in finer detail. In other words, the emphasis was towards provision of information contained in documents rather than servicing the documents themselves. This situation paved the way for the emergence of a new breed of organisations known as Documentation Centres. One of the basic functions associated with any Documentation Centre is that it brings to the notice of specialist users current and recent literature of value to them. However, the functions that are assigned to a Documentation Centre vary from one Documentation Centre to another. For example, a local Documentation Centre has the sole function of providing information services that support the activities and programmes of its parent organisation of which it is a part. It would collect and serve information concerning the actual work in progress of the institution. Towards fulfilling this objective, the local Documentation Centre may be engaged in the selection, acquisition of worth while material and its organisation for use. Its services may be designed both to satisfy the existing and anticipated needs of its users. In other words, the local Documentation Centre might provide both anticipatory service as well as services designed to satisfy specific demands of users. A national Documentation Centre on the other hand will perform certain residual functions and might undertake activities, which are beyond the means of local Documentation or Information Centres.

Generally local Documentation Centres are attached to individual R&D institutions, business houses, industrial enterprises, and government departments, etc. and are administered by their parent institutions. In many cases, the Documentation Centre would be a division of the main institution.

At the national level, it might be the responsibility of appropriate government agencies to establish and to administer such a centre. The general norm recommended for financial support is that 5 per cent of the budget spent on R&D must be diverted to meet the expenditure of a national centre. In a developing country like India, Documentation Centres are mostly established by the government.

There are varying patterns of organisation in different countries. Centralised as well as decentralised structures have come into existence. Countries like UK have adopted a mixture of centralised as well as decentralised models. But, the network concept has gained importance in the modern times and the trend is now towards pooling and sharing of resources for achieving maximum economy and productivity.

1.3.3 Information Analysis Centres

The Weinberg Report extensively discussed the role of Information Analysis Centres (IACs) and their importance and emphasised that "the activities of most successful (information analysis) centres are intrinsic part of science and technology. The centres not only disseminate and retrieve information; they create new information. The process of shifting through large masses of data often leads to new generalisations. In short, knowledgeable scientific interpreters who can collect relevant data, review a field, and distil information in a manner that goes to the heart of a technical situation, are more help to the over burdened specialist than is a mere pile of relevant documents. Such knowledgeable scientific middlemen, who themselves contribute to science are backbone of the information (analysis) centre; they make Information Centre a technical institute rather than a technical library. The essence of good technical Information Centre is that it is operated by highly competent working scientists and engineers – people who see the operation of centre as an opportunity to advance and deepen their own personal contact with their science and technology." The COSATI standing panel wrote the following comprehensive definition into its character: 'An information analysis centre is a formally structured organisational unit, specifically (but not necessarily exclusively) established for the purpose of acquiring, selecting, storing, retrieving, evaluating, analysing and synthesising the body of information and/or in a clearly defined specialised field or pertaining to a specified mission with intent of compiling, digesting, repackaging, or otherwise organising and presenting pertinent information and/or data in a form most authoritative, timely and useful to a society of peers and management.'

The key activities of IACs are: analysis, interpretation, synthesis, evaluation, and repackaging of information carried out by subject specialists, resulting in the production of new, evaluated information – in the form of critical reviews, state-of-the-art monographs, or data compilations, as well as substantive, evaluated responses to queries – for the purpose of assisting a community of users more broadly representative than the staff of the parent institutes or laboratories. The enclosed diagram illustrates the main activities of a typical IAC.

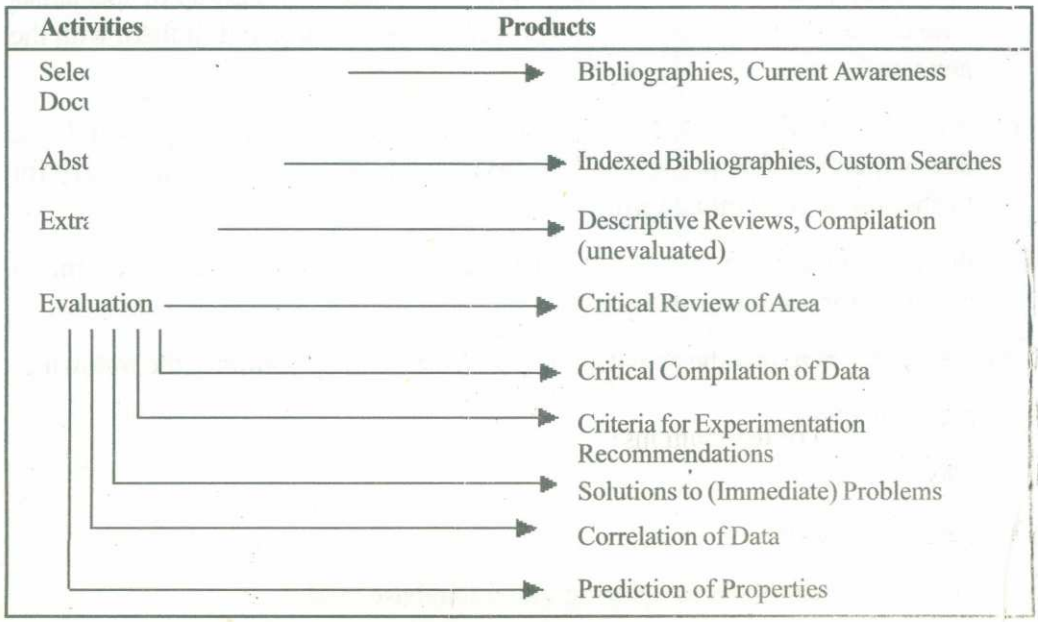


Fig. 1.3: Activities and Products of Information Analysis Centres
(Source: Atherton, 1977)

1.3.4 Data Centres

The contemporary society needs data for various activities such as planning and development, decision-making, etc. in every sphere of human progress.

Data must be collected, processed and organised so as to facilitate its utilisation in an effective manner. There are different categories of data such as: Scientific data, Technical data, Techno-economic data, Industrial data, Manpower data, Socio-economic data, and Demographic data, etc. Data are normally collected through the process of observation and surveys. Data collected from different sources by different methods are required to be stored and made available to those who require it. For this purpose, suitable institutional mechanisms have developed. They are known as Data Centres.

According to UNESCO a Data Centre "constitutes an organisation handling quantitative numerical data". Such centres take the primary function of collecting, organising and disseminating data (mainly numerical) and also provide a measurement service and are in a position to advance relevant measurement techniques. The term 'Data Centre' is used interchangeably to define a range of Information Centres, not all of which are critically evaluating data. Data Centres vary both in scope and size. There can be Data Centres at local, national, regional and international levels. The Data Centre generally includes three major components:

1) An organised data collection (i.e., the database);
2) A connection with data sources which feed the database; and
3) A contact with users who are expected to interact with the database with different types of questions.

This can be diagrammatically represented as:



Fig. 1.4: Structure of a Data Centre

The following are the basic principles relating to the organisation of a Data Centre:

i) data received and collected from different documents by a group of specialists who decide the importance and relevance of data, control and fit them with the generator source;

ii) the received data are organised in order to establish that they represent basic data which must be processed or synthetic data which may be necessary for further use in their initial form;

iii) the data are converted to a machine-readable form and is structured into a database for computer processing.

It may be stated here that the activities of a Data Centre may comprise the following:

i) data collection,
ii) data control,
iii) data codification,
iv) data organisation and structuring into a database, and
v) data retrieval.

For accomplishing all these functions, a Data Centre should be equipped with suitably trained manpower. Many such Data Centres have been established under the erstwhile NISSAT programme. National Information Centre for Crystallography is an example of a Data Centre.

1.3.5 Referral Centres and Clearing Houses

Referral Centres

There are a variety of organisations involved in the dissemination activity. These organisations need to be properly coordinated by an agency for their effective functioning. This situation has paved the way for the establishment of a new kind of organisation known as Referral Centre. Referral Centres provide switching mechanisms among different types of Information Institutions. The basic function associated with a Referral Centre is that it serves as an intermediary, directing those who have queries concerning scientific and technical subjects, to organisations as well as to individuals who have specialised knowledge in those fields and are willing to share that knowledge with others. Referral Centres provide guidance and assistance in solving the information problems of the user community with regard to appropriate information. To achieve this objective, a Referral Centre has to perform certain basic operations. These are:

1) A Referral Centre should possess an inventory of all significant information resources in different disciplines.

2) It should compile and publish directories of scientific and technical information resources.

3) A Referral Centre has to analyse the operating relationship that exist in the scientific information complex.

For the purpose of Referral Centre, **information resources** may be considered to include Professional Societies, University Research Bureau and Institutes, Government Agencies, Libraries, Testing Stations and Individual Experts as well as more professional source of information such as Technical Libraries, Information and Documentation Centres, and Abstracting and Indexing services.

At any given point of time, a Referral Centre must be in a position to provide information relating to the number of libraries and specialised Information Centres available in a particular subject field and their location. Such analytical data will help in the day-to-day working of a Referral Centre.

A Referral Centre might receive request by letters, by personal visits and through telephone. Advice can be provided on the spot in case of telephonic enquiries and personal visits, but it is generally followed by a letter conforming or amplifying the information that has been given. The information given might be a list of names and addresses of resources appropriate to the request made by the user.

Clearing Houses

A Clearing House is a central agency for collection, classification and distribution of information. It may include specialised Information Centres as well as conventional libraries. In scientific parlance, a Clearing House is a relatively new word. It represents a depository for documents with the additional objective of servicing as a central agency engaged in the distribution of information. It also includes such functions as collecting and maintaining records of research and development. Sometimes, subjective questions about items in these records are referred to the source and thus a Clearing House may have to perform the function of a Referral Centre. The Smithsonian

Institute of Science Information Exchange Services serves as a Clearing House for research in progress. Similarly, the National Referral Centre of the Library of Congress provides referral services to experts within the field of enquiry. It does not supply data or documents. The Defence Documentation Centre in the USA is a depository of reports and other documents generated by the Department of Defence. It also serves as a referral centre for identifying experts in various fields.

The Educational Research Information Centre (ERIC) is another centre which acts as a resource centre and also provides referral service. For a number of years the BLLD, U.K., functioned as a Referral Centre.

Most of the Clearing Houses have specialised as well as developed collections. They have **information gathering networks** to acquire documents in their subject areas. They also provide specialised information services in some selected areas. They answer specific and general type of questions and may act as central searching places for enquiry especially for R&D reports.

1.3.6 Deinstitutionalised Information Services

(Non-traditional Information Organisations)

In the preceding sections different types of traditional Information Institutions have been discussed in a brief manner. The purpose was to provide some idea about the range of Information Organisations which have been established over a period of time for meeting the information needs of society, as a whole. It has also been stated that the library, as the traditional storehouse of knowledge and preserver of cultural heritage, is caught in the maelstrom of change, generated by technological advances. While accepting that change will come, it is necessary for us to preserve the essence of institutionalised service by enhancing the key aspects of the overall service. However, the information service is no longer exclusively defined in terms of activities carried out in a traditional library and Information Centre. For example, during the last two decades the phenomenon of *information broker* has developed a pace, especially in the USA and other advanced countries. In USA itself there are a number of brokerage firms in operation, the important ones being Information Store and Information Unlimited.

Information Broker

The information broker is an individual or a firm, who, on demand, seeks to answer questions using all available sources and who is in business for profit. The broker has a commercial attitude and uses a variety of sources including libraries to obtain answers to the client's requests. Information brokerage costs from $20 to $40 per hour in the USA. The complexity of the research and the nature of information required by the client, rather than the pricing practices, accounts for the range in the cost. Broking thus rests on the axial principle: information for payment. This exchange does not apply in the library world as most of the libraries do not operate on cost-recovery basis. Information is provided, but costs are not charged to the user. There is an important distinction between information which is freely available and information which is free.

The services offered by brokers in the private sector include all those traditionally offered by librarians, and more.

- Services offered by both brokers and special librarians are: abstracting, bibliographic verification, cataloguing, collection development, collection

management, current awareness service, document delivery, indexing, information analysis, online searching, patent searching, etc.

- Services offered by brokers only are: briefing or instant education, information repackaging, market research/analysis, personnel recruitment, press cutting service, translation service, and seminars/workshops. Information brokers specialise in providing fast, efficient services. These firms largely staffed by people with library backgrounds provide literature searches, retrieve and supply documents. These firms may not pose any threat to libraries. In fact, they supplement them by filling needs and demands that publicly supported libraries cannot and should not try to meet providing special and expensive services to business, professional and other users who can afford them. If libraries did offer such special services, demand for them would soar to a level where the staff will be overwhelmed and costs would exceed the library budget.

Human Networks

In the Information Science Literature of 1970s and 1980s, the main focus has been on technology and physical resource dimensions of Information Organisations. While the problems and difficulties associated with informational professionals keeping pace with innovations have been discussed, human sources of information were largely ignored. Most of the insights into the role of the people as information sources came from literature outside this field. It may be emphasised that as long as the human factor remains unacknowledged, organisations may fail to achieve optimal effectiveness from information resources.

Information Networks and Information Flows

In all management organisations, normally there exist formal and informal channels for communication.

The formal structures represent an ordered system that regulates authority and communication flows, links decision makers at different levels with defined data transmission channels, and generates an orderly flow of information and decision processes. In the formal structure, information flows are primarily vertical communication down the line relays information about the organisational ideologies, policies, procedures, practices, work directives and feedback on performances – and upward communication provides management with feedback on performance and problems at lower levels.

The informal structure represents the social interactions that occur within organisations, irrespective of the defined structures. While the two concepts are not necessarily mutually exclusive, a distinction is sometimes made between them. In other words, in contrast to formal flows, informal communication patterns tend to be spontaneous, unregulated, and unstructured. While most informal communication is lateral, certain individuals within one work group play a key role in organisational communication, linking different hierarchical levels, or divisions or acting as '*gatekeepers*' of strategically importan data emanating from outside organisational boundaries. The informal network exerts a powerful and constant influence in organisations. It specially makes its presence felt in times of organisational tension and uncertainty – that is in situations eliciting fear and anxiety and stimulating social interaction and especially when formal communication systems are not functioning effectively in keeping employees informed of problems and issues affecting them.

In the analysis of informal networks the organisation is regarded as a mutually independent social system made up of 'components' and 'connections' among

those groups. Within a group, communication activity is intense. Certain individuals act as links between discreet groups. Since 1960s, there has been involved research into communication networks by T.J. Allen and others. They identified particular informal communicative and informational roles within organisational settings. The *'technological gatekeeper',* the *'internal communication star' and the 'external communication star'* are some of the concepts that were put forward and discussed by them. These 'stars' are approached by others within the organisation for advice on technical matters due to their perceived knowledge and experience. Because of their professional and personal links with significant 'others' outside the organisation, 'external communication stars' are regarded as important information sources. Technological gatekeepers are both internal and external communication 'stars'. Such persons are a few in numbers an 'elite' within the organisation. Technological gatekeepers have a much higher incidence of exposure to professional literature, attend more conferences and have more professional affiliations. They perform vital informational roles and are approached in preference to documentary or computer-based information sources, due to both inherent inadequacies of other information media and to a need for interpersonal interaction in the discussion of complex technical problems. Allen's concept has been applied more generally to other organisations in writing on the role of "boundary – spanning individuals" in information transfer. It may be stated that due to different cultures, conceptual frameworks, and terms of reference, communication barriers develop between different organisations. Information transfer across organisational boundaries requires effective "boundary-spanning", which is a two-step process, searching out relevant information from one side and disseminating it on the other side of the boundary. Hence, the "boundary-spanning" role requires a thorough understanding of the local coding schemes and conceptual frameworks from both sides of the boundary, an ability to translate from one 'language' to the other and highly developed information and communication skills. "Boundary-spanning" individuals play a key role in overcoming the problems associated with communication 'at the boundaries'.

Information Manager Network

It has long been assumed that the focal point for information gathering and dissemination in most corporations is an established Library or Information Centre. This Library or Information Centre is described as staffed by professional information specialists who are assisted by some non-professionals. Together, these individuals are responsible for the management of the library collection and for any response required by client initiated request for information.

A more effective corporate information focal point namely "the information manager network' has been identified. This network consists of a group of information managers each of whom is assigned information responsibility for a specific technical division while remaining organisationally linked.

This organisational linkage makes this concept more effective and valuable. In fact, this network concept is similar in structure and function to the *'technological gatekeeper'*. The attempt to exploit a network organisational structure is obviously based upon the belief that the basic function is to provide information regardless of the source. The source could be published literature, personal contact within or outside the firm, company records, meeting notes, etc. However, the data or information itself is not sufficient. Clear, concise communication of results must be either written or presented to the most appropriate audience for true contributions to be realised. Information managers must work constantly at delivering not only the information but also the resulting implications of its usage, specially for decisions

as indicated by their work. Only then they are seen as contributors to the analysis and decision making process and ready, therefore, to risk with their client the uncertainties of this full partnership.

As a concluding point it might be emphasised that an organisational network of information managers who are divisionally assigned can be more strategically positioned to contribute essential information inputs for decision making process in organisations and in gaining importance in corporate management.

Invisible College Phenomenon

In the late 1960s and early 1970s there was a considerable level of interest in the invisible college phenomenon as one aspect of the role of scientific and technical information in national economic development. In two of his much quoted review articles De Solla Price observes that there was an elite of high performing scientists who produced about half of the published work in the field, whose number was equal to the square root of the population. Later studies by others have more or less conformed to the number predicted by Price's formula.

Although geographically dispersed, the key specialists with in an international invisible college network appear to perform the same type of role as do technological gatekeepers or boundary spanners within one organisation.

A number of studies on invisible college phenomenon have been reported in literature since 1983. These studies focus on the relative importance of the informal network of scientific communication and the published literature varies with the field of research, with informal communication being more important in rapidly developing fields and more important in applied science/engineering than in basic sciences. An excellent review of the current state of invisible college research appears in the publication entitled '*Scholarly Communication and Bibliometrics*' edited by C.L.Borgman.

The reports on the impact of computer-mediated communication technologies, such as e-mail, fax, and computer conferencing, on scholarly communication are also of particular interest in this connection.

Information Filters

Information filter is a name used to describe a variety of processes involving delivery of information to people who need it. Although this term is appearing quite often in popular and technical articles describing applications such as electronic mail, multimedia distributing system, and electronic office documents, the distinction between filtering and the related processes such as retrieval, routing and extraction are often not clear. This is a new concept which is related to personalised information delivery.

Information filters are essential mediators between information sources and their users. In most cases, both information sources and information users possess no mutual knowledge that might guide them in finding the information most relevant for the users' immediate or long term needs. Filters, which are positioned logically as "*third parties*" to the communication between the users and sources, should possess both the knowledge and functionality to critically examine the information in the sources and to forward the information they '*judge*' as relevant to individual users.

The special feature about information filters is that they can work on behalf of users as well as sources. In the first case, which is the most common today, filters assist users in finding relevant information and over coming the "*information flood*".

In the second case, filters can be used by sources to "*target*" information to potentially interested users.

Currently, it appears that many of the research issues involved in the proper design of high performance filters are addressed only for a specific and relatively narrow class of sources and users. One reason for this is that it is exceedingly difficult to provide general purpose solutions to information filtering requirements. In the general case, user needs do not seem to lend themselves to precise modelling, and information sources do not seem to provide precise enough descriptions of their contents. Given this double imprecision, information filters are being optimised for specific context, specific category of users and from specific sources. Information filtering is a new type of information service for which manual as well as automatic techniques are being developed.

Intelligent Agents and Push Services

The development of intelligent agents, sometimes called 'bots' (and in the information industry 'knowbots') is of interest in terms of document access and delivery, although the territory is relatively unexplored.

Agents take a query from a user and act on his/her behalf to find solution – they may thus be part of the portals service infrastructure. Typical of these is the 'shopping bot', which uses a customers stated requirements for a product to visit a range of shopping sites, collecting data on price, availability, etc. The results are stored and presented to the user, who may then issue a 'buy' order. The application of this methodology to information products is only in experimental stage and not yet established.

Disintermediation

This term is used for the process whereby users are encouraged to interact directly with services. The customer interacts directly with the system – such as online search service. Similarly, in libraries, the introduction of self service issue to take one example – is a process of disintermediation since it removes the need for staff to intermediate between the issue system and the user. Apart from economic advantages of this process which are obvious it can also bring benefits to users, by saving the time of the users.

Since 1960s technological developments have influenced the services provided by libraries and information services. These developments also influenced the career expectations of information professionals with regard to online searching.

The introduction of computerised databases by commercial firms, developments in telecommunication technology and the high costs involved in online searching initially offered many opportunities for information professionals. In other words, they could be gatekeepers of electronic information. At first, the pace of change was comfortable enough to give information specialists time to adopt their service attitudes, skills, and relationships with users. Developments such as commercial services aimed at end-users, more user-friendly products and the introduction of CD-ROM databases raised the question of end-users doing their own online searches. The growth in end-user searching was, however, rather slow. In fact there was little time to prepare information specialists for this impact. The Internet of course, came as a sudden bolt and created tremendous interest in end-user information retrieval. Suddenly, the information profession is confronted with a changing social environment. More and more people who have access to computer demanded access to Internet. These end-users claim to do their own information searching and ask for documents

to be delivered in time. They even demand for guidelines and systems for organising the overload of information. 'Disintermediation', 'end-user empowerment' has become common words towards the end of 1990s.

Due to the increase in the number of end-users claiming to do their own online searching, some experts have gone so far as to predict the doomsday of libraries and information centres and the end of the intermediary in fact, the end of information specialist (Keift, 1995). On the other hand, others consider these changes as a welcome opportunity to adopt more exciting roles and to widen their horizons (Finlay and Finlay 1996, Mc Dermott, 1998). However, according to Arthur Winzenried "the need for intermediary who accesses, assimilates, reformulates and then packages information to suit the end-user is essential if meaningful outcomes are to be achieved; the alternative is chaos." (Anon, 1997). Disintermediation is thus regarded as both a threat and a golden opportunity, and reaction to it will depend on whether one views it as a passing phase or something to be taken seriously.

"End-user empowerment" refers to users having access to information and having the necessary skills to retrieve their own information according to their own needs. This does not necessarily mean that the information specialist as an intermediary will become obsolete: this is because all end-users may not have the time or the interest to do their own searches. Although there is a connection between disintermediation and 'end-user empowerment', end-user empowerment does not necessarily imply disintermediation.

Knowledge Mediators

Libraries as a component of information chain act as a link between knowledge sources and users. Owen and Wiercx, 1996 suggested that they could be understood or named as knowledge mediators. The process where by libraries provide users with insight into the existing body of knowledge and assist users in acquiring resources referring to or containing such knowledge is known as knowledge mediation. The institution or persons involved in such process are called knowledge mediators.

Self Check Exercises

3) Discuss in brief the types of Information Institutions.

4) List the main activities and products of a typical Information Analysis Centre.

5) State the basic principles relating to the organisation of Data Centre.

6) Write the functions of Referral Centre and Clearing House.

7) Briefly explain the terms 'Disintermediation and End-user empowerment'.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

to be delivered in time. They even demand for guidelines and systems for organising the overload of information. 'Disintermediation', 'end-user empowerment' has become common words towards the end of 1990s.

Due to the increase in the number of end-users claiming to do their own online searching, some experts have gone so far as to predict the doomsday of libraries and information centres and the end of the intermediary in fact, the end of information specialist (Keift, 1995). On the other hand, others consider these changes as a welcome opportunity to adopt more exciting roles and to widen their horizons (Finlay and Finlay 1996, Mc Dermott, 1998). However, according to Arthur Winzenried "the need for intermediary who accesses, assimilates, reformulates and then packages information to suit the end-user is essential if meaningful outcomes are to be achieved; the alternative is chaos." (Anon, 1997). Disintermediation is thus regarded as both a threat and a golden opportunity, and reaction to it will depend on whether one views it as a passing phase or something to be taken seriously.

"End-user empowerment" refers to users having access to information and having the necessary skills to retrieve their own information according to their own needs. This does not necessarily mean that the information specialist as an intermediary will become obsolete: this is because all end-users may not have the time or the interest to do their own searches. Although there is a connection between disintermediation and 'end-user empowerment', end-user empowerment does not necessarily imply disintermediation.

Knowledge Mediators

Libraries as a component of information chain act as a link between knowledge sources and users. Owen and Wiercx, 1996 suggested that they could be understood or named as knowledge mediators. The process where by libraries provide users with insight into the existing body of knowledge and assist users in acquiring resources referring to or containing such knowledge is known as knowledge mediation. The institution or persons involved in such process are called knowledge mediators.

Self Check Exercises

3) Discuss in brief the types of Information Institutions.

4) List the main activities and products of a typical Information Analysis Centre.

5) State the basic principles relating to the organisation of Data Centre.

6) Write the functions of Referral Centre and Clearing House.

7) Briefly explain the terms 'Disintermediation and End-user empowerment'.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

1.4 INDIAN SITUATION

After India attained independence, efforts were made in many directions for development. Deliberate decisions were taken by the government to harness science and technology for the economic development of the nation. In the process, a variety of institutions have sprung up in every region of the country. Development of infra-structural facilities which are essential for organising appropriate and effective information systems and services received governmental support. This situation paved the way for the development of Libraries and Information Institutions throughout the country.

1.4.1 The Three Era Framework

The three era framework discussed earlier in this Unit is also reflected in the Indian context though not with all the characteristic features seen in US Era-1I. Institutions such as Libraries, Documentation and Information Centres at academic and professional levels, R & D Institutions and laboratories, government agencies and many public and private sector undertakings have come into being in large numbers. In the initial stages, all these organisations functioned in isolation with out any linkages within themselves. By and large, the situation has changed and we can perceive established linkages at least within some categories of institutions.

On the other hand, the Era II organisations which were established during 1950s and 1960s fulfil the exclusive information needs of mission-oriented organisations like the Atomic Energy Commission, ISRO, Electronics Commission and the like were developed during Era II. CSIR, ICAR, ICMR, DRDO, and other research complexes may also be included in this group. There has not been any effort to coordinate the information activities of these two Eras of institutions.

From the 1970s, Era III organisations started to emerge. Institutions like Small Enterprises Documentation Centre, Documentation Centres attached to National Health and Family Welfare Centre and a few others, might be considered as problem solving type of institutions. Most of the CSIR organisations, CFTRI, CLRI, CRRI, CDRI and CBRI, etc. started problem-oriented research and required specialised Information Centres. Also, some of the projects had undertaken by ICAR, ICMR required specialised Information Centres. This paved the way for the development of organisations like National Medical Library etc.

Public sector industries like BHEL, CMTRI, SAIL and private sector industries like Bharat Electronics, Tata Energy Research Institute, RANBAXY, etc. also developed their own specialised information cells for meeting their technical information needs. Since most of the above mentioned organisations grew up in the context of servicing scientific and technical information, they seldom attempted to supply societal information. Except the National Informatics Centre which tried to integrate the societal information along with administrative information in its efforts to design an administrative information system for India. This is largely due to the fact that information infrastructure is considered more as a lubricant for furthering the R&D activities than as a raw material for important decisions and policy making. It may also be stated that information services in India have yet to reach the level of sophistication either in terms of utilising modern technologies to offer versatile services or in the production of reprocessed and consolidated packages which could meet the specific information needed at policy and decision making levels. The institutions that emerged as the result of three era framework could offer only the traditional type of information services with hardly any distinction in spite of an urgent need to introduce distinctiveness in their service and products.

In 1980s the policy of government towards information infrastructure has changed considerably. The government encouraged the modernisation of information systems in a more coordinated manner utilising modern technologies. As a result, national information systems like NISSAT (now discontinued), ENVIS, and BTIS, etc. were taken up. Coordination of these national information systems and sharing of national information resources using modern communication technology became an important step in the reorganisation of information institutions in the country. As a result of this changed outlook, efforts were made to establish resource sharing information networks, and the country is now in the process of establishing national, regional and local area information networks. Projects such as INFLIBNET, DELNET, and CALIBNET making the use of facilities provided by INDONET and NICNET, etc. have been planned to be developed in phases. Networking and resource sharing concept is being seriously pursued in the development of information services and products at different levels in India. The organising principle behind this growth is optimal and effective use of available information resources for societal development. The progress made by DELNET and INFLIBNET merit special mention in this connection.

1.4.2 Research and Information System for Non-Aligned and other Developing Countries

The need for research and information infrastructure for the developing world was recognised both in G-77 forum and NAM summits. It was observed that the developed countries get significantly analytical support from the OECD Secretariat on various issues of relevance to North- South negotiations and international economic relations. It was argued that the developing countries should have their own research and information infrastructure for deriving their policy options and negotiation strategies so as to promote their interests in a more effective manner.

The Economic Declaration of NAM summit held in Colombo in 1976 marks the beginning of the conception of the Research and Information System (RIS) for the developing countries in the global framework. It was envisaged that the RIS in the global framework could be fostered by a group of member countries, who offered themselves to be the coordinators for this purpose. After the New Delhi summit of NAM in1983, the Govt. of India decided to set up a separate autonomous body called Research and Information System for the Non-Aligned and Other Developing Countries. The Ministry of External Affairs, as its contribution to the process of establishing RIS in the global framework took special interest in this matter. As a result, the Research and Information System for the Non-Aligned and Other Developing Countries was set up in 1984 by the Government of India as an autonomous body with the basic objectives of providing analytical support to the Developing Countries on various aspects of economic development and improving the capability to face the challenges of the emerging world economic scenarios.

The aims and objectives of RIS, India include: developing a data bank / information storage, processing and retrieval centre on the global and regional problems bearing on the interests of the developing countries, etc. RIS launched research and information activities, keeping in view the aim and objectives enshrined in its constitution.

The activities of RIS can be categorised into six groups as under:

1) Contribution to the preparedness of developing countries for the forthcoming international meetings;

2) Improving the general awareness among the policy-makers and academia about the various aspects of the international economic issues;

3) Promoting collective self-reliance among the developing countries;

4) Institutional networking;

5) Activities at the request of various international and other bodies;

6) Documentation Centre; and

7) RIS Databank.

This is one of the initiatives taken by the Government of India to enhance the quality of economic coordination amongst developing nations.

Table 1. 1: Illustrative List of International Information Systems and their Focal Points in India

National Focal Point	System
Department of Scientific and Industrial Research	1) UNISIST/UNESCO 2) Regional Network of Exchange of Information and Experiences in Asia and Pacific (ASTINFO/UNESCO)
Department of Environment	International Referral System for Sources of Information on Environment (INFOTERRA/UNEP)
Bhabha Atomic Research Centre	International Nuclear Information System – (INIS/IAEA)
Indian Agricultural Statistics Research Institute	Agricultural Information System – (AGRIS/FAO)
Industrial Toxicology Research Centre	International Register for Potentially Toxic Chemicals (IRPTC/UNEP)
National Environmental Engineering Research Institute	Global Environmental Monitoring System –(GEMS/UNEP)
National Institute of Oceanography	1) Marine Environmental Data Index – (MEDI/UNESCO) 2) Aquatic Sciences and Fisheries Information System – (ASFIS/FAO)
National Informatics Centre	Regional Informatics Network for the South and Central Asia - (RINSCA/UNEP)
Department of Science and Technology	Technological Information Pilot System – (TIPS/UNDP)

(***Source*** : National Conference on Scientific Information for Defence, 1986 New Delhi. pp 191-193)

Self Check Exercise

8) Discuss the growth and development of Information Institutions in India.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of this Unit.

.....

.....

.....

.....

.....

.....

.....

Table 1.2: An Illustrative List of Information Systems and Institutions in the Country

Types of Information	Name of the Programme	Operating Agency	Status/Remarks
Bibliographic	National Information System for Science and Technology (NISSAT)	Deptt. of Scientific and Industrial Research	Discontinued: The programme in its earlier form has been suspended. Alternative programme is in the planning stage.
	Environmental Information System (ENVIS)	Deptt. of Environment	Operational
	Biotechnology Information System (BTIS)	Deptt. of Science and Technology	Operational
	Network of National Informatics Centre (NICNET)	Deptt. of Electronics	Operational
Management	Management Information System for Science and Technology (NMIS)	Deptt. of Science and Technology	Being evolved
Remotely Sensed Data	National Natural Resources Management System (NNRMS)	Deptt. of Space	Operational
	Natural Resource Data Management System (NRDMS)	Deptt. of Science and Technology	Operational
Statistical Information Institution	Central Statistical Organisation	Deptt. of Statistics	Operational
	Indian National Scientific Documentation Centre (INSDOC)	CSIR	Merged with another CSIR organisation under the new name National Institute of Science Communication and Information Resources (NISCAIR)
Defence	Defence Scientific Information and Documentation Centre (DESIDOC)	Defence Research and Development Organisation (DRDO)	Operational
	Bhabha Atomic Research Centre (BARC)	Deptt. of Atomic Energy	Operational
Trade Information	Small Industrial Extension Training Institute (SIET/ SENDOC)	M/o Industries	Operational
	Research and Development Centre on Iron and Steel (RDCIS, SAIL)	Deptt. of Steel	Operational
	Bharat Heavy Electricals Ltd. (BHEL)	M/o Industries	Operational
Medical	National Medical Library (NML)	DG Health Services	Operational
	Geodata Centre GSI and IBM	Deptt. of Mines	Operational
	Retail Stores Audit, National Readership Survey, etc.	Operations Research Group	Operational

1.5 INSTITUTION BUILDING

The perspective of Information Institutions described in the earlier sections of this Unit, indicates clearly the growth and development of these institutions. The growth has been rather uneven, adhoc and not necessarily based on a well-thought-out process. This situation needs to be rectified through a well-thought-out National Information Policy, which provides guidelines relating to the priority areas for developing and fostering Information Institutions in the country.

This is all the more important, because the modern society is a 'society of institutions' and institution building is receiving attention as a subject of study in its own right.

1.5.1 Prerequisites for Building Institutions

It may be stated that the "strategies and approaches for institution building vary from country to country in accordance with its own environment, requirements, priorities and the level of existing institutions. In fact, the foregoing discussion is intended to provide the context for understanding the problem. What is important to consider is that an institution should have set goals, objectives and criteria for establishing priorities. It should have challenges and opportunities, carefully conceived roles, well defined tasks, and a clear sense of purpose. Its programmes must be symbolic of what it stands for and its role in society, infused with social values. It has a purpose, function and ability to survive and to serve clientele, relevant to needs, time and environment" (Prof. Y. Nayudamma). The effectiveness of any organisation is to be judged by taking into consideration its contacts with users and their information needs in different contexts, and its contribution in full measure to the decision making processes for economic, social and industrial development. For this purpose a concerted and a coordinated effort is needed by government, industry, and STSI institutions in the country.

Information Institution building is a complex process. It involves men, material, machinery and money which should be managed effectively for obtaining optimum results. Clear perspective and farsightedness, determining appropriate goals and objectives, fixing target for outputs, careful planning with guidelines of policies, criteria for priorities and efficient execution, organisation and management are essential steps involved in institution building. These requirements lead us to a discussion on manpower for institution building.

1.5.2 Human Resources

Human resources that operate the institutions are primarily responsible for the success or failure associated with them. It is human resources that provide leadership, technical skill, managerial control and evaluation of performance of any institution. Such manpower needs to be built up systematically. Several factors are to be considered in this regard, they are:

i) manpower assessment in terms of types, quantity, quality and levels for a specified period of time.

ii) educational and training facilities for different levels of personnel – operational, supervisory, management at top levels, design and development specialists and research personnel, etc.

iii) placement of personnel, with promising career opportunities turned out by the institution.

iv) continuing education programmes and workshops for all categories of information personnel operating at different points for the purpose of exposing to current trends.

v) programme of scholarships, fellowship and financial grants at different levels to attract talented persons.

vi) award/reward system for professional excellence.

vii) promotion of fundamental as well as applied research in Information Science.

The main objectives should be to build a cadre of information scientists and technologists with diverse specialisation and skills, operating with cohesion to organise and offer high quality information services. Constitution of a national manpower consortium for information professionals would enable such a task. Institutions like National Institute of Scientific Communication and Information Resources (NISCAIR), DRTC, NISTADS, and manpower divisions of CSIR, NIC, and some University Schools associated with Library and Information Science programmes, Management Institutions, National Institute of Applied Manpower Research and Professional Associations, should be represented on such a consortium. The consortium should formulate a unified approach that would enable the formation and sponsoring of research projects on manpower development studies. If such measures are taken well in time, the manpower needs of the newly established institutions could be taken care of. The above suggested steps if implemented would lead to the establishment of effective information institutions in the country.

1.5.3 Role of Institutions in Knowledge Based Economy

In the earlier sections of this Unit, we have attempted to know the evolutionary patterns of Information Institutions in India. In the process, we have learnt that the success or failures of these institutions depends to a large extent on the human resources available in these organisations and some of the steps that need to be taken for human resource development. However, we have not attempted to know how far these organisations are prepared for their role in new competitive era, called Knowledge Based Economy (KBE). No case studies assessing the preparedness of Indian Information Institutions have been reported in the literature. However, from the studies conducted elsewhere, some performance indicators that might prove helpful as parameters are discussed in the following sections:

These parameters are:

- Organisational restructuring: included in these are
  - i) reorienting the structures according to markets, products or processes
  - ii) becoming flatter and more flexible
  - iii) relying more on informal communication
  - iv) creating flexible work groups and teams
- Expansion in roles and functions
  - i) IT specialists
  - ii) trainees/educators
  - iii) negotiators
  - iv) filters
  - v) navigators
  - vi) knowledge managers

- New initiatives in products and services
  - i) development and/or involvement in the Intranet
  - ii) customisation and development of databases
  - iii) design of websites, web pages and interfaces
  - iv) introduction of push-technology-based services and products
  - v) creating and launching of knowledge products
- Strategic alliances and networking
  - i) enhancing internal communication
  - ii) strengthening networking
  - iii) building new partnerships
  - iv) expanding external relations
- Effective user liaison mechanisms
  - i) redefining the user groups
  - ii) user consulting and defining information needs
  - iii) refocusing newsletters
  - iv) initiating, briefing and online delivery of hot news
- Creative use of outsourcing of operations
  - i) procurement of information materials
  - ii) processing operations and services
  - iii) automated delivery of documents
  - iv) portals

If studies are conducted to assess the preparedness of Indian Information Institutions for the KBE, using the above mentioned performance parameters, new facts will come to light which might form the basis for revamping these institutions.

Self Check Exercises

9) List the essential steps involved in institution building.

10) Describe the various factors for manpower development in the institutions.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

1.6 SUMMARY

In the foregoing pages of this Unit, some basic aspects relating to Information Institutions have been identified and briefly discussed.

The Unit commenced with an introduction, which emphasised the importance of institutions in modern society and contended that the performance of modern society rests increasingly on the performance of these institutions. It has been mentioned that during the last fifty years, society in every developed country has transformed into a society of institutions and all the major tasks are being entrusted to large organisations.

While stressing the special significance of Information Institutions to modern society, a historical perspective of their growth and development highlighting the main trends in general, and with particular reference to India, is provided.

It has been observed that the literature of Library and Information Science does not contain many reports and studies, which discuss the growth of Information Institutions. Therefore, the report entitled "Into the Information Age" is found very useful in delineating the contents of this Unit. The three modes of information transfer with corresponding value systems along with the significant features associated with *three eras* have been briefly discussed.

The Unit discusses the essential features pertaining to different types of Information Institutions indicating their specific role in the process of information dissemination. In this context, the significance of non-traditional institutions such as 'Information Broker' etc. and new emerging concepts like Information Filters, Human Networks and Disintermediation, '*End User Empowerment*', etc. have been discussed and explained. Also, the concept of 'Knowledge Based Economy' and the consequential *paradigm shift* for Information Institutions has been referred to. Information Organisations are urged to prepare for the new competitive era, called Knowledge Based Economy (KBE).

Another relevant feature included in the Unit, is the Indian scenario depicting the growth pattern of Information Institutions in the country. The relevance of 'three era framework' to Indian situation, and necessary strategies and approaches for institution building, are briefly considered. The Unit concludes by emphasising that institution building is a complex phenomenon and involves men, material, machinery and money, which should be managed effectively for obtaining optimum results. Also, effective exploitation of information organisations is an essential requisite for the preparation of an institution for its role in Knowledge Based Economy.

1.7 ANSWERS TO SELF CHECK EXERCISES

1) The growth pattern of Information Institutions has been discussed under three basic modes of information transfer pattern, each corresponding to a different value system. They are:

   i) Disciplinary Information Transfer corresponding to the value system of pure science, academic and basic, research-called Era I.

   ii) Mission- oriented Information Transfer corresponding to the value system of government sponsored missions (such as AEC, NASA in the 1960s) – called Era II.

   iii) Problem – oriented Information Transfer corresponding to the value system of solving societal problem- called Era III.

   Presently networking and resource sharing concept is being seriously pursued in the development of information services and products at different levels

5) The following are the basic principles relating to the organisation of a Data Centre:

   i) data received and collected from different documents by a group of specialists who decide the importance and relevance of data, control and fit them with the generator source.

   ii) the received data are organised in order to establish that they represent basic data which must be processed or synthetic data which may be necessary for further use in their initial form.

   iii) the data are converted to a machine-readable form and is structured into a database for computer processing.

6) Referral Centre and Clearing House have to perform certain basic operations. These are:

   Referral Centre

   1) A Referral Centre should possess an inventory of all significant information resources in different disciplines.

   2) It should compile and publish directories of scientific and technical information resources.

   3) A Referral Centre has to analyse the operating relationships that exist in the scientific information complex.

   Clearing House

   1) It is a depository for documents with the additional objective of servicing as a central agency engaged in the distribution of information.

   2) Collection and maintenance of records of research and development.

   3) Sometimes, subjective questions about items in these records are referred to the source and thus a Clearing House may have to perform the function of a Referral Centre.

7) Since 1960s technological developments have influenced the services provided by libraries and other information institutions.

   Developments such as commercial services aimed at end-users, more user-friendly services and the introduction of CD-ROM databases raised the question of end-users doing their own online searches. The growth in end-user searching was, however, rather slow. All of a sudden the information specialist is confronted with a changing social and working environment. This situation is triggered by the advent of the Internet. More and more people who have access to computers and get connectivity to the Internet. These end-users claim to do their own information searching. Thus 'disintermediation' and 'end-user empowerment' have become buzzwords of the late 1990s.

   'Disintermediation' relates to the role of the intermediary in acting between information and its end-users. It is the finding of information by an end-user with out a need for a third party. As applied to libraries, 'disintermediation' means the diversion of information from centralised physical repositories to alternate sources available directly through computers and computer networks.

'End-user empowerment' refers to end-users having access to information and having the necessary skills to retrieve their own information according to their own needs – in other words, they can do it on their own. With empowerment they should be less dependent on information specialists, which do not necessarily mean that the information specialist as intermediary will become obsolete. This is because not all the end-users will have the time or the interest to do their own searches.

8) The growth and development of Information Institutions in India can also be discussed in Three Era Framework. In Era I, institutions such as Libraries, Documentation and Information Centres, R&D institutions, government and public sectors have come into being in large numbers. Initially these institutions functioned in isolation without any linkage within themselves. On the other hand, the Era II organisations during the 1950s and the 1960s fulfilled the exclusive information needs of mission-oriented organisations like CSIR, ISRO, ICAR, ICMR, and Atomic Energy Commission. Here no effort to coordinate the information activities came up. From 1970s, Era III institutions like Small Enterprises Documentation Centres, Documentation Centre attached to CSIR laboratories gave rise to specialised Information Centres and they might be considered as problem solving type of institutions. Public sectors like Bharat Electronics, Tata Energy Research Institute, RANBAXY, etc. also developed their own specialised information cells.

   In 1980s the policy of government towards information infrastructure has changed considerably. The government encouraged the modernisation of information systems in more coordinate manner utilising modern technologies. As a result, national information systems like NISSAT, ENVIS, and BTIS etc. were taken up and networking and resource sharing concept is being seriously pursued in the development of information services and products at different levels in India.

9) Information Institution building is a complex process. It involves men, material, machinery and money which should be managed effectively for obtaining optimum results. Clear perspective and farsightedness, determining appropriate goals and objectives, fixing target for outputs, careful planning with guidelines of policies, criteria for priorities and efficient execution, organisation and management are essential steps involved in institution building.

10) Several factors to be considered for manpower development are:

   i) Manpower assessment in terms of types, quantity, quality and levels for a specified period of time.

   ii) Educational and training facilities for different levels of personnel – operational, supervisory, management at top levels, design and development specialists and research personnel, etc.

   iii) Placement of personnel, with promising career opportunities turned out by the institution.

   iv) Continuing education programmes and workshops for all categories of information personnel operating at different points for the purpose of exposing to current trends.

   v) Programme of scholarships, fellowship and financial grants at different levels to attract talented persons.

   vi) Award/reward system for professional excellence.

   vii) Promotion for fundamental as well as applied research in Information Science.

1.8 KEYWORDS

Communication Star : Expert approached by others within the organisation for advice on technical matters due to his/her perceived knowledge and experience, and having professional and personal links with significant 'others' outside the organisation.

Development : Process of differentiation of activity (ies).

Disintermediation : Relates to the role of the 'intermediary' in acting between information (and other products) and its end users. In other words, it is the finding of information by an 'end-user' without the need for a third party. As applied to libraries, disintermediation means the diversion of information from centralised physical repositories to alternate sources available directly through computers and computer networks.

End-user Empowerment : Refers to end-users having access to information and having the necessary skills to retrieve their own information according to their own needs- in other words they can do it on their own. With empowerment, they should be less dependent on information specialists.

Era : Period of history.

Evolution : Process of organisation by development.

Growth Pattern : Process of increase in size and number with some consistency.

Information Broker : An individual of a firm, who, on demand, seeks to answer questions using all available sources and who is in business for profit.

Information Filter : An essential mediator between information sources and their users.

Information Institution : An institution which normally performs the activity (ies) related to the knowledge/information transfer.

Information Manager Network : Network consists of a group of information managers each of whom is assigned information responsibility for a specific technical division while remaining organisationally linked.

Information Transfer : A chain of activities, the main link being information generator, editor, publisher of primary publications, indexing and abstracting journal producers, libraries, documentation and information centres, on-line services, information companies and the end user.

Intelligent Agents and Push Services : Sometimes called 'bots' (and in information industry 'know bots') are persons who assist users in document access and delivery. These agents take query from a user and act on his/her behalf to find a solution. They form the part of the 'portals' infrastructure. Typical example is the 'Shopping bot'.

Invisible College : An elite of high performing scientists who has an informal network of scientific communication and the published literature.

Knowledge Mediators : Persons or libraries who provide users with insight into the existing body of knowledge and assist them in acquiring resources referring to or containing such knowledge.

Technological Gatekeeper : Expert both internal and external communication star, having much higher incidence of exposure to the professional literature, attends more conferences and has more professional affiliations.

1.9 ACRONYMS USED IN THE TEXT

AEC	Atomic Energy Commission
BLLD	British Library Lending Division
BRC	Bibliographic Retrieval Services
CBRI	Central Building Research Institute
CDRI	Central Drug Research Institute
CFTRI	Central Food and Technological Research Institute
CLRI	Central Leather Research Institute
CMTRI	Central Machine Tools Research Institute
COSATI	Committe for Scientific and Industrial Research
CRRI	Central Road Research Institute
CSIR	Council of Scientific and Industrial Research
DRDO	Defence Research Development Organisation
ICAR	Indian Council of Agricultural Research
ICMR	Indian Council of Medical Research
ISRO	Indian Space Research Organisation
NASA	National Aeronautic Space Agency
NISTADS	National Institute of Science Technology and Developmental Studies
SAIL	Steel Authority of India Limited
SDC	Systems Development Corporation
STSI	Scientific Technical and Societal Information

1.10 REFERENCES AND FURTHER READING

Anon (1997). The Librarian and the Library User: What the Future holds. *The Electronic Library.* 15(1), 15-24.

Becker, J. (1979). Library Society and Technological Change. *Library Trends.* 27 (3), 409-16.

Bell, D. (1979). The Social Framework of information Society. *In* : Dertouzos, M.L. and Moses J. (eds.), *Computer Age: A Twenty Year View.* Cambridge, Mass: MIT Press. pp. 163-211.

Chase, Roy (1998). Knowledge Navigators: Changing Practice of Librarians. *Information Outlook.*

De Gannaro, R. (1982). Libraries, Technology and the Information Market Place. *Library Journal.* 1045-54.

Drucker, P.F. (1988). The Coming of the New Organisation. *Harvard Business Review. Jan-Feb*, (66), 45-53.

Drucker, P.F. (1980) *Management, Tasks, Responsibilities, Practice.* New Delhi: Allied Publishers.

Finlay, K. and Finlay, T. (1996). The Relative Roles of Knowledge and Innovativeness in Determining Librarians' Attitudes Towards and Use of Internet: A Structural Equation Modelling Approach. *Library Quarterly.* 66(1), 69-83.

Guiliano, V.E. [et al] (1978). *Into The Information Age: A Perspective for Federal Action on Information.* Chicago: ALA.

Kieft, R.K. (1995). The Death of the Librarian in the (post) Modern Electronic Information Age. *In : Information for a New Age: Redefining the Librarian.* Compiled by Fifteenth Anniversary Task Force Library Institution Round Table American Library Association. Engle Wood: Libraries Unlimited. pp. 15-22.

Klobas, J.E. (1996). *Information Infrastructure; Organisational Capability for Online Information Provision.* London: Oxford University Press.

Lancaster, F.W. (1983). Future Librarianship: Preparing of Unconventional Career. *Wilson Library Bulletin.* 747-53.

Lancaster, F.W. (1979). Science, Scholarship and Communication of Knowledge. *Library Trends.* 27(3), 367-88.

Matarazzo, J. and Connolly, S. (1999). *Knowledge and Special Libraries*. Boston: Butterworth Heinemann.

Mc Dermot (1998). Searches on the Beachhead: The Internet Librarian Conference at Monterey. *Searcher: The Magazine for Database Professionals*. Feb. 62-8.

Nayudamma, Y. (1980). Science and Technology–Patterns of Institution Building. *Society and Science.* 3(4), 137-138, 141.

Neef, D. (1998). Rethinking Economics in the Knowledge-based Economy. *In: The Economic Impact of Knowledge.*Boston: Butterworth Heinemann.

Neway, J. (1985). *Information Specialist as Team Player in the Research Process*. Westport, CN: Greenwood Press.

Raizada, A.S. and Satyanarayana, R. (1975). Database Services. *Annals of Library Science and Documentation.* 22(1), 30-7.

Rajagopalan, T.S. and Rajan, T.N. (1986). Information Institutions: Patterns of Growth and Development with a Perspective of Future. *In:* Rajagopalan, T.S. (ed.) *Ranganathan's Philosophy: Assessment, Impact and Relevance.* New Delhi: Vikas. pp. 64-75.

Rajan, T.N. (1980). A New Perspective for Information Organisation in US. *Annals of Library Science and Documentation.* 27(1-4), 135, 144.

Remeil, L. Knowledge Management-Role for Information Professionals. *Finance Bulletin.* 100, 41-43.

Special Libraries Association (1997). *Enhancing Competitiveness in the Information Age: Strategies and Tactics for Special Librarians and Information Professionals*. Washington, DC: SLA.

ignou
THE PEOPLE'S
UNIVERSITY

UNIT 2 INFORMATION CENTRES: TYPES AND THEIR ORGANISATION

Structure

2.0 Objectives

2.1 Introduction

2.2 Information Centres

- 2.2.1 Origin
- 2.2.2 Definition
- 2.2.3 Libraries and Information Centres
- 2.2.4 Need for Information Centres

2.3 Information Centres: Types

- 2.3.1 By Specialised Interest
- 2.3.2 By Ownership
- 2.3.3 By Level of Service
- 2.3.4 By Variety of Services Provided
- 2.3.5 By Types of Material
- 2.3.6 By Service in Terms of Users

2.4 Organisation of Information Centres

- 2.4.1 Areas of Activity

2.5 Services of Information Centres

- 2.5.1 Lending of Books
- 2.5.2 Inter-library Lending of Documents
- 2.5.3 Photocopy Service
- 2.5.4 Document Delivery Service
- 2.5.5 Reference, Literature Search and Preparation of Bibliographies
- 2.5.6 Referral Service
- 2.5.7 Newspaper Clippings
- 2.5.8 Translations
- 2.5.9 Technical Enquiry
- 2.5.10 Information Scouting
- 2.5.11 Current Awareness Services
- 2.5.12 Abstracting
- 2.5.13 Information Centre Publications
- 2.5.14 CD-ROM Search
- 2.5.15 Online Access to Databases
- 2.5.16 Internet Services

2.6 Planning an Information Centre

2.7 Examples of Information Centres

- 2.7.1 National
- 2.7.2 International

2.8 Summary

2.9 Answers to Self Check Exercises

2.10 Keywords

2.11 References and Further Reading

ignou THE PEOPLE'S UNIVERSITY

2.0 OBJECTIVES

After reading this Unit, you will be able to:

- define the role of information centres and special libraries;
- identify the different types of information centres;
- know their various levels;
- explain the purpose and functions of information centres;
- describe the services of information centres; and
- list and give a brief description of representative examples of national and international information centres.

2.1 INTRODUCTION

Information centres emerged to fulfil the requirements for information support to research and development, business and industry, satisfying functions of government departments and other types of organisations. These centres play a vital role in bridging the information gap between information needs of a user and actual information needed. By providing an acquisition and dissemination point, it allows the users more time to develop new information and utilise what is already accessible. It is an agency whose function is to provide the right information at right time to the user who needs it and in the required usable form.

The work of the information centres focuses on the management of documentary resources, the collection of new resources and research in the resources available and in other databases to find solutions to specific problems. Information services are activities that emerged as a result of growing needs of users engaged in research, industrial development, decision-making, planning for socio-economic development, etc. thus a national framework has resulted which includes sereral new types of information centres. This framework is usually referred to as information infrastructure and is involved in locating, aacquiring, processing, storing, retrieving and disseminating information. This infrastructure includes the components of the information system, i.e., Special Libraries, Information/Documentatin Centres, Information Analysis Centres,. Data Centres, Clearing Houses, etc.

In Unit 1 of this Block you have learnt about the evolution and growth of information institutions and their role in the modern society. In this Unit, we introduce you to information centres, their types, purposes, functions and their organisation. We will also cover various types of information centres that offer users a variety of information services and products to satisfy their requirements. Some representative examples of information centres in India and other countries with brief description of their activities and services are also provided.

2.2 INFORMATION CENTRES

Knowledge and information although readily available have to be made available in a proper form to users that include decision-makers, entrepreneurs, scientists, engineers and technologists. We all know that for socio-economic development of any nation, it is essential to promote scientific and technological research and disseminate information at a faster pace so that it reaches its target for maximum utilisation. The developing countries have also recognised the need for a well developed information infrastructure for scientific and technical information at national level.

This awareness on the part of the national planners and policymakers has led to make plans for setting up national, regional and local information services in various disciplines. In order to provide information services to all category of users, the information infrastructure has to be strengthened with the help of various institutional resources that also include information centres as already covered in Unit 1 of this Block. Information centres thus are principal institutions which store formal and informal information sources that provide need-based information to the users.

2.2.1 Origin

From the time libraries came into existence, they have been collecting all types of materials and keeping them ready for users. It was quite easy too, as the users were a small group and the librarians knew what the users usually wanted. In the last five decades there has been a tremendous growth in published literature and information leading to knowledge explosion. This has led to complications in information generation, handling and use. Need began to be felt for analysing the contents of the holdings of libraries as traditional library services were limited to lending of documents only. In addition to this there are many kinds of documentary sources other than conventional types which fall outside the range of what libraries collect. The emphasis is towards provision of information contained in the documents, rather than the documents themselves. In a library the services are based on documents and information is scattered in various documents. Thus a point was reached when the libraries were unable to carry out user needs. Therefore, the need for a different approach was felt for handling and serving the scattered items of information. Eventually this led to emergence of information centres which perform switching and reference function besides collecting, disseminating data and offer enquiry and retrospective search. Access to precise and reliable information to users at right time and in the most convenient form can help to minimise wastage of resources.

Let us now see how information centres came into being. The John Crerar Library of Chicago recognised the need for a specialised type of library service and as early as 1946 organised a department called the 'Research Information Service' which offered the industry various kinds of information services. This led to several other centres in United States patterned after the John Crerar Library. These eventually came to be known as 'Information Centres'.

It has to be noted here that in a broad sense an 'Information Centre' and a 'Documentation Centre' means one and the same. Information Centres lay emphasis on information contained in documents as a unit of service whereas a Documentation Centre carries all activities based on documentary sources. Thus the distinction does not seem to be clear and appears totally artificial. However, to lay emphasis on information, the term 'Information Centre' is more appropriately used to represent both these types of centres laying emphasis on the supply of information and not merely documents.

2.2.2 Definition

Information service units in organisations have been usually referred to as 'Information Centres' or "Information Departments'. The emphasis in this case, as mentioned earlier, is towards provision of information contained in the documents, rather than documents themselves which is the main consideration of traditional libraries. An information centre can be defined as: "an organisation that (i) selects, acquires, stores and retrieves specific information in response to requests; (ii) announces, abstracts, extracts and indexes information; and (iii) disseminates information in response to requests from documents or in anticipation."

Harrod's Librarians' Glossary defines an Information Centre as being "usually an office, or a section of a bibliographical centre, research bureau or documentation centre, which gives information about books or on a subject with which the organization providing the facilities or the centre is concerned. The functions of this centre include technical writing, indexing, abstracting, SDC, etc., each of intensive nature".

Another earlier definition of an Information Centre in relation to library functions is:

- An organisation with library as a unit with responsibility to its parent organisation,
- An organisation which charges a fee for its services that cover full cost of the cooperation, and
- An organisation that relies on the library collection to provide information services for an external user group upon request.

In the above definition we see that the emphasis is on activities and products and the amount of intellectual effort involved in the preparation of the products. It has to be noted here that each individual activity and product eventually forms the input for other activities and products. Here the activities like selection and collection have been taken from libraries which are document-oriented, whereas the activities like indexing, abstracting and extracting are peculiar to information centres. This feature distinguishes an information centre from other types of information institutions.

Self Check Exercise

1) State the definition of an information centre.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

2.2.3 Libraries and Information Centres

As we are aware, while the special libraries been in existence since the beginning of twentieth century, the information centres emerged from the 1950s and have now developed into a major group of information organisations. Although they have overlapping functional characteristics, there are also considerable variations in the level of services offered by them. It is thus clear that libraries have been traditionally collecting and disseminating records of science and scientific thinking. An information centre, however, collects as well as interprets the collected material for the user.

The special library concept can be kept alive even though the scientific and technological community asks for more and more processed information, rather than processing it themselves. Information centre on the other hand do not really take the role of special libraries, but actually need them for their resources. In other words, an information centre cannot exist without the facilities of a more or less traditional library as a starting point for its efforts.

The difference between information centres and most of special libraries can be viewed by the degree with reference to the services that both provide/organise.

Presently, three functional levels of services are offered by both these institutions. At the **basic level,** the special libraries disseminate information and materials acquired by them, answer reference queries, direct users in need of detailed information for research to proper sources of information and handle journal literature to keep the users informed of the current developments in a particular discipline. Secondly, at the **intermediate level,** a special library or information centre, offers complex literature searches in specific subject fields, carries out retrospective search of literature leading to bibliographic compilation, selects or acquires or provides materials as demanded by users, produces current awareness bulletins in specific disciplines, prepares new products/publications or provide selective dissemination of information to individual or groups of users based on specific profiles. Lastly, at the **highest level**, an information centre offers highly specialised services including information consolidation and repackaging involving analysis, synthesis and evaluation of information and present them in a form required by users. This range of services has also led to the formation of different types of information centres, such as data centres, information analysis centres, etc. which are being dealt with in subsequent Units of this Block.

The higher level of information services also requires staff with subject specialisation, technical writing and communication abilities. These services, can however, also be offered by a special library, depending on staff strength and material being acquired and organised. Besides the above, a basic difference between these two types of information organisations is that while the special library offers services only to the staff of the parent organisation, an information centre also serves a large number of users having a common subject interest.

The above discussion reveals that the information centre differs from the library in the following ways:

- Degree of delegation by the user, that is, the task of searching and evaluating information is done by the staff.
- Information evaluation and exercising judgement while retrieving information/ material in relation to the users' requests.
- Providing information itself rather than the document containing information as in the case of libraries.
- Processing of search input into a variety of search products.
- Provides information not only to users of parent organisation but also to users outside the organisation.
- Not only identify, acquire, process, store and retrieve information (the library functions) but also reduce, analyse and present information/data in a suitable form as desired by the users.

The above mentioned aspects thus imply that a library handles and provides address of a document containing information but an information centre gives information that is inside the document and also processes and disseminates it.

There are a number of arguments for and against in terms of the relationship between information centres and libraries. Some information specialists feel that the library services (of special libraries) include information services while others argue that the library services are totally different from information services and each operate separately. However, for our purpose, we may consider information centres as organisations that have emerged as extensions from the special libraries and

that they practice and perform many library techniques and functions with some modifications that may be essential to handle information as the unit of service and to serve the varied requirements of the specialised users.

2.2.4 Need for Information Centres

In the previous section we have learnt that the information centres have emerged from the libraries which have books, periodicals and other types of reading materials. As the size of the collection and variety of available documents in libraries grows, it becomes unmanageable and eventually a point is reached when nothing productive can be derived out of it. This leads to starting up of special types of services so that maximum utilisation of resources can take place.

Some of the reasons for setting up of an information centre are:

- Increase in volume and variety of information sources;
- Rising cost of documents;
- Emphasis of service from documents to information contained in documents;
- To meet the changing complexity of information needs of users;
- To keep pace with developments in various subject areas;
- Improved decision making by managers, scientists, R & D personnel, planners and policymakers;
- To be part of resource sharing and networking activity in a region, subject or otherwise;
- To have access to new publications, information services and databases;
- To avoid duplication of efforts; and
- Need for carefully evaluated, analysed, consolidated and repackaged information oriented towards the special needs of the users.

Thus we can see that the libraries were concerned with the supply of documents, whereas information centres have main concern for what is contained inside the documents.

Self Check Exercises

2) Distinguish the relationship between special libraries and information centres.

3) State some reasons for the need of information centres.

Note: i) Write your answers in the space given below.
ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

2.3 INFORMATION CENTRES: TYPES

As already discussed, information units are concerned with conservation, documentation of information and their activities can range from basic library functions, through contents description and the dissemination and exploitation of information to data and information analysis. In this section, types of information centres are discussed under several broad groups.

There are various arguments/views concerning these groupings. An organisation owned by a private agency may offer specialised or general service or a specialised service by a government agency operating either at local or national level.

Let us now have a brief description of various types of information/documentation centres. It is to be noted here that there is a lot of overlap in various categories of information centres discussed below. Suitable examples are also provided in each category and it can be seen that same example may serve for more than one category of information centres.

2.3.1 By Specialised Interest

Information Centres grouped under this category are those institutions that cater to specialists in various subject areas of research, mission-oriented projects, special kinds of information or information from particular regions.

a) Subject Field – Information Centres devoted to subjects like-science, technology, social sciences, engineering, agriculture, etc.

Examples:

Science and Technology – National Institute of Science Communication and Information Resources (NISCAIR), New Delhi.

Social Sciences – National Social Science Documentation Centre (NASSDOC), New Delhi.

b) Mission-oriented – Information Centres devoted to missions, sectors, etc. of national economy.

Examples:

Agriculture – Agricultural Research Information Centre, Indian Council of Agricultural Research, New Delhi

Defence- Defence Scientific Information and Documentation Centre (DESIDOC), New Delhi.

Environment- Environmental Information Centre, Federation of Indian Chambers of Commerce and Industry, New Delhi.

c) Kinds of Information – Information Centres dealing with a particular kind of information like industrial information, bibliographical information, management information, etc.

Examples:

Industrial Information - Small Enterprises National Documentation Centre (SENDOC), Hyderabad.

Management Information – National Informatics Centre, New Delhi.

Bibliographical Information - National Social Science Documentation Centre (NASSDOC), New Delhi and National Institute of Science Communication and Information Resources (NISCAIR), New Delhi.

d) Geographical Region – Information Centres concerning a particular geographical region.

Examples:

Japan Information Centre of Science and Technology, Tokyo, Japan.

European Translation Centre (ETC), Delft, Netherlands.

2.3.2 By Ownership

Information Centres by ownership include those institutions that are owned, funded and run by government agencies or learned societies or professional associations or private agencies.

a) Government Information Centres

Examples:

National Informatics Centre (NIC), New Delhi.

National Social Science Documentation Centre (NASSDOC), New Delhi.

National Institute of Science Communication and Information Resources (NISCAIR), New Delhi.

b) Semi-Government Information Centres

Examples:

National Centre for Science Information (University Grant Commission), Indian Institute of Science Campus, Bangalore.

c) Information Centres of Non-Government Organisations (NGOs)

Examples:

International Development Research Centre (IDRC) Library, Canada.

UNESCO Social and Human Sciences Documentation Centre, Paris, France.

Asia Regional Information Centre (ARIC), Asian Development Bank (ADB), Manila, Philippines.

d) Private Information Centres

Examples:

Farmers' Information Centre (Maroochy Horticultural Research Station), Nambour, Australia.

Documentation and Information Centre, TERI Library, TERI, New Delhi.

e) International Information Centres

Examples:

Trade Information Services, International Trade Centre (UNCTAD/WTO), Geneva.

International Patent Documentation Centre (INPADOC), European Patent Office, Munich.

Infoterm - International Information Centre for Terminology, Vienna.

2.3.3 By Level of Service

Many information centres operate at various levels which can be international or global, regional, national or local.

a) Global/International Information Systems/Centres – These centres usually have decentralised input, centralised processing and decentralised dissemination or output of information.

Examples:

AGRIS/CARIS International Information System for the Agricultural Sciences and Technology, FAO, Rome.

Infoterm - International Information Centre for Terminology, Vienna.

International Serials Data System (ISDS), Paris.

b) Regional Information Centres – Countries belonging to a geographical region group together to form regional information activities.

Examples:

SAARC Documentation Centre, New Delhi.

Pan African Development Information System(PADIS),The Economic Commission For Africa (ECA), Addis Ababa, Ethiopia.

c) National Information Centres – These are information centres usually established by governments of nations and operate at national level. The national information centres perform national level fuctions, activities and services.

Examples:

The National Documentation Centre, Bangkok, Thailand

National Centre for Scientific and Technological Information & Documentation (NACESTID), Ministry of Science, Technology and Environment, Hanoi, Vietnam.

Bangladesh National Scientific and Technical Documentation Centre (BANSDOC), Dhaka, Bangladesh.

National Social Science Documentation Centre (NASSDOC), New Delhi.

National Institute of Science Communication and Information Resources (NISCAIR), New Delhi.

d) Regional Information Centres (inter-country) – These centres are usually established in geographically large countries. Regional Centres are set-up in different regions in order to make available information facilities to users.

e) Sectoral Information Centres – This category of information centres is devoted to a specific discipline or a subject area. These are available on a national basis to users and institution engaged in the concerned discipline or mission.

Examples:

National Information Centre For Marine Sciences (NICMAS), National Institute of Oceanography, Goa, India.

Biotechnology Information Centre, Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai, Tamil Nadu.

National Information Centre for Food Science and Technology, CFTRI, Mysore, India.

Pollution Prevention Regional Information centre, Nebraska Business Development Centre (NBDC), The University of Nebraska, Omaha (UNO).

f) Local Information Centres - These centres are attached to individual organisations to meet their specific information requirements.

Examples:

Information Centre, United Riceland Ltd., Kurukshetra, India.

Business Information Centre, Transport Corporation of India Ltd., Gurgaon, India.

Biotechnology Information Centre, Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai, Tamil Nadu.

2.3.4 By Variety of Services Provided

Information Centres can also be categorised by the variety of services provided to their users. These centres usually offer some specialised services which are unique. These services include:

a) Current Awareness Services

b) Abstracting and Digest Services

c) Product Information Services

d) Data Bank

Examples:

National Social Science Documentation Centre (NASSDOC), New Delhi.

National Institute of Science Communication and Information Resources (NISCAIR), New Delhi.

Small Enterprises National Documentation Centre (SENDOC), Hyderabad.

2.3.5 By Types of Material

Some information centres offer only a special kind of material like patents, standards, etc. and these are categorised according to types of material offered by them.

Examples:

International Patent Documentation Centre (INPADOC), European Patent Office, Munich.

International Development Research Centre (IDRC) Library, Canada.

2.3.6 By Service in Terms of Users

As we are aware, in the present day context, users of information organisations are increasing in volume and variety. The users can be categorised in various groups according to their information requirements which include research, study, scientific applications, marketing of commercial products, etc., planning, policymaking, decision-taking and for many other day-to-day activities. User category is vast and includes Scientists, Research and Development users, Industrial users, Government employees, Management professionals, Marketing professionals and others.

These are institutions that cater to the above mentioned special category of users and are set-up keeping in view the special needs of these users. With the advent of modern day technologies, such information centres are gradually increasing in number.

Information Centres world over are catering to specific requirements of users and there are hundreds of such examples. Some examples in our country are mentioned below:

Scientific and Technological Users - National Institute of Science Communication and Information Resources (NISCAIR), New Delhi and National Centre for Science Information (University Grant Commission), Indian Institute of Science Campus, Bangalore.

Government Employees - National Informatics Centre, New Delhi.

Industrial Workers - Small Enterprises National Documentation Centre (SENDOC), Hyderabad.

Agricultural Workers - Agricultural Research Information Centre, Indian Council of Agricultural Research, New Delhi.

Self Check Exercises

4) Name different categories of information centres.

5) What are the levels at which information centres operate ?

6) Give examples of information centres that provide service in terms of users.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

2.4 ORGANISATION OF INFORMATION CENTRES

There are different patterns of organisation of Information Centres which vary with the volume of information handled, the level of information centre, the position of information centre with an organisation and the type of users it serves.

The Information Centres at local levels and which are attached to individual research and development institutions, business houses, industrial enterprises, government departments, etc. are established and administered by their parent organisations. At

the national level, it might be the responsibility of the appropriate government agency to establish and administer the National Information Centre.

In countries where research and developmental efforts are government funded, the information centres are usually established in the government sector. There are thus varying patterns of national level organisation of information centres.

Functional Organisation

In most of the organisations, the responsibility for selection and acquisition of documents, processing and storage of documents and conventional services are usually the responsibility of the library which is usually a separate entity from the information centre. The information centre, thus would have responsibility for processing of information and the information services to be offered. The work of the information centres may therefore be organised on a functional basis.

The different operations may be organised into several areas of activity as discussed below:

2.4.1 Areas of Activity

The areas of activity of an information centre can be divided into three major aspects, which are:

i) Management and Administrative Services;

ii) Internal Operating Services; and

iii) External User Services.

Let us now study in detail the organisation of an information centre's various activities.

i) **Management and Administrative Services**

Management and administrative services include developing and implementing plans, policies and standards consistent with an organisation's overall objectives. This also includes recommending policies to top management to meet changing needs and handle emergency situations as they develop. The management level of the centre provides guidance to members of the staff as per oganisation's policies and procedures. Management studies to identify and analyse problem areas, work measurement and simplification studies, maintenance of records and compilation of statistics are also performed at management level.

Establishing professional and non-professional personnel requirements, hiring staff with required skills are responsibilities assigned to the administrative level. The administrator should supervise the work of his/her employees and develop and prepare on-the-job instructional material and guidelines for his/her staff.

Another most important and frequently ignored aspect here is the public relations function. Unless users, top managers and external sources of information are kept informed of the achievements of the information centres regarding what is currently taking place and what its aims are, it will remain a mere depository rather than a disseminator of information.

ii) **Internal Operating Services**

The internal operating services of an information centre can be broken down into four major areas: acquiring and disposing of materials, cataloguing and classifying the information, physically preparing the materials for handling and analysing the data.

The selection of books, periodicals, reports, maps, patents and the rest of the collection should not be left to the judgement of the staff members but should reflect suggestions and knowledge contributed by senior personnel of information centres, scientists, prominent users and other specialists.

A good information centre also performs the action complimentary to selection and acquisition, that is, to discard and replace materials. Needs change constantly and acquisition and weeding out practices should reflect these changes.

The cataloguing, classifying and indexing operations are professional tasks requiring that the practitioners have specialised technical knowledge. Once a classification scheme is decided, it should be suitably developed, expanded and periodically revised to meet the changing needs. Similarly, establishing/adopting a bibliographic record format for cataloguing each item and recording data in a main catalogue file/database that describes each publisher and identifies its unique features are essential for efficient operations. For indexing, a suitable indexing system is required to be established, alternately, some standardised list of subject headings can also be used for drawing index terms besides having a well developed authority file suitable for the subject area of the information centre.

The physical preparation of the material after it is selected, acquired, classified and catalogued includes several other activities.

The fourth area of internal operation is analysis, synthesis and summarisation of information by literature search. Here the information analyst examines the source materials such as technical reports or research documents and then indexing, extraction and abstracting of these source documents take place. The depth of analysis depends on the purpose to be served.

Indexing identifies the concepts of documents and helps in retrieving the source document later on. Abstracting consists of summarising the source material for facilitating selection of proper material.

iii) **External User Services**

The major external user service in any information centre is circulation of materials. Unlike public libraries where circulation of materials is unrestricted, the information centre staff must use extreme caution in circulating limited documents. They must see that the documents are issued only to authorised personnel.

In addition to circulation of materials, the information centre also provides inter-library loan services, reference service and photocopy of original documents. Other services of information centres are discussed in the next section of this Unit.

Self Check Exercise

7) List the areas of activity for organising an information centre.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

2.5 SERVICES OF INFORMATION CENTRES

The modern day information centres offer a vide range of services. The variety and range of services of an information centre are so vast, and become many times difficult to distinguish between services of automated libraries and information centres. However, the services of an ideal information centre are products of well organised professionally staffed information organisation. The interdependence of various functions of information centre results in activities which are well organised to ensure the best service for the least cost/effort.

Given below are some services which are offered by most of the information centres:

2.5.1 Lending of Books

Lending of books to users for home reading has always been one of the basic functions of any library since time immemorial. Many information/documentation centres are still lending books to users and it has been one of the chief services of most of the information centres especially for users belonging to the parent organisation of the centre. However, periodicals, reports and other categories of specialised materials are not lent to users.

2.5.2 Inter-library Lending of Documents

Libraries have always been cooperating with each other by sharing resources in the form of inter-library lending. Inter-library lending of documents between libraries becomes a necessity when library materials are required by their users for a short period or on urgent basis especially in case of special libraries where material relevant to objectives/activities of the parent organisation only are acquired. Such material, thus, is borrowed from other libraries to satisfy user needs and returned back after use. This arrangement works on give and take principle and has been found to be very successful especially at local level.

Most of information centres too offer this service by depending on local libraries for satisfying requirements of their users on demand.

2.5.3 Photocopy Service

In this service, photocopy of materials available with the information centre is provided to users on request. Here, the user himself/herself locates the document, requests for a copy of the same, pays a token amount and copy of the document is provided on the spot. This service is very popular with student users and scholars. This service, however, is available only if copy of some portions of a document is required by users and not copy of the whole document. Many information centres also provide self operated photocopy service to users.

2.5.4 Document Delivery Service

In document delivery service copies of materials are provided to users upon request. But in this case, copies of material not only from within the document base of the information centre, but also available from other organisations (within the city, region, country or world) are provided to the users. Contrary to photocopy service where on the spot copy of material located by the users is provided, here, user has to make a formal request on a form by giving bibliographic details of the documents required. The user is also expected to pay usually in advance for such a service. The information centre then traces the documents, makes photocopy and sends the same to the user. This service thus may take one week to three months depending upon the availability of material requested for.

2.5.5 Reference, Literature Search and Preparation of Bibliographies

Reference services are either passive or active. A passive reference service is one in which the information centre acquires and makes available reference books, reports and data. The user can examine these for the information that he/she needs. It functions more like a reference room in any library. An active reference service is provided when a member of the staff locates the material for the user rather than the user finds it for himself / herself. Facts may be culled from several documents and gathered material is provided to the user. Here the staff doing search should have subject knowledge.

Conducting literature searches on a specific problem or subject is a valuable service provided by most of the information centres. Such a search may present duplication of research, or may take the form of a state-of-the-art report or it may be an exhaustive survey. Literature search can be comprehensive search on a given topic or exhaustive retrospective search.

A bibliography, as you have studied in BLIS course, is a list of references on a given topic. When references on a given topic (as specified by a user) are provided to a user, the service is referred to as bibliographic service. Bibliographies are usually compiled in an information centre as an end result of a literature search. A bibliography may contain a select listing by author, title and subject or it may take the form of an annotated listing in which significance, pertinence and relevance of the items are evaluated. Bibliographies may be selective or comprehensive or may be exhaustive in approach.

Presently, information centres prepare bibliographies from printed sources (indexing/ abstracting journals), CD-ROMs or from online access databases. As this is a paid service, users can request for the same according to their paying capacity wherein cost of bibliography prepared from online access databases is maximum and the one from printed sources is the least.

2.5.6 Referral Service

This is also a kind of reference service where a user requests for some material and the information centre does not have the same and cannot obtain it, then if its location is known, the user is referred to the source or organisation or individual who can provide the information about the material.

2.5.7 Newspaper Clippings

In this service, newspaper clippings on topics relevant to the information centre are cut and pasted on sheets of paper and placed in folders for ready reference by users. The folders containing the newspaper clippings are properly indexed and in most of modern information centres, this service is being computerised too.

2.5.8 Translations

In information centres, many users, especially those belonging to science and technology field often require translations from materials published in foreign languages. Translation service can be offered from within the information centre or the centre may contract the work to a translation agency. This service is becoming more and more useful. As science has no geographical boundaries and to keep abreast with various scientific developments, it is essential that translation facilities to be made available in all information centres.

2.5.9 Technical Enquiry

This service is very much like the reference service with the difference that in reference service any type of query is answered by the staff of the information centre but a technical enquiry also referred to as technical query service can be handled only by the subject specialists working in the information centre. For conducting technical enquiry service, the information centre has to procure latest sources in the particular subject area.

2.5.10 Information Scouting

Information scouting consists of keeping abreast of the data like; who has what information and where it is available and referring the requests to the appropriate persons and/or to facility in the organisation or outside it, or both. Knowledge of such information may become available through personal interviews with originator by a member of the staff or the originator may notify the organisation that his/her research efforts will be recorded at a conference or a meeting. To glean such information, information centres should be staffed with well informed and well-linked persons.

2.5.11 Current Awareness Services

Your must have studied about various current awareness services in BLIS course in the context of special libraries. In fact, majority of the users are of the view that current awareness services are synonymous with information centres and feel that these are offered only by information centres. The various current awareness services usually offered by information centres include circulation of accession list, selective dissemination of information, bulletin board, announcement of new arrivals, copies of contents pages of journals and many others.

2.5.12 Abstracting

Abstracting is the process of writing a summary of an article, report, journal or similar publication so that users of an organisation may quickly read a digest of the original material. Bibliographical details accompany the summary giving the user enough information to identify the publisher.

Besides preparing abstracts of internally generated material and externally originated publications, the information centre may also subscribe to any of the published abstracting indexing services. These publications are usually oriented towards a particular discipline. Many information centres also offer contents and abstracting service which is a combination of reproduction of contents pages of journals and also providing their abstracts alongwith to enable user to know what new/latest journal articles of their interest have been published.

2.5.13 Information Centre Publications

The information centre should keep its users informed of various holdings, new acquisitions and its own publications. This can be done in the form of various brochures about each activity/service/publication or an 'acquisition list' or 'list of new arrivals' or as a 'list of publication of the information centre.'

2.5.14 CD-ROM Search

Present day information centres, existing in an electronic environment, are gradually replacing printed resources by electronic resources. Majority of published literature is now also available in the form of CD-ROMs – both reference as well as full-text

material. Information centres thus make available to users either references or materials available on CD-ROMs or provide facilities for searching the CDs within library premises.

2.5.15 Online Access to Databases

We are aware that information retrieval from databases provides access to a broad range of information at a low cost. Libraries/information centres all over the world are finding such services/system as everyday necessity. For the past so many years several major database vendors provide ready access to hundreds of databases containing a wide range of materials. The records of databases contain usually references to journal articles, books, technical reports, patents, conferences proceedings, standards, dissertations, etc. These databases cover recorded knowledge in most areas and carry useful data/information.

Users request for a search on a particular topic when they require current literature for research. Search can be for references or details on a topic of interest to the users. Online search is very expensive as the information organisation offering this service has to subscribe to a database directly or through a vendor. Search process involves intervention of a senior information professional having subject knowledge as well as search skills.

2.5.16 Internet Services

The modern information centres working in electronic and networked environment also make available several Internet services or services through Internet. Many users maintain contact with the information centres for various services through e-mail by sending and receiving requests for services. This is faster, cheaper, involving lesser human intervention and time saving. Besides this many information centres also extend limited Internet search facilities to their users by charging a token amount or even free.

Self Check Exercises

8) State any five services of an information centre.

9) List some computerised services of information centres.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

2.6 PLANNING AN INFORMATION CENTRE

The planning process in the establishment of an information centre has the following steps:

a) **Formulation** of the overall objectives of the information centre.

b) **Inputs** – Relating to information, manpower/expertise facilities such as institutional support, building and equipment.

c) **Organisation** – Execute authority for control, supervision and administration, functional organisation, costing and budgeting, and developing operational capabilities.

d) **Output Services** – Work out the details of preparing time schedule for implementing the output services that are planned.

e) **Action Plan** – Drawing out realistic plan which would involve a number of sequential and time bound actions for developing the information centre in a phased manner and with the available means and resources.

f) **Total Quality Management** – Ensuring of quality aspect in all activities including inputs.

g) **Review and Evaluation** – Reviewing and evaluating the developmental phase for any modification or alteration of either the programme or the strategy.

Self Check Exercise

10) List the processes involved in planning an information centre.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

2.7 EXAMPLES OF INFORMATION CENTRES

Information is an intellectual resource and provides vital input to developmental processes for various activities. Realising the needs and importance of information delivery and information services, countries all over the world have been quite active in creating information systems at various levels. Given below are a few examples of national and international information centres.

2.7.1 National

We have many national information centres like NISCAIR (formerly INSDOC), NASSDOC, DESIDOC and many others performing at the national level catering to users in various subject areas. Given below are some examples of information centres/documentation centres operating in India.

i) National Institute of Science Communication and Information Resources (NISCAIR), CSIR, New Delhi

NISCAIR was formed in 2002 by merger of Indian National Scientific Documentation Centre (INSDOC) and National Institute of Science Communication (NISCOM). INSDOC was established in 1952 by Council of Scientific and Industrial Research (CSIR) with UNESCO's technical assistance to serve the scientists and technologists in industry, government, universities and research institutes by providing documentation services. NISCOM had been involved in publication of scientific literature especially journals.

The NISCAIR maintains the National Science Library and provides various services/ activities that include electronic library, document procurement, organisation and dissemination of S & T information, translation of S & T documents, networking, online bibliographic information, conducting training programmes for library/information professionals and preparation of databases. NISCAIR has several publications that include primary and secondary journals. The major initiatives presently handled by NISCAIR are a Traditional Knowledge Digital Library (TKDL), e-journals consortia and National Science Digital Library.

ii) National Social Science Documentation Centre (NASSDOC), ICSSR, New Delhi

National Social Science Documentation Centre (NASSDOC), was established in 1969 as a Division of ICSSR with the chief objective to provide library and information support services in the field of social sciences. Services are available to researchers in social sciences; those working in academic institutions, autonomous research organisations, policy making, planning and research units of government departments, business and industry, etc. in India. NASSDOC also provides guidance to libraries of ICSSR Regional Centres and ICSSR maintained Research Institutes.

Facilities available at NASSDOC include library and reference services; collection of unpublished doctoral dissertations, research project reports, current and old volumes of selected social science journals of Indian and foreign origin; literature search service from databases; compilation of bibliographies, and document delivery service. NASSDOC is also involved in union catalogue project and conducting short term training courses.

iii) Defence Scientific Information and Documentation Centre (DESIDOC), DRDO, New Delhi

DESIDOC was established in 1958 under the Defence Research and Development Organisation (DRDO) and is a central information agency for collection, processing and dissemination of scientific and technical information of interest to DRDO laboratories, establishments and other agencies of the Ministry of Defence. Facilities of DESIDOC include Defence Science Library (DSL), translation services, information network and communication facility and multimedia facility. DESIDOC brings out a few periodicals and some adhoc publications and the centre also acts as the publication wing of DRDO. In order to provide efficient information service to the DRDO scientists by sharing resources of all the DRDO labs/establishments, DESIDOC has provided e-mail and Internet facilities to all the DRDO labs/establishments.

iv) Small Enterprises National Documentation Centre (SENDOC)

Small Enterprises National Documentation Centre (SENDOC) was established in 1970 at the National Small Industry Extension Training Institute (NISIET) as a unique knowledge resource centre to cater to the information needs of Small and Medium Enterprises (SMEs). The centre has a rich collection of knowledge resources like books, journals, reports, business and industrial information in print and electronic media. SENDOC operates several online databases and its activities include : lending of books, inter-library lending of documents, reference, preparation of bibliographies, literature search, newspaper clippings and technical enquiry service.

Equipped with rich knowledge resources, expertise and facilities, the centre has been conducting since 1971 national and international programmes in information science and other user-centric programmes and has trained library and information professionals

from more than 108 developing countries. The centre also possesses the state-of-the-art facilities in IT and provides a variety of documentation and information services through its division Business Information Bureau (BIB).

v) Wildlife Institute of India - Library and Documentation Centre, Dehradun

Set up in 1986, with only four library services, the centre now offers nearly 22 services to its users in the area of wildlife. Besides the library, Information Analysis and Documentation is a separate unit within the library. This unit is responsible for providing information and bibliographic services. Major activities include monthly Current Content Service, preparation of topical bibliographies, Indian Wildlife Abstracting Service, newspaper clipping service and maintenance of specialised in-house and CD-ROM databases concerning wildlife.

vi) BARC Scientific Information Resource Division – Central Library, Depository Library and Divisional Libraries

The Bhabha Atomic Research Centre (BARC) has a Scientific Information Resource Division taking care of library and documentation activities of the centre. All the activities are in turn covered by the Central Library, Depository Library and Divisional Libraries. The Central Library at BARC has got the necessary infrastructure and facilities including electronic information resources to meet the information requirements of the scientists and engineers in BARC and other institutions under the Department of Atomic Energy.

The Depository Library (DL) is the most comprehensive library in the country for scientific and technical reports in the field of nuclear science and technology. There are over 5,50,000 reports. A majority of them are available in microfilm (microcard/ microfiche) and some on CD-ROM. The reports are loaned to scientists on request.

In addition to the Central Library many important scientific divisions of BARC have Divisional Libraries containing books and other publications which are needed for day-to-day reference. However, the Central Library is responsible for procurement and processing of materials required by the Divisional Libraries.

vii) Bioinformatics Centre, National Institutre of Oceanography, Goa

Bioinformatics Centre was established at the National Institute of Oceanography (CSIR), Dona Paula, Goa in January 1990, recognising the importance and necessity to develop the emerging areas of Bioinformatics and its application in Marine Sciences, under the Biotechnology Information System (BTIS) programme. Bioinformatics Centre at NIO has been engaged in collection and dissemination of data/information on Marine Biodiversity, building databases in the subject, developing networking and communication and provides training to potential users.

viii) Agricultural Research Information Centre, ICAR, New Delhi

The Indian Council of Agricultural Research (ICAR) is running an Agricultural Research Information Centre (ARIC) as the Central source of information on all research projects and schemes financed by the ICAR since 1967. The centre maintains databases on agricultural projects, deputation reports and research projects of institutions which have computerised updating of the databases. The ARIC is the national input centre for the AGRIS and CARIS agricultural databases of the FAO, which is the largest information system of its kind in the world. The ARIC is also the National Focal Point for the SAARC Agricultural Information Centre (SAIC). The

centre has also published several directories in addition to a half-yearly directory of conferences, seminars, symposia and workshops in agriculture.

2.7.2 International

There are varying patterns of national and international level organisations or information centres in various countries. Given below are some examples of information/documentation centres operating in other countries serving users internationally or regionally.

i) Japan Information Centre of Science and Technology – JICST, Japan

JICST covers almost all vital information in science and technology in the world and its collection is world's most comprehensive one in the field of science and technology, especially for literature published in Japan. The collection of JICST includes a large number of not only domestic serials titles but serials titles from over 60 nations, with difficult-to-obtain literature such as technical reports and proceedings in and out of Japan. They are deposited in the JICST libraries for reading and photocopying services. JICST offers computerised information through JOIS and STN and other customised services including speedy photo-copying, translation services and manual search services.

ii) Bangladesh National Scientific and Technical Documentation Centre (BANSDOC), Dhaka, Bangladesh

Bangladesh National Scientific and Technical Documentation Centre (BANSDOC), established in 1972 as an unit of Bangladesh Council of Scientific and Industrial Research (BCSIR), is a premier science and technology (S&T) information organisation in Bangladesh. In 1987, BANSDOC and National Science Library (NSL) were amalgamated and the newly created organisation was renamed as BANSDOC owing the status of a premier national organisation and apex body in the country with the recommendation of the National Science and Technology Policy envisaged in 1987.

BANSDOC provides the scientists, technologists, technicians, industrialists, planners and policy-makers with scientific and technological information and upliftment of socio-economic development of the country is its mandate. With that end of view, BANSDOC collects, processes and stores information and data on scientific research and experimental development in all branches of science and technology and disseminates such information to researchers, irrespective of their affiliations whether they are engaged in research, academic institutions, planning organisations, policy making bodies or in the nationalised and private sector industries.

iii) Institute for Scientific and Technical Information (INIST), National Centre for Scientific Research (CNRS), France (Institut de l'Information Scientifique et Technique (INIST) - Centre National de la Recherche Scientifique (CNRS), France)

INIST, is the centre for scientific and technical information of the CNRS, France, is one of world's major scientific and technological information facility with a huge library that has large document collections available to the public through document delivery services; indexing services of literature in Science, Technology, Medicine, Humanities and Social Sciences designed to contribute to bibliographic databases; information services available online or on a variety of electronic media, and; its document holdings cover the core international scientific and technical literature. The collection of INIST includes journals, scientific reports, conference proceedings, books

and doctoral dissertations and grey literature. INIST is not a lending library but supplies photocopies of documents from not only its own collection base but from anywhere in the world.

iv) Pakistan Scientific and Technological Information Centre (PASTIC), Pakistan

PASTIC, a unit of the Pakistan Science Foundation, is a premier organisation in the field of information dissemination, serving researchers in Pakistan requiring scientific and technological information. PASTIC procures, processes and disseminates scientific and technological information to the researchers as well as provides bibliographic and translation services. PASTIC also develops inter-library cooperation and resources sharing at national level. It also develops and strengthens the National Sciences Reference Library. Its services include bibliography compilation, indexing and abstracting, technical translations, current awareness services, reference, patent information and duplicating information on request. PASTIC is also the national focal point for various international organisations including the SAARC Documentation Centre.

v) SAARC Documentation Centre (SDC), New Delhi, India

SDC, a regional centre of the South Asian Association for Regional Cooperation (SAARC), was set up in 1994 in New Delhi, India to enable exchange of information in the field of science, technology, industry, trade, commerce and development matters amongst SAARC Member States. The centre aims to meet the information needs of scholars in the SAARC region, provides timely access to relevant and accurate information, develops human resources in the area of library/information science/ information technology and is involved in developing a SAARC Traditional Knowledge Digital Library (TKDL) for protecting traditional knowledge, genetic resources, etc. in the SAARC Region.

SDC acts as a repository of documents/reports in the region and on the region and offers information services for scholars in the SAARC region.

vi) Coconut Information Centre (CIC), Sri Lanka

CIC was established in 1979 to acquire, classify and disseminate scientific and technological information about coconuts. It is one of the best institutions of the world in the field of coconut research and information. The centre was set up and efforts were made to capture and record coconut documentation and release information products. Presently, this centre is involved in consolidating and augmenting CIC services in order to provide researchers with easier access to current literature. The centre collects information products related to the area of coconuts and has also been instrumental in publishing the COCONIS Newsletter and bringing out a Directory of Coconut Research Workers.

vii) All-Russian Scientific and Technical Information Institute of Russian Academy of Sciences - Vserossiisky Institut Nauchnoi i Tekhnicheskoi Informatsii (VINITI), Moscow, Russia

VINITI, the leading information centre in Russia has been supplying the world community with scientific and technical information since 1952. VINITI is established and financially supported by the Russian Academy of Sciences, Russian Ministry of Industry, Science and Technologies. The main task of VINITI is to provide information support to scientists and specialists of Russia in natural and technical sciences. VINITI produces information products in printed and electronic form and also publishes journals.

viii) Canada Institute for Scientific and Technical Information (CISTI), National Research Council, Canada

CISTI, the Canada Institute for Scientific and Technical Information, is one of the world's major sources of information in all areas of science, technology, engineering and medicine. CISTI started over 75 years ago as the library of the National Research Council of Canada, the leading agency for R&D in Canada, and became the National Science Library in 1957. The change to CISTI came in 1974 to reflect the wider scope of services provided and the increasing role in the development of electronic information products and services for the scientific and technical community.

CISTI's headquarters in Ottawa houses one of the world's most comprehensive collections of publications in science, technology and medicine. NRC Research Press is CISTI's publishing arm, with 15 international journals of research plus several books and conference proceedings. CISTI can provide any information a user needs, whether an article from a journal or an in-depth literature search, or a referral to an expert. The institute has easy-to-use electronic information tools that enable users to remain up-to-date with new developments in their field.

Self Check Exercises

11) Write a short note on any national information/documentation centre of India.

12) Write a short note on any international information/documentation centre.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

2.8 SUMMARY

You are aware that special libraries emerged at the beginning of the 20th century and later they led to the formation of information centres due primarily to fulfil the requirements for information support for business, trade and commercial organisations, government departments and research organisations. As the information centres constitute the information infrastructure of a country, they help in strengthening the information handling, services and utilisation. Information centres also serve the purpose of providing access to information for every type of users. There are different kinds of information centres and each one has an important role to play and serve the chief purpose of providing timely access to information in the required field.

We must also keep in mind the relationship of information centres and libraries from various angles as their services and other efforts too are complimentary to each other. Presently well established information and documentation centres have been set up at international, national, regional sectoral and local levels. The present day users cannot function without the modern computerised services of information centres. The well functioning information centres with application of computer and communication facilities can create an effective network which will help in maximum utilisation of resources and facilities and result in easy flow of information all over the country for the benefit of the users.

2.9 ANSWERS TO SELF CHECK EXERCISES

1) An information centre can be defined as an an organisation that :

   i) selects, acquires, stores and retrieves specific information in response to requests;

   ii) announces, abstracts, extracts and indexes information; and

   iii) disseminates information in response to requests from documents or in anticipation.

2) Special libraries traditionally have been collecting documents, storing and making them available to users on demand. However, as the focus has been towards utility of services, shifting from documents to information, the information centres have been established to provide information services in addition to making documents available to users. Initially these new type of services were being provided by special libraries but for our purpose, we may consider information centres as organisations that have emerged as extensions from the special libraries and that they practice and perform many library techniques and functions with some modifications that may be essential to handle information as the unit of service and to serve the varied requirements of the specialised users.

3) Some reasons for need of information centres are:

   - Emphasis of service from documents to information contained in documents.
   - To meet the changing complexity of information needs of users.
   - To keep pace with developments in various subject areas.
   - Improved decision making by managers, scientists, R & D personnel, planners and policymakers.
   - To be part of resource sharing and networking activity in a region, subject or otherwise.
   - To have access to new publications, information services and databases.
   - Need for carefully evaluated, analysed, consolidated and repackaged information oriented towards the special needs of the users.

4) Information centres may be categorised as:

   a) By specilaised interest,

   b) By ownership,

   c) By level of service,

   d) By variety of services provided,

   e) By types of materials, and

   f) By service in terms of users.

5) Information centres operate at various levels which can be international or global, regional, national or local levels.

   a) Global/International Information Systems/Centres – These Centres usually have decentralised input, centralised processing and decentralised dissemination or output of information, e.g. AGRIS/CARIS International Information System for the Agricultural Sciences and Technology, FAO, Rome.

b) Regional Information Centres – Countries belonging to a geographical region group together to form regional information activities, e.g. SAARC Documentation Centre, New Delhi.

c) National Information Centres – These are information centres usually established by governments of nations and operate at national level. The national information centres perform national level fuctions, acatvities and services, e.g. Thai National Documentation Centre, Bangkok, Thailand and Bangladesh National Scientific And Technical Documentation Centre (BANSDOC), Dhaka, Bangladesh.

d) Regional Information Centres (inter-country) – These centres are usually established in geographically large countries. Regional Centres are set-up in different regions in order to make available information facilities to users.

e) Sectoral Information Centres – This category of information centres is devoted a specific discipline or a subject area. These are available on a national basis to users and institution engaged in the concerned discipline or mission, e.g. National Information Centre For Marine Sciences (NICMAS), National Institutre of Oceanography, Goa, India.

f) Local Information Centres – These centres are attached to individual organsations to meet their specific information requirements, e.g. Information Centre, United Riceland Ltd., Kurukshetra, India.

6) Some examples of information centres that provide services in terms of users are:

i) Scientific and technological users - National Institute of Science Communication and Information Resources (NISCAIR), New Delhi

ii) Government employees - National Informatics Centre, New Delhi

iii) Industrial workers - Small Enterprises National Documentation Centre (SENDOC), Hyderabad

iv) Agricultural workers - Agricultural Research Information Centre, Indian Council of Agricultural Research, New Delhi

7) The major areas of activity of an information centre are:

i) Management and Administrative Services,

ii) Internal Operating Services, and

iii) External User Services.

8) The major services of an information centre are:

a) Answering technical queries

b) Literature searches and preparation of bibliographies

c) Current awareness services

d) Document delivery service

e) Translation services

9) Some computer-based information services are:

- CD-ROM search
- Online access to databases
- Internet search

10) The planning of an information centre involves: formulation of objectives, inputs including information sources, manpower, facilities and finance, services to be provided and an action plan for implementation review and evaluation.

11) Defence Scientific Information and Documentation Centre (DESIDOC) was established in 1958 under the Defence Research and Development Organisation (DRDO) and is a central information agency for collection, processing and dissemination of scientific and technical information of interest to DRDO laboratories, establishments and other agencies of the Ministry of Defence. Facilities of DESIDOC include Defence Science Library (DSL), translation services, information network and communication facility and multimedia facility. DESIDOC brings out a few periodicals and some adhoc publications and the centre also acts as the publication wing of DRDO. In order to provide efficient information service to the DRDO scientists by sharing resources of all the DRDO labs/establishments, DESIDOC has provided e-mail and Internet facilities to all the DRDO labs/establishments.

12) Japan Information Centre of Science and Technology (JICST), Japan covers almost all vital information in science and technology in the world and its collection is world's most comprehensive one in the field of science and technology, especially for literature published in Japan. The collection of JICST includes a large number of not only domestic serials titles but serials titles from over 60 nations, with difficult-to-obtain literature such as technical reports and proceedings in and out of Japan. They are deposited in the JICST libraries for reading and photocopying services. JICST offers computerised information through JOIS and STN and other customised services including speedy photocopying, translation services and manual search services.

2.10 KEYWORDS

Documentation Centre : An organisation that (1) selects, acquires, stores and retrieves specific documents in response to requests; (2) announces, abstracts, extracts, indexes documents; and (3) disseminates documents in response to requests for documents or for their contents.

Information Centre : An organisation that (1) selects, acquires, stores and retrieves specific documents in response to requests; (2) announces, abstracts, extracts, indexes documents; and (3) disseminates information in anticipation and in response to requests.

Information Services : Literature search, preparation of a bibliography, supply of current references on a topic, supply of copy of a document or its part specially a journal article, translation, etc.

Infrastructure : A set of institutions, organisations, resources, which supports the flow, handling and delivery of information from the generator to the user, including its acquisition, processing, replacing and transfer.

UNIT 3 DATA CENTRES AND REFERRAL CENTRES

Structure

3.0 Objectives

3.1 Introduction

3.2 Data: Basic Concepts

- 3.2.1 Meaning and Definition
- 3.2.2 Historicity
- 3.2.3 Importance and Role
- 3.2.4 Characteristics

3.3 Data Generation, Compilation and Dissemination

- 3.3.1 Data Generation
- 3.3.2 Data Compilation
- 3.3.3 Data Dissemination

3.4 Data Centres

- 3.4.1 Meaning
- 3.4.2 Structure
- 3.4.3 Functions
- 3.4.4 Services
- 3.4.5 Types and Levels

3.5 Committee on Data for Science and Technology (CODATA)

- 3.5.1 Origin and Development
- 3.5.2 Functions

3.6 International and National Data Centres

- 3.6.1 International Data Centres
- 3.6.2 National Data Centres

3.7 Socio-Economic Data System in India

- 3.7.1 Definition and Types
- 3.7.2 Use of Socio-Economic Data
- 3.7.3 Data Generation and Collection Process
- 3.7.4 Bibliographical Control
- 3.7.5 Qualitative Improvements of the Indian National Data System

3.8 Referral Centres

- 3.8.1 Referral Service
- 3.8.2 Referral Centre: Definition and Meaning
- 3.8.3 Need and Purpose of a Referral Centre
- 3.8.4 Functions of a Referral Centre
- 3.8.5 Activities of Some Notable Referral Centres

3.9 Summary

3.10 Answers to Self Check Exercises

3.11 Keywords

3.12 References and Further Reading

3.0 OBJECTIVES

After reading this Unit, you will be able to:

- understand the meaning of data and their manifestations;
- distinguish different categories and types of data;
- know the functions/activities performed by the Data Centres at international, national and local levels;
- get acquainted with structure and functioning of Referral Centres; and
- mention some important Referral Centres of the world.

3.1 INTRODUCTION

Gathering and compilation of data are one of the basic requirements of a person involved in any developmental activities. New subjects and areas have been added to the existing ones; and data activities once restricted to science and technology have now spread to social sciences and humanities also. Data needs of contemporary society are changing day by day. Input of statistical data is now required for planning, policy making and for executing a plan. The study of data and Data Centres is, therefore, considered as a prerogative in the potential use of services of essential facilities available at international, national and local levels.

Data compilation activity, which began as an informal function, has now become an organised activity. It involves gathering, processing, evaluation and dissemination. An organised activity first commenced in 19th century and culminated with compilation and publication of a document. For example, *International Critical Tables* (in English).

The process of observation, analysis, documentation, and collection has continued ever since. As literacy spread, science became established as a discipline, and data, information and knowledge began to accumulate at an ever-growing pace that continues to accelerate. By the later half of the 20th century, humanity had access to volumes of data and information much greater than at any other time in human history.

Data is collected from a variety of sources and in different ways by observation and survey. This makes the distinction also in the type of data. It is also possible that data gathered and compiled for one purpose may also be found useful in another activity or purpose.

Those who use data and information need to have very good knowledge of their tools and must also have a thorough understanding of what to do with these raw materials. Editors, publishers, librarians, website designers and other professionals have created and continue to create collections out of this raw material to facilitate the search and use of such material. By their very nature, these collections imply choices made by their creators and in many instances, researchers may prefer or need to have access to the original source for that data or information.

People working with data or information do so for a variety of purposes, transforming the data and information for reuse and distribution beyond the boundaries of their workplaces, and sometimes, beyond geographical boundaries as well.

Study of Data Centres involves all these activities and it also helps to distinguish them from Data Banks. The Data Centres all over the world have grown in number and it is better to gain knowledge about them. This Unit is intended to study all these aspects in detail.

3.2 DATA: BASIC CONCEPTS

3.2.1 Meaning and Definition

The term *data* has many connotations. It is often used as equivalent to *information*. Both data and information are different conceptually and content wise. *Data* precisely is numerical. It is also factual. It has only one dimension and gets its meaning contextually. For example digit *"15"* in isolation is only a number. It has only one dimension, as a number. Its meaning may add up when used in context. For example: *"15 Years"*. It depicts either a period, or an age of an individual. So *data* attains meaning when it is exemplified by another dimension, like years in the above context.

Data is termed as *raw information*. It is also defined as groups of non-random symbols, consisting of quantities, action objects, etc. Data items may be alphabetic, numeric or special symbols and even graphics. For example: Traffic signs.

The term *data* refers to an individual fact, statistics or a piece of information (unprocessed) or a group of facts, statistics or the like. The data may be described as a discrete and unorganised piece of information.

Data is defined as facts and figures that can be used as a basis for reasoning, discussion, or calculation. Data, particularly raw data collected from observations and experiments, may include redundant or irrelevant items as well as useful facts and figures, and must be refined to be meaningful. It is also stated that, the scientific research is based on a definite scientific knowledge and *data* is regarded as the *crystallised* presentation of the essence of scientific knowledge.

Information consists of data, possibly from various sources, presented in a context that is new or pertinent to a specific situation. The way in which data are organised will depend on an individual's need, how the data are interpreted and the purpose for which the information is sought. These data may exist in the form of documents wherein information about an event or facts are recorded so that data may not be lost and can be used as and when required.

The description of the characteristics of data is called *metadata.* This metadata is a prerequisite for the measurement of data quality. The relationship of metadata is comparable to the relationship between product description and a manufactured product.

Data Resource Management (DRM) is a discipline the purpose of which is to define what data are available and where they can be found, in addition to defining controls and quality mechanisms. All of these create a framework where every user of these data can determine their suitability for any particular situation. DRM includes:

- Data definition;
- Data modelling;
- Data standards;
- Data administration;
- Data quality assurance and data quality management;

- Metadata management; and
- Creation and maintenance of data warehouses and data marts.

3.2.2 Historicity

The first scientific journal was started in mid 17th century. Its importance is realised after two centuries. This first attempt also triggered the developments in scientific literature including generation of data. Most activities relating to data gathering commenced as early as the 15th century. The astronomical data is the first kind that has long historical background. Some definite efforts to collect data were made in the 19th century, in subjects like physics, chemistry and astronomy. Books were also compiled during this period which are, still in use. The notable titles are:

1) *Landolt Bornstein Tabellen. 1st Edition. 1988 (Primarily physical and chemical data) 281p. 1910 Ed. 20,000 pages in 21 Vols, (in German).*

2) *Tabes Annuelles de Cinstarte et Donnes Numeriques. 1910-30. 20 Vols. (in French).*

3) *International Critical Tables of Numerical Data of Physics, Chemistry and Technology. 1926-33. 8 Vols. (in English).*

These are very comprehensive. A handy ready to use *Handbook* was created in the condensed form. The *Kay and Laby Tables of Physical and Chemical Constants* fulfilled this need. This single volume handbook was published in 1911, and ran into 13 editions from 1911 to 1967 with revisions.

In 1963, the *National Standard Reference Data System (NSRDS)* was created. It was a single agency of a single country. International Council of Scientific Unions (ICSU) realising that this single agency cannot undertake the work of mobilising data activity suggested the creation of an International Committee and thus *Committee on Data for Science and Technology (CODATA)* was created.

3.2.3 Importance and Role

Scientific knowledge is built upon the edifice created by its predecessors. The success of new researches (in science and technology) depends on the availability of results of earlier research. These results should be appropriately evaluated and systematically compiled to facilitate their easy retrieval and access. The provision of ready access to such compilation of reliable data is an essential condition to ensure efficiency of science and technology.

Data are also needed for various activities which involve a certain degree of decision making in public and/or private sector at different management levels. The main purpose of data is to access and use it to support the creation and development of knowledge. This, in turn, drives innovation and accelerates change as a result. Innovation and change create new data and information in a self-reinforcing cycle. Thus new knowledge may modify or displace the previous knowledge.

3.2.4 Characteristics

Prof. C.N.R. Rao said '*Data is like Viswaroopadarshan in the Universe*'. For example, solar eclipse is a useful data and it has several characteristics and manifestations which astronomers (even astrologists) would like to record, first the event, then the repercussions of the event.

An important characteristic of data especially in science and technology is its constant value which is termed as its standard value. For example, valency or atomic weight of an element. This characteristic cannot be generalised to every kind of data. Social Science data for example is ever dynamic and changing. It varies considerably from place to place, e.g. Demographic data.

Self Check Exercises

1) Define data. Differentiate data from information.

2) What role does data play in research activity?

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

3.3 DATA GENERATION, COMPILATION AND DISSEMINATION

3.3.1 Data Generation

Data as already stated is generated as a result of investigation, observation, surveys, experiment and even by analysis of existing data. For instance, the due date and the date of return of books, both are two sets of data. The processing and analysis of this data would generate a new set of data like number of defaulters, the amount of overdue charges and so on.

Man's curiosity is the motivation for the data generation. Data generation may sometimes occur from natural sources, sometimes it is created artificially (created in laboratories). Generation of data is an endless process. It is a human, socialisation process. Data generation has become a routine activity.

3.3.2 Data Compilation

The generated data should be compiled to put it for use. It involves:

- Collection of data;
- Correction of data; and
- Grouping of data.

The main objective of these steps is to help in advancement of knowledge, by systematically organising it. In this process the following functions are carried out:

- Choice of the variable
- Defining the groups
- Data correlation
- Data arrangement
- Data presentation

Data compilation follows processing and organising in which now computers are being engaged extensively. There are, in practice, a large number of databases, non-bibliographic, source databases. These databases are predominantly numeric. Several numeric databases are commercially available for online access and use. There are also other databases like *Economic Data* created by Data Resources Inc. which include macro-economic variables. These can be used for econometric studies and modelling. These databases allow the user to retrieve stored potential data. Computer processing has become common in the work of data processing, organisation and its dissemination.

3.3.3 Data Dissemination

The objective of data dissemination is to facilitate its scrutiny and evaluation by other users. This may help to validate the data. Data dissemination may also prevent its duplication. Data can be disseminated through:

- Formal/informal contact with professional colleagues;
- Published literature; and
- Information centres, libraries, documentation centres, data centres and data marts.

Self Check Exercise

3) Mention the important functions related to data activity.

Note: i) Write your answer in the space given below.
ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

3.4 DATA CENTRES

3.4.1 Meaning

A centre that meets the users potential need for data, obtained from various sources. It is an oganisation infrastructure from where services are offered. It is also considered as a Special Information Centre or sometimes equivalent to Information Analysis Centre (IAC). It performs three important functions: Data Compilation, Data Evaluation and

Data Dissemination. UNESCO defines Data Centre as an organisation handling *quantitative numerical data.*

Data Centres store data related to narrow field of specialisation. They are sometimes associated to a range of Information Centres. Any institution interested in developing data handling capacities may be called a Data Centre.

Data Banks are multidisciplinary and handle all types of data comprising administrative, statistical, techno-economic, census, management subjects. These are produced by various institutions and agencies.

Data Centres and Data Banks have some difference, although sometimes they are considered synonymous. They primarily vary in regard to the subject they deal with. The difference may be attributed to the type of data they handle. For example, Data Centres handle only numerical data pertaining to Science and Technology primarily with physical and chemical properties. Another point of difference between Data Centres and Data Banks is that, the former handle data themselves, and the literature concerning them while the latter handle only data.

3.4.2 Structure

The Data Centre contains three components:

1) An organised data collection (Database).

2) A connection with the data sources which periodically update the database.

3) Users who are in direct interaction with the database to meet their requirements.

The structure of a Data Centre may be visualised as below:



Fig. 3.1: Structural Organisation of a Data Centre

The above Fig. 3.1 depicts, the general structural organisation of a Data Centre. This consists of:

a) Data Source;

b) Documents with data provided in them;

c) Internal character (Organisation); and

d) Apparatus to meet the users needs:

The organisation of Data Centre ensures a centralised database with which the user interacts for basic data. The main points to be noted in the structure of a Data Centre are:

a) Volume and kind of data;

b) Availability of computer facility; and

c) Access to other equipment facility.

The organisation of a Data Centre also shows how information (input and output) flow within the organisation (see Fig. 3.2 below).

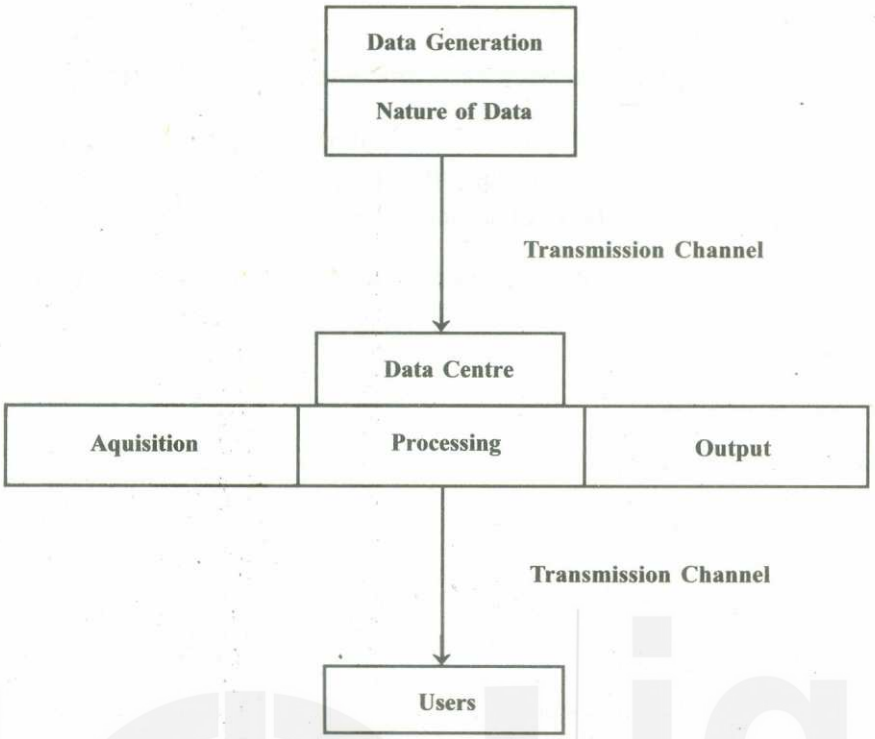


Fig. 3.2: Organisation of a Data Centre

Data Centre employs the following categories of personnel:

- Data Coordinators
- Data Specialists
- Data Analysts
- Programmers

3.4.3 Functions

The functions performed by a Data Centre are:

a) Data collection;

b) Data control;

c) Data coding;

d) Data storage;

e) Data organisation and encoding; and

f) Data dissemination and retrieval.

In short a Data Centre is expected to perform the following three functions:

1) Data Evaluation;

2) Data Dissemination; and

3) Referral Service.

3.4.4 Services

The Data Centre is expected to provide the following two types of basic services:

- Answer to users queries; and
- Supply the processed/synthesised data (processed from basic data).

The Data Centre, which is involved in the acquisition and processing of data, is in a strategic position to disseminate the data and answer the user queries. Data services may be provided on demand and/or on anticipatory basis.

The categories of data services also involve appropriate mechanisms. They are:

i) Reference Mechanism;

ii) Referral Mechanism;

iii) Announcement Mechanism;

iv) Accretion Mechanism;

v) Compilation Mechanism;

vi) Evaluation Mechanism;

vii) Document Access Mechanism;

viii) Publication Mechanism;

ix) Promotion/Liaison Mechanism; and

x) System Monitoring/Improvement.

From the users' point-of-view, and to differentiate types of Data Centres, all these mechanisms, can be reduced to three types of services:

a) Data Evaluation and Compilation Services;

b) Data Dissemination Service; and

c) Data Referral Service.

Self Check Exercises

4) Distinguish between Data Centre and Data Bank.

5) Explain the structure and functions of a Data Centre.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

The organisational structure of DECs and Local-DDCs is conceived as below:

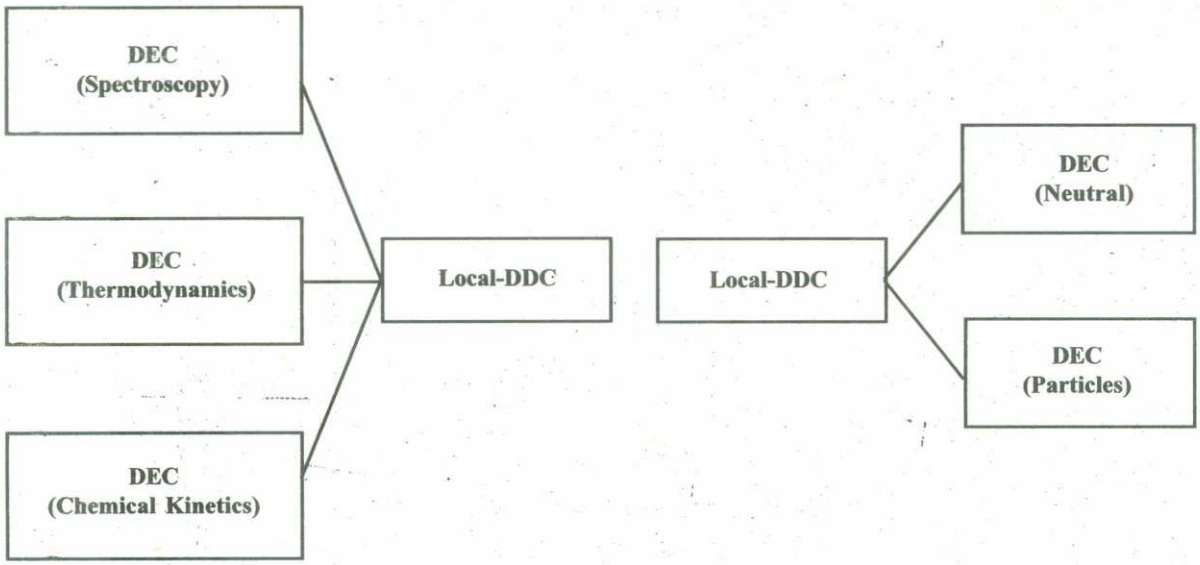


Fig. 3.4: Organisational Structure of DECs and Local DDCs

A DDC need not be a specialised centre in a narrow subject field, but should cover a wide area. In principle, every country should have a DDC, so that users can easily communicate with it. It may, however, be appropriate to provide a DDC for a region of several countries or for a part of a country depending on the scale and characteristics of the users. Such a centre, whether national or regional, is referred to as a Local-DDC to distinguish it from Global-DDC.

A Local-DDC should offer the following services:

a) Collect published compilations of evaluated data to offer for reference;

b) Collect or store, machine readable data and provide services from it;

c) Assist users to find the data;

d) Keep users abreast of current developments in their respective areas;

e) Inform users about current acquisitions;

f) Perform search functions on request;

g) Undertake retrospective searches on required aspects; and

h) Publish secondary publications on data.

A Local-DDC should be capable of providing online services within its jurisdiction; to states, districts and institutions.

Global-DDC

DDC is also established at Global level. It is an extension of the functions of DEC. The important distinction between Global-DDC and a Local-DDC is that the former is highly specialised in subject matter and responds only to such information to readers. Several Global-DDCs are linked to each Local-DDC in a network. Functions of Global-DDC are:

a) To store all output products (Compilations, Tapes, etc.) of DEC in the respective field;

b) To comprehensively collect and store other significant and quantified data;

c) To disseminate data upon user's request;

d) To exchange information through the network among the Local-DDC in related subject fields; and

e) To provide necessary information to a DRC.

Data Referral Centre (Global) (DRC)

There could be only a single DRC established at Global level. This serves the users throughout the world.

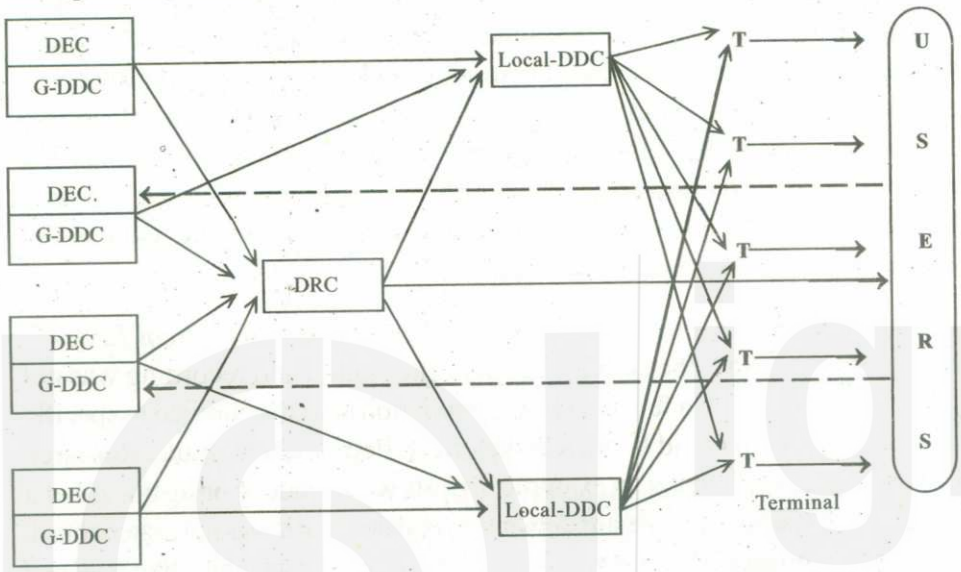


Fig. 3. 5: Functional Relationship between DEC, L-DDC and DRC

The functions of a DRC are:

a) To collect on a world-wide basis information on data resources relating to data generation, compilation and evaluation;

b) To prepare a comprehensive file on the kinds of data available from these resources with a detailed subject index for data access (inventory service); and

c) To guide users to the appropriate sources, where they may find the required data (referral service).

Self Check Exercises

6) Discuss types and levels of Data Centres.

7) Discuss interrelationship between different Data Centres.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

3.5 COMMITTEE ON DATA FOR SCIENCE AND TECHNOLOGY (CODATA)

3.5.1 Origin and Development

In earlier days, statistical data generated from experiments and surveys, were generally recorded for current use. Individuals or laboratories conducting research and developmental activities were confined to data generated by themselves. These were not be able to access others data because there were no standard practices or mechanisms to record and put the data for potential use. *Shruti* (listening) and *Smriti* (remembering) were the channel of transformation of knowledge from one generation to other. Even the generated data had less authenticity and reliability. It was released by the scientific community and they started compiling and recording data for future use and gave a pace to the research and developmental work. As a result the first pioneering work was brought out in the form of *International Critical Tables of Numerical Data of Physics, Chemistry and Technology* during 1926-33 in 8 volumes. This was proved to be an important and comprehensive data tool on the subject, and it is still widely used by the scientific community globally.

The National Academy of Sciences, USA established an office of *Critical Tables* in 1957. During 1930 – 1957, the activity of data compilation and recording was not much accelerated. However, a few scattered compilation activities limited to specific subjects, like, Petroleum could be traced. American Petroleum Institute, Research Project 44, may be considered as an example. Efforts were made to bring out either a revised edition of *Critical Tables* or supplements to update it but it was not materialised. Moderate efforts were also made to bring out single volume data tables like *Kay and Laby Tables* during 1911-67.

The data compilation activity was realised as a collective effort, as it could be used by various agencies in a variety of forms. Besides individual and academic/research institutions, government and other international institutions had also started participating in this activity. As a result, National Standard Reference Data System (NSRDS) was established in 1963, in USA. Similarly, data compilation activities also started in other countries, like in USSR, UK, France, Japan, and Germany, etc. Still the coordination part was missing among various data compilation and data generating agencies located globally. A need was felt to have a centralised agency to coordinate and to share its activities with other countries which was realised in 1966 when the *International Council of Scientific Unions (ICSU)* created *CODATA: Committee on Data for Science and Technology.* Its secretariat is housed at 51, Bld de Montmorency, 75016 Paris, France. Keeping in view the rapid expansion of scientific research which had occurred continuously since the end of World War II and to fully utilise the investment in research, better mechanisms were needed to evaluate, store, retrieve, and disseminate the data. While national organisations carry out some of these functions, CODATA is the international umbrella organisation which encourages, coordinates, and tries to avoid duplication of such efforts.

CODATA provides scientists and engineers with access to international data activities for increased awareness, direct cooperation and new knowledge. It was established to promote and encourage, on a world-wide basis, the compilation, evaluation and dissemination of reliable numerical data. It is concerned with all types of data resulting from experimental measurements, observations and calculations in every field of science and technology, including the physical sciences, biology, geology, astronomy, engineering, environmental science, ecology and others. Its main objectives are: to improve the quality and accessibility of data, as well as the methods by which data are acquired,

managed, analysed and evaluated, with a particular emphasis on developing countries; to facilitate international cooperation among those collecting, organising and using data; to promote an increased awareness in the scientific and technical community of the importance of these activities; and to consider data access and intellectual property issues. These objectives are met by the CODATA through various mechanisms like working groups, task groups, organising conferences, bringing out various publications, etc. It also reaches out to different disciplines through its growing number of members, each outlining their different data needs, sharing knowledge about their respective data activities and identifying common areas of interest.

3.5.2 Functions

1) To ascertain on a world-wide basis, what work on evaluation and publication of numerical data on each subject and country is being carried out, CODATA, took up a major task of world-wide survey of data compilation and evaluation of data activity. The results of this survey were published in a book form. The title of the publication is *International Compendium of Numerical Data Projects.* This compilation has more than 150 projects and has records of Data Centres of 26 countries. About 120 other sources of information on data are also listed in this publication with full bibliographic details.

This book contains world-wide projects with information on:

   i) Scope;

   ii) Mode of operation; and

   iii) Form of dissemination of output.

2) To achieve coordination among countries and strengthening of existing programmes, in such a way as to maximise effectiveness, to minimise unintentional or undesirable overlapping and to recommend new compilation programmes when necessary.

3) To encourage and support of the needed work by appropriate private, governmental and intergovernmental agencies, and to encourage and support experimental work.

4) To encourage the use of standard nomenclature symbols, and constants, advocated by the responsible unions and when desirable to form editorial policies and procedures for the presentation of information directed towards uniformity in collected data.

5) On a world-wide basis it will stimulate wider distribution of compilation of high quality data to:

   i) Maintain and distribute;

   ii) Carry out inventory and directing continuing data compilation projects; and

   iii) Provide adequate indexing of the substances and properties covered by such compendium.

6) To encourage and coordinate research on new methods for the preparation and generation of critically evaluated tables, generally expressed in numerical form. Most of these functions are general. The specific functions largely depend on organisational structure too.

Besides its fundamental aim of fostering world-wide cooperation in scientific and technical data, the CODATA sponsors a Biennial CODATA International Conference on Data, which attracts approximately 300 data specialists from around the world; organises specialists meetings of scientific data, which address issues specific to one discipline or topic; brings out publications on data handling, data compilation, surveys of data activities, and conference proceedings; and sponsors Task Groups, Working Groups, Commissions

and other groups addressing specific data issues, such as: supplying information on sources of reliable data, coordinating multinational data project, establishing format standards to promote data exchange, sharing, and compatibility, preparing guidelines to present data in the primary literature or archival databanks, organising training/ conferences/seminars and symposia, etc. Besides these, the CODATA brings out the following regular and ad-hoc publications.

- CODATA Newsletter: An announcement publication of current data compilations, with comments, contents and accessibility.
- CODATA Bulletins.
- CODATA Directories of Data Sources.
- CODATA Referral Database.

Self Check Exercise

8) Write a brief note on CODATA.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

3.6 INTERNATIONAL AND NATIONAL DATA CENTRES

3.6.1 International Data Centres

a) ***NASA Astronomical Data Centre (ADC)***

The Astronomical Data Centre of the National Aeronautics and Space Administration is playing a key role in publication of astronomy data, catalogues, and journal tables. The Centre is responsible for making these data sets computer-readable and developing new methods, tools, and techniques for their preparation and use. It also functions as a coordination agency to collaborate and exchange data with other data centres on international level.

b) ***International Centre for Diffraction Data (ICDD)***

The International Centre for Diffraction Data is a non-profit scientific and technical organisation. It has world-wide membership from academics, governments, and industries. The Centre is dedicated towards collection, storage, editing, publication, and dissemination of data pertaining to powder diffraction for the identification of crystalline materials. It has vision to encourage the use of the Powder Diffraction File (PDF) for phase identification of crystalline materials. It has now become a centre for quality diffraction data. It fulfills the research requirements of the scientific and technical community and also promotes the application of materials characterisation methods in

science and technology. It provides a forum for the exchange of data and information among the participating members through publication and dissemination of X-ray diffraction data. More than 300 scientists and technologists from all over the world are its active members. These members and other volunteers are actively engaged in developments in the field of X-ray powder diffraction and related disciplines. They produced a primary reference of X-ray powder diffraction data. These are compiled in the form of Powder Diffraction File (PDF). The PDF is available on a variety of media, like books, CD-ROM, DVD, etc. The File meets the requirements of scientists and technologists working world-wide in the field of X-ray powder diffraction. The data to be included in the PDF are acquired through individual contributions from scientists, research laboratories, through literature surveys, and from Grant-in-Aid program. In order to collect and select data before including in the File, more than 200 leading scientific and technical journals are searched manually besides conducting a comprehensive literature survey covering patents, dissertations, theses, online databases, and other published open literatures.

3.6.2 National Data Centres

India, being the second largest scientific and technological base in the world, contributes significantly in the research and developmental activity. In India, several institutions and organisations, like Council of Scientific and Industrial Research (CSIR), Indian Council of Medical Research (ICMR), Indian Council of Agricultural Research (ICAR), Indian Space Research Organisation (ISRO), Defence Research and Development Organisation (DRDO), and other academic and research institutions are engaged in data generation and compilation activities. Some of our national laboratories and institutions are coordinating at the national level for exchange of data. Some of them are discussed below.

a) ***Environmental Information Centre (EIC)***

The Environmental Information Centre functions under the aegis of the Ministry of Environment and Forests. The Centre provides high quality environmental data and information on India in a timely and cost-effective manner, to improve environmental studies, project screening and scoping, and the decision-making process. It stores, processes and validate data before organising into the retrieval system. It also functions as a clearinghouse of environmental information on the Indian sub-continent. It disseminates comprehensive, easy-to-use environmental data on India and information on the environmental clearance process and environment regulations in India. The integrated environmental database on India is derived using the Geographical Information System (GIS) and includes pollution data.

b) ***National Thermophysical Properties Programme***

It is located at the Indian Institute of Science, Bangalore. This National Centre was established by the Science and Engineering Research Council (SERC) of the Department of Science and Technology (DST). The basic function of the Centre is to evaluate and collect data pertaining to thermophysical properties. It also supports other centres like, Indian Association for the Cultivation of Science for Thermodynamic and Transport Properties; University of Allahabad for Stability Contents of Coordinate Compounds; and University of Madras for Crystallographic Data.

c) ***National Crystal Data Centre (NCDC)***

National Information Centre on Crystallography (NICRYS) was established in 1982 at Department of Crystallography and Biophysics, University of Madras to serve National Information Centre on Crystallography under National Information Systems for Science and Technology (NISSAT) programme of Department of Scientific and

Industrial Research (DSIR), Government of India. During 1978-1981 the Centre functioned National Crystal Data Centre under a project funded by SERC of Department of Science and Technology. Since the project NISSAT is over, therefore, support from NISSAT is discontinued.

d) ***National Marine Data Centres (NMDCs)***

The National Marine Data Centres (NMDCs) was established by the Department of Ocean Development (DOD), Government of India with the objectives: to develop efficient data handling and database structures using state-of-the-art strategies to exercise stringent quality control on data and its efficient dissemination for operational prediction systems and to a variety of bonafide users; and to substantially augment data acquisition systems using an optimal blend of satellites, data buoys and specially designed cruises of research vessels, etc.

The following institutions are serving various kinds of data services:

Indian Oceanographic Data Centre (IODC)

It is located at the National Institute of Oceanography, Goa and has been designated as the Indian National Oceanographic Data Centre (INODC) in India. It holds global physical, chemical, and biological oceanographic data sets. These are being utilised by the academicians and researchers throughout the world. The Centre produces the World Ocean Atlas and World Ocean Database. It has several ocean data web applications that can be accessed through the Internet. It acquires, processes and stores oceanographic data; checks and controls the quality of data; disseminates data; prepares charts and atlases particularly of the Exclusive Economic Zone of various maritime states of India; compiles catalogues, inventories and indices; and brings out INODC Newsletter.

It has data holdings of Acoustic Doppler Current Profiler (ADCP); Argo Profiling Float; Coastal Buoy; Coastal Water Temperature Guide (CWTG); Global Temperature-Salinity Profile Program (GTSPP); Joint Archive for Sea Level (JASL); Ocean Time Series Data Base (TSDB) and Satellite Data from the Satellite Oceanography Group at NODC (SOG).

Institute for Ocean Management

It has been located at the Centre for Water Resources, Anna University, Chennai, Tamil Nadu with the borader objectives: to collect conventional and non-conventional information on various aspects of the coastal zone and oceans; to prepare document and maintain data and information for easy retrieval; to prepare basic information products; to render a user-service; to manage, archive and exchange data and information with the other centres including coordination within the information network; and also to organise short term training courses on multidisciplinary aspects of coastal fish culture and operation and maintenance of marine instruments.

National Remote Sensing Agency

It is functioning under the aegis of the Department of Space at Bala Nagar, Hyderabad. It identifies inputs that can be obtained from the remote sensing data; designs and standardises the formats for the exchange of data; and collects, processes, archives and disseminates data pertaining to Sea Surface Temperature (SST), Potential Fishing Zone (PFZ), Ocean surface wind vectors; Wave height and direction including Wave energy zones along coast.

India Meteorological Department

The Centre is located at IMD, Shivaji Nagar, Pune. The Centre is responsible for collection of data pertaining to atmospheric temperature, pressure, relative humidity, wind velocity, wind direction, surface temperature and rainfall from surface observatories, pilot balloon stations, agro-meteorological and radiation observatories, air pollution monitoring stations, rain gauge stations and ships.

Geodata and Information Division

This Centre is functioning at the Marine Wing, under the Geological Survey of India, 63 NSC Bose Road, Kolkata. It acquires, formats processes, retrieves and disseminates data; brings out data products in collaboration with other agencies.

National Institute of Oceanography

Its Regional Centre is located at Mumbai. It monitors, stores and retrieves data pertaining to marine pollutants from various locations along the coastline of India. These pollutants include: dissolved oxygen, levels of DDT and BHC in marine fishes, level of nitrogen in sea water, biochemical oxygen demand, inorganic nitrate and phosphate and heavy metals like copper, cadmium and mercury in sediments.

Central Drug Research Institute

A premier research laboratory located at Lucknow collects, stores and disseminates data pertaining to marine flora and fauna. It holds taxonomical data, crude extract, fraction, pure compounds from marine plants and organisms.

Central Salt and Marine Chemical Research Institute

Bhavnagar based institute acquires data on marine algae and chemicals, reformats, codifies and controls the quality, prepares value-added information products and finally disseminates to the end-users. It has holdings of marine algae and marine chemicals.

Fishery Survey of India

Located at Mumbai, collects statistical data on demersal, pelagic and oceanic fishery resources, analyses and processes data before dissemination to fishing industries, development agencies, governmental agencies and other end-users. It brings out bulletins and newsletters, atlases, special publications and resources information series.

Central Marine Fisheries Research Institute

Kochi based institute involved in collection and storage data on marine fish landings in the country from inshore waters of the EEZ, giving species-, gear-, state- and zone-wise particulars quarterly and annually; recording of length, weight, sex and maturity stages of selected fishes; and organisation of data on fishery related environmental parameters. It brings out bulletins and special publications, publishes information on the marine fish landings and state-wise appraisal of marine fish production.

e) ***Nuclear Data Centre (NDC)***

The Bhabha Atomic Research Centre (BARC) situated at Mumbai has a vast collection of nuclear science and technology data. It has a separate group which deals with nuclear data, and this group is in liaison with International Atomic Energy Agency, Vienna. India is a member of *International Nuclear Data Centre (INDC)*. The Indian group sends a report to INDC.

Self Check Exercise

9) Name some of the important International and National Data Centres.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

3.7 SOCIO-ECONOMIC DATA SYSTEM IN INDIA

3.7.1 Definition and Types

Socio-economic data pertain to a country or other types of geographical regions. As these data are relevant to specific activities of a geographical region/state/country, in this Unit, we discuss the Indian socio-economic system to illustrate the data system for socio-economics.

Socio-economic data comprise statistical and factual data relating to a number of socio-economic activities of a country. Broadly, they can be grouped into four categories as given below:

- Census/Survey data that include population census, agricultural census, sample surveys of households, rural labour, etc. These are collected on a repetitive basis by official statistical agencies through enquiries and sample surveys.
- Control data includes data on industrial production, labour amenities in industries, banking, etc. This data is collected on a continuing basis by regulatory agencies for control purposes.
- By-Product data are obtained through routine accumulation as by-products of administrative activities of the governments. This type of data include, data on railway transportation, income-tax, international data, etc.
- Ad-hoc collection of data is through surveys by various agencies for specific purposes. For example, data collected by the Programme Evaluation Organisation of the Planning Commission for evaluating specific plan programmes.

A major part of the national database comprises control data and by-product data.

3.7.2 Use of Socio-Economic Data

Socio-economic data are used in three major areas of human activities:

1) Decision-making at macro and micro-levels;

2) Development planning; and

3) Socio-economic research.

Three interrelated activities which have resulted in both quantitative and qualitative expansion of socio-economic data are:

- Formulation and implementation of development plans;
- Construction of various development indicators (e.g. GNP, Physical quality of life index); and
- Maintenance of the system of national accounts.

The planners and others involved in all these activities convert statistical and other types of factual data into a plan and execution model. Not only planning and execution activities are carried out using data, but the results also need to be measured statistically. Thus, the creation and development of an efficient national data system for:

- Collection;
- Processing;
- Dissemination; and
- Maintenance of various types of data are an imperative need for the country.

3.7.3 Data Generation and Collection Process

Among the developing countries, India has one of the best organised statistical data system. During the last four decades of planning, India has built up a reasonably sound socio-economic database. There are more than 1200 agencies involved in collecting and processing of data. The official agencies that are the major sources of statistical information may be grouped into the following seven categories, three at the Union Level and four at the State Level.

Union Level:

1) Major Statistical Agencies;
2) Statistical Units located in Administrative Agencies at various levels; and
3) Statistical Units located in Regulators' Agencies.

State Level:

1) State Statistical Bureau;
2) Statistical Units located in State Administrative Departments;
3) District Statistical Offices; and
4) Taluk/Block Statistical Offices.

The Central Statistical Organisation (CSO) is the apex body for coordinating the decentralised statistical activities. CSO liaises with the union level agencies concerning union level data on the one hand and the State Statistical Bureau data on the other. The following Fig. 3.6 gives an idea of statistical system in India.

Three interrelated activities which have resulted in both quantitative and qualitative expansion of socio-economic data are:

- Formulation and implementation of development plans;
- Construction of various development indicators (e.g. GNP, Physical quality of life index); and
- Maintenance of the system of national accounts.

The planners and others involved in all these activities convert statistical and other types of factual data into a plan and execution model. Not only planning and execution activities are carried out using data, but the results also need to be measured statistically. Thus, the creation and development of an efficient national data system for:

- Collection;
- Processing;
- Dissemination; and
- Maintenance of various types of data are an imperative need for the country.

3.7.3 Data Generation and Collection Process

Among the developing countries, India has one of the best organised statistical data system. During the last four decades of planning, India has built up a reasonably sound socio-economic database. There are more than 1200 agencies involved in collecting and processing of data. The official agencies that are the major sources of statistical information may be grouped into the following seven categories, three at the Union Level and four at the State Level.

Union Level:

1) Major Statistical Agencies;
2) Statistical Units located in Administrative Agencies at various levels; and
3) Statistical Units located in Regulators' Agencies.

State Level:

1) State Statistical Bureau;
2) Statistical Units located in State Administrative Departments;
3) District Statistical Offices; and
4) Taluk/Block Statistical Offices.

The Central Statistical Organisation (CSO) is the apex body for coordinating the decentralised statistical activities. CSO liaises with the union level agencies concerning union level data on the one hand and the State Statistical Bureau data on the other. The following Fig. 3.6 gives an idea of statistical system in India.

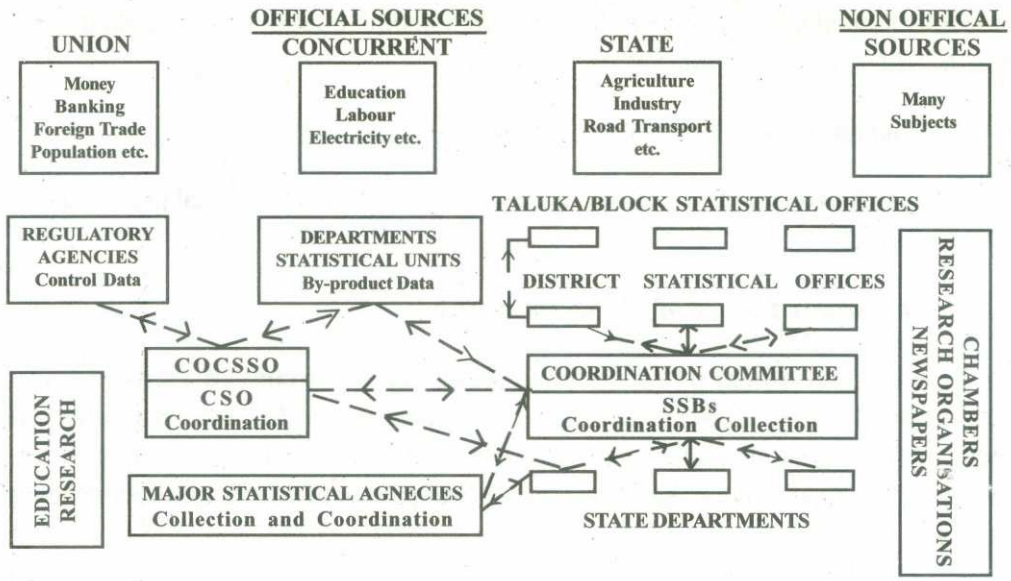


Fig. 3.6: Indian Statistical System

National Sample Survey Organisation (NSSO)

The National Sample Survey Organisation (NSSO) functions under the overall direction of a Governing Council with required independence and autonomy in collection, processing and publication of data pertaining to national sample surveys. The Organisation carries out socio-economic surveys. It undertakes fieldwork for the Annual Survey of Industries and follow-up surveys of Economic Census. It also conducts sample checks on area enumeration and crop estimation surveys and prepares the urban frames useful in drawing of urban samples. In addition, it collects price data from rural and urban sectors.

The major activities of the Organisation include survey design, field operations, processing of data collected and releasing the results based on surveys. It has two divisions, namely, Survey Design and Research Division and Data Processing Division. Their headquarters are located at Kolkata. The Data Processing Division has Data Processing Centres at Delhi, Giridih, Nagpur, Bangalore, Ahmedabad and Kolkata. The Kolkata based headquarter has the responsibility of data entry, processing and tabulation of socio-economic data. The Field Operations Division has its headquarters at Delhi and Faridabad with a network of 6 Zonal Offices, 48 Regional Offices and 117 Sub-regional Offices spread throughout the country.

Some of its important activities include: Economic Censuses and its follow up surveys, compilation of Index of Industrial Production, as well as Consumer Price Indices for Urban Non-Manual Employees, Human Development Statistics, Gender Statistics, imparting training in Official Statistics, Five Year Plan work relating to Development of Statistics in the States and Union Territories; dissemination of statistical information, work relating to trade, energy, construction, and environment statistics, revision of National Industrial Classification, etc.

The following subjects are covered the NSSO by:

1) The Statistical Abstracts India, presents 251 tables grouped under 39 broad categories.

2) A number of subjects are covered by the National Sample Surveys. They are 1-9 :

   - Population and Vital Events (once in 10 years).
   - Housing and Environment.

3) Income Expenditure and Levels of Living.
   - Consumer Expenditure (Domestic) (twice in 10 years).
   - Household Income.
   - Household Indebtedness.
   - Household Capital Formation (once in 10 years).
   - Household Enterprise/Activity.

4) Agriculture and Animal Husbandry.
   - Acreage and Production.
   - Land Utilisation.
   - Crop Production.
   - Land/Agricultural Holdings (once in 10 years).
   - Livestock Products/Enterprise (once in 10 years).

5) Industry.

6) Prices.

7) Employment and Labour Conditions (twice in 10 years).

8) Health and Nutrition.

9) Education and Culture.

3.7.4 Bibliographical Control

Basically, the data gathering agencies are responsible for processing, disseminating and maintenance of the collected data. The data publication may be grouped under the following three categories:

a) Serials/Periodicals (recurrent publication);

b) Ad-hoc (non-recurrent) publication reports of specific surveys, and enquiries which generally contain statistical supplements; and

c) Non-statistical documents like reports of research and investigative studies, which contain substantial quality of both primary and secondary data.

The question of bibliographical control or statistical publication has to be examined in the context of the overall national bibliographical system. There are several issues, which deserve special consideration. They are:

a) The need for a recurrent national bibliography system, which includes data serials, ad-hoc (non-recurrent) statistical publications, non-statistical documents, which deal with data problems.

b) Document delivery systems to support a national system of statistical publication.

c) Setting up a National Inventory of Statistical Data (NISD).

d) The need for an evaluation of the data system by appropriate agencies.

3.7.5 Qualitative Improvements of the Indian National Data System

The qualitative improvement of data system can be ensured only with the extensive use of the data by the policy/decision-makers and researchers. Quality of data can further be improved through interactive discussions by participants on the issues like data collection and use in seminars, conferences and meetings.

Self Check Exercise

10) What do you mean by socio-economic data system and what are its broad categories?

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

.....

3.8 REFERRAL CENTRES

Information Centres like libraries, have been providing reference service from documentary sources in order to meet user's information requirements. Sometimes the user's information needs may also be met by referring them to the resources of other libraries. In this way, the library can assist the user in negotiating sources of information available in some other library, to fulfil his/her information needs.

The above act is the basis of *Referral* concept, and the service provided to the user is called as a *Referral Service*.

3.8.1 Referral Service

Let us first know -what is referral service and how is it different from reference service. In reference service the user or the librarian refers directly to the source of document. On the other hand, referral service directs the inquirer to a source of information, which may be either a document, or an organisation or it may be even an individual.

In traditional/conventional library services, one depends on in-house availability of sources, in referral service, the sources may vary from documentary sources to a vast knowledge available from individuals, specialists and experts located outside the organisation. Based on user needs, a referral organisation maintains not only files of documentary information sources, but also profiles of experts in various disciplines.

3.8.2 Referral Centre: Definition and Meaning

The *Harrod's Librarian's Glossary* .... defines Referral Centre as follows:

1) *"An organization for directing researchers for information and data to appropriate sources, such as, libraries, information evaluation centres, documents and documentation centres and individuals. A Referral Centre does not supply data or documents.*

2) *A Referral Centre is some sort of an "Information Desk" for the scientific and technical community which does not provide enquirers directly with the information they need, but suggest sources (organisation, facility individual) likely to satisfy the users/ clients.*

3) *Referral Centre is an organisation for the indication of sources (of persons, institutions and publications) from which scientific information may be obtained on a given subject."*

It provides a mechanism for switching to such sources.

3.8.3 Need and Purpose of a Referral Centre

A single institution or organisation like a library, cannot cater to the users increasing and varied needs of information. It cannot also perform every function. Even the large computer systems and/or networks, are unable to cope-up with growing mass of information and simultaneously meet the user demands. This calls for division of labour in information handling. A switching and control mechanism is introduced to ease this complexity of information handling-activity. A new type of information system known as *Referral Centre* came into existence to satisfy this need.

The basic purpose of a Referral Centre is to ease the stress on a single *Information System* which is being loaded with all services. Libraries are integral and fundamental components of the information network system. They are unable to handle dynamic needs of users, which sometimes fall outside the contents of documents alone.

Some of the factors of change in this context are:

1) Bulk factor;
2) Time factor;
3) Current information factor;
4) Evaluation factor; and
5) Personal factor.

These factors have yet another dimension to create and establish Referral Centres. The help, and guidance often sought from experts, specialists and individuals, is another influencing factor necessitating the establishment of Referral Centres.

3.8.4 Functions of a Referral Centre

1) To collect on a world-wide basis information about information/data sources within the subject or mission.
2) To prepare a comprehensive inventory of the types of information/data services available from these sources with a detailed subject index to facilitate its access.
3) To guide users to the appropriate sources where from the required data or information may be obtained.
4) To function as an intermediary between enquirer and the organisation and/or individuals who possess specialised knowledge on the subject of enquiry.

Basic Tasks of Referral Centre:

1) To take stock of all significant information sources in all subject fields; i.e. in Physical Sciences, Social Sciences and Engineering, etc;
2) To compile directories of information sources; new and revised (to fill-up the gaps); and
3) To analyse the operative relationship that exists in the scientific information complex.

Table 3.1: Functional Differences between Library and Referral Centre

Library	*Referral Centre*
1) Provides not only sources of information but also documents as well as the needed information.	Provides source of information alone.
2) Stocks primary, secondary and tertiary literature.	Stocks only access tools, such as directories guide and lists.
3) Provides enquiry, reference bibliographical and other range of services.	Provides only enquiry service.

3.8.5 Activities of Some Notable Referral Centres

a) ***National Referral Centre, Library of Congress***

The National Referral Centre for Science and Technology of Library of Congress was started in 1963. The Referral Centre of Reference Department works closely with another division, viz. Science and Technology Division of the Library of Congress. This is deigned and developed as a clearing house. It facilitates comprehensive coordinated access to the nation's resources of scientific and technical information. This centre is one of the most active wings, and maintains an comprehensive inventory of significant information resources. It has developed a very exhaustive *Register of Information Sources* of different kinds. Information source in the context of Referral Service is defined as:

"Any organisation, facility or individual willing to and able to give authoritative response to scientific and technical enquiries out of an existing store of knowledge or expertise."

This centre maintains a file of a large number of experts to provide information to the users which contains details of names, addresses and a brief description of the information source.

b) ***International Referral Service of UNEP***

The United Nations Environmental Programme (UNEP) has established International Referral Service covering all sources of environmental information. In every country, a National Group through various local centres provides details about the information. Library of Congress has established one such centre,which is actively cooperating with the Special Committee on Environmental Information of the Special Libraries Association (SLA). It obtains detailed information of different organisations and their sources.

c) ***Referral Centre of Israel***

The Science and Technology Referral Centre of Israel performs the following functions. This centre :

i) provides information relating to information services available to or from other information centres of Israel;

ii) collects and disseminates information from sources both in Israel and abroad which are not available through commercial channels or whose acquisition requires, national, international or governmental participation; and

iii) brings out directories, and other reference materials which are of national and interdisciplinary interest.

d) ***Information Referral Service System (INRES)***

The WIDE Initiative (Web of Information for Development) was launched by the United Nations Development Programmes (UNDP) Special Unit for Technical Cooperation among Developing Countries (SU/TCDC). In the year 1974, SU/TCDC was established within UNDP by the United Nations General Assembly. The WIDE Initiative was launched to support and to further, technical cooperation among developing countries (TCDC). It introduced Internet-based services and efforts to give more visibility to developing country expertise, foster communications and promote more effective technical cooperation among developing countries. In the year 1977, a Public Access Database, known as *WIDE Online*, service was started. This service is concerned with collecting and accessing biographical information of experts (expertise, locations, contacts, publications, etc.) and information on institutions, products, services and best practices. It includes *TCDC/WIDE Innovative Experiences,* which is a database of experiences and projects demonstrating innovative development activities or cooperation carried out by institutions and professionals in developing countries.

WIDE Online is also providing paper-based Information Referral Service System. This system has built up a database of new sources of information of 3400 institutes in various developing countries. TCDC has also been undertaking *WIDE InterLink* to enhance the visibility of developing countries expertise and knowledge. It is a programme of strategic partnerships with TCDC stakeholder organisations. It has been designed to promote stakeholder participation in the WIDE Initiative by using WIDE Online, or its offline version, to raise the profile of developing countries expertise and knowledge; and to provide assistance to stakeholders in strengthening their capacity for sharing expertise and promoting technical cooperation among developing countries.

WIDEFORUM-L is a forum for policy dialogue and knowledge networking for strengthening the WIDE Initiative TC/DC.

GOODWIDE-L collects and critiques innovative experiences in technical cooperation among developing countries.

Presently the WIDE Initiative is working with partnerships across three continents, and it has planned to expand its partnerships and services to other continents.

DARE

UNESCO Social and Human Sciences Documentation Centre encourages international cooperation in social sciences by exchange of information. It supports the social and human sciences information and documentation programmes of UNESCO. It serves as a clearing house for relevant UNESCO documents. This also works as an information centre for specialists, governmental and non-governmental organisations, members states, and to train, research and documentation centres. It maintains database of social sciences. It also provides computer-based products from the DARE Data Bank including publications, data on floppy disks, UNESCO CD-ROM and online access via UNESCO/Internet. Some of these activities of DARE are discussed below:

DARE Database

This database was launched in the 1970s in the field of social and human sciences, as on June 2004, DARE Database comprised the following three sets of referral data:

1) About 4800 records of social science research and advanced training institutions, professional associations and groups.

2) About 4800 records of social science periodicals.

3) About 48 records pertaining to social science specialists.

Online Periodicals

Internet access of full-text articles of about 700 scientific periodicals in the social and human sciences with subject index, title index.

Publications

DARE has brought out the following publications:

- *World Directory of Human Rights Research and Training Institutions*, UNESCO Publishing, 2001.
- *World Directory of Peace Research and Training Institutions*, UNESCO Publishing, 2000.
- *World Directory of Human Rights Research and Training Institutions,* Sixth edition, *2003.*
- *World Directory of Peace Research and Training Institutions, 1999.*

Online Databases

- Africa South of the Sahara database *(March 2004)*
- Poverty Research Institutes database *(last upload March 2004)*
- Migration Research Institutes database *(last upload March 2004)*
- Human Rights Institutes database*(last upload July 2003)*
- Peace Institutes database*(last upload July 2003)*

Self Check Exercise

11) Distinguish between Referral Service and Referral Centre. Describe the functions of a Referral Centre.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

3.9 SUMMARY

This Unit discusses the folllowing essential aspects relating to Data Centres and Referral Centres.

Data activity is not restricted to Science and Technology, but has spread to other disciplines in a more systematic and organised manner. It involves several operations like gathering, compilation, processing, evaluation, and dissemination.

Data Centres perform compilation, evaluation and dissemination of data in different subject fields. The establishment of CODATA, has paved the way for collection of data on several broad aspects on a global basis. Referral service involves provision of pertinent information relating to the sources of information to different categories of users. Referral Centres collect information tools which aid them in providing appropriate referral services to the user community.

3.10 ANSWERS TO SELF CHECK EXERCISES

1) Data precisely is numerical, factual, alphabetical or graphic and is also termed as raw information. It is also defined as groups of non-random symbols, consisting of quantities, action objects, etc. Both data and information are different conceptually as also content wise.

2) Research depends on the availability of results of earlier research data. Data must be made available easily to the researchers.

3) The important functions related to data activities are data generation, compilation, evaluation, and dissemination.

4) Data Centre is an organisation which handles *quantitative numerical data*. Data Centres handle only numerical data for Science and Technology whereas Data Banks are multidisciplinary and handle all types of data comprising. Administrative, statistical, techno-economic, census, management subjects, etc.

5) Source of data, database and users of data form the structure of a Data Centre. Data compilation, evaluation, and dissemination are the main functions of a Data Centre.

6) There are three types of Data Centres:

   a) Data Evaluation Centre (DEC)

   b) Data Dissemination Centre (DDC)

   c) Data Referral Centre (DRC)

   These centres work in coordination in two levels - Local and Global.

7) Data Dissemination Centres (DDCs) are part of the Data Evaluation Centres (DECs). DDC (Global) would also be one in the world and DRC is also at Global Level. The data flows to user from DEC - DDC (Global) - DRC-DDC(Local)-user.

8) CODATA is an interdisciplinary Scientific Committee of the International Council for Science (ICSU), which works to improve the quality, reliability, management and accessibility of data of importance to all fields of science and technology. CODATA is concerned with all types of data resulting from experimental measurements, observations and calculations in every field of science and technology, including the physical sciences, biology, geology, astronomy, engineering, environmental science, ecology and others. Particular emphasis is given to data management problems common to different disciplines and to data used outside the field in which they were generated. The main objectives of CODATA are to improve the quality and accessibility of data, as well as the methods by which data are acquired, managed, analysed and evaluated, with a particular emphasis on developing countries; facilitate international cooperation among those collecting, organising and using data; promote an increased awareness in the scientific and technical community of the importance of these activities; and consider data access and intellectual property issues.

9) A) International Data Centres:

   - NASA Astronomical Data Centre
   - International Centre for Diffraction Data (ICDD)

B) National Data Centres:

- Environmental Information Centre (EIC)
- National Thermophysical Properties Programme
- National Crystal Data Centre (NCDC)
- National Marine Data Centre (NMDC)
- Nuclear Data Centre

10) Socio-economic Data System comprises statistical and factual data relating to a number of socio-economic activities of a particular region or country. Socio-economic data can be grouped into four broad categories namely

i) Census/Survey Data;

ii) Control Data;

iii) By-product Data; and

iv) Ad-hoc Collection of Data.

11) When the informational needs of the users are met from outside a library it is termed as *Referral Service*. On the other hand, Referral Centre is a *Directional Source* which directs to a source of information. It provides a mechanism for switching to information sources.

The functions of a Referral Centre include collection of information sources and guide users to appropriate sources.

3.11 KEYWORDS

Clearing House : An organisation that collects and maintains records of research, development and other activities being planned, currently in progress, or completed; it provides documents derived from these activities, and referral services to other sources for information relating to these activities.

Data Bank : A comprehensive file of data which is usually stored on a direct access storage device.

Data Compilation : The regular and systematic recording of information discovered in a variety of miscellaneous collection.

Database : Information stored in computer files, and accessible via a remote terminal and telecommunications link on a particular subject, or subjects.

Econometric : The application of statistical techniques to economic theories.

Historicity : The quality or state of being historic as distinct from the mythological or legendary.

Information Desk : A desk in a library or other building staffed by one or more persons whose function is to give information.

Raw Data : (Information Retrieval) Data, in machine-sensible form or otherwise, which has not been processed.

Switching Mechanism : The process of connecting machines, terminals, users, etc. via a telecommunications link.

3.12 REFERENCES AND FURTHER READING

Atherton, Pauline (1977). *Handbook of Information Systems and Services.* Paris: UNESCO.

DRTC Refresher Seminar (12:1980). Data Seminar on Data Accessibility and Dissemination. Paper E A and HA.

Weisman, H.M. (1972). *Information Systems, Services and Centres.* New York: Becker and Hayes.

Websites

http://www.undp.org/tcdc

http://www.nio.org

http://www.nodc.noaa.gov

http://www.mopsi.nic.in/nsso

http://www.unesco.org

http://www.unesco.org/most/dare.htm

http://www.unesco.org/shs/shsdc

http://www.barc-nic.org

http://www.dsir.nic.in/division/nissat/nisnat/nics/nicrys,html

http://www.codata.org

http://www.loc.org

ignou
THE PEOPLE'S
UNIVERSITY

UNIT 4 INFORMATION ANALYSIS AND CONSOLIDATION CENTRES

Structure

4.0 Objectives

4.1 Introduction

4.2 Genesis of Information Analysis and Consolidation Centres

- 4.2.1 Barriers to the Use of Information
- 4.2.2 Information Consolidation: Definition
- 4.2.3 Objectives of Information Consolidation
- 4.2.4 Users of Information Analysis and Consolidation Products
- 4.2.5 Processes in Information Analysis and Consolidation

4.3 Information Analysis and Consolidation (IAC) Centres

- 4.3.1 Activities, Products and Services of IAC Centres or ICUs
- 4.3.2 User Groups and Types of IAC Products

4.4 Planning and Management of IAC Centres

4.5 Examples of IAC Centres in India

4.6 Summary

4.7 Answers To Self Check Exercises

4.8 Keywords

4.9 References and Further Reading

4.0 OBJECTIVES

After reading this Unit, you will be able to:

- describe the concept of information analysis and consolidation;
- explain the need for information analysis and consolidation, processes involved in information analysis and consolidation, and different IAC products for different levels of users;
- know the activities and products of IAC Centres; and
- get acquainted with information analysis and consolidation activities performed by some of the R&D centres, information centres, and private organisations in India.

4.1 INTRODUCTION

You have studied the activities and services of information centres in Unit 2. Most of the information centres offer two functional levels of services. At the basic level, information centres disseminate information and materials acquired by them, answer technical reference queries, direct users in need of detailed information for research to proper sources of information and handle journal literature to keep users informed

of the current developments in a particular discipline. At the intermediate level, information centres offer complex literature searches in specific subject field, carry out retrospective searches and provide bibliographies, produce current awareness bulletin, provide selective dissemination of information (SDI) to individuals or group of users based on user's profile, index, abstract and extract the information to disseminate it to the users in response to request or in anticipation. Some information centres, particularly in science and technology, offer highly specialised services including information consolidation and repackaging involving analysis, synthesis and evaluation of information for the users. Such information centres came to be known as information analysis centres and data centres.

The basic process involved in indexing, abstracting and extracting of information is, 'analysis of information'. In indexing activities it is 'subject analysis' and in abstracting and extracting activities it is 'content analysis'. Here no critical evaluation is carried out of the basic contents of the documents. The resultant product is factual, non-critical or non-evaluative. Whereas, in Information Analysis and Consolidation Centres, the emphasis is on 'evaluation' of the contents. The Information Analysis and Consolidation Centres gather everything known about a clearly defined subject-field, analyse and evaluate this information, condense and repackage it in appropriate form for a well defined user group and disseminate it to that user group. In other words IAC Centres provide users timely, authoritative, evaluated and consolidated information in convenient form, which users can understand, assimilate and use with certain degree of confidence and reliability within the framework of their working environment.

In this Unit you will study about the activities and products of Information Analysis and Consolidation (IAC) Centres, need for IAC, processes involved in IAC, and planning and management of IAC Centres. Activities and products of representative IAC Centres in India will also be covered.

4.2 GENESIS OF INFORMATION ANALYSIS AND CONSOLIDATION CENTRES

The need for evaluated and consolidated information arose from the fact that most of the literature in science, technology, health, business, education and related fields is written by experts for experts and cannot be effectively used by non experts or potential users in its original form. In other words information is not presented in the language and form that is understandable, readable and acceptable to the potential users who may benefit from it. Another problem in the effective utilisation of information is overabundance of information on a particular topic. Sheer amount of information scattered over wide range of sources in diverse form, discourage its use by the potential users who may benefit from it. Indexing and abstracting services systematically scan the current primary literature (like periodicals, conference proceedings, research reports etc.) on the particular subject field, select the relevant items, index or summarise each item, and arrange them in a helpful sequence for location and identification of individual items. It has been observed that the volume of indexing and abstracting services have been growing with the alarming growth of primary literature and even to scan the literature of a subject through these highly condensed devices is becoming difficult. What a busy user needs is information, that is critically evaluated, condensed, packaged and made available in a form, which can be immediately used in decision making, problem solving or for any other purpose in hand. To fulfil this need, a new kind of information organisations started emerging in the field, which focused on information analysis and consolidation.

4.2.1 Barriers to the Use of Information

Historically, the concept of information analysis and consolidation evolved in response to the difficulties encountered by the users in the use of information leading to non-use of information by them and the potential users who would have otherwise benefited if information was available to them in more usable form. These difficulties or barriers in the use of information by the users are basically due to the inherent characteristics of the world of information, which are as follows:

- Exponential growth of information and increasing rate of obsolescence: Users have inadequate time reading and assimilating new information;
- Interdisciplinary nature of information leading to scattering and seepage of information: Users can specialise only in restricted subject fields;
- Wide variation in quality and reliability of information: Users find it difficult and have inadequate time for evaluating and selecting the right information;
- Information is presented in multiplicity of languages: Users are not familiar with the language(s) to use the information;
- Information presented in a wide range of standards and formats: Users may not be familiar with that standard or format to use the information;
- Required information is published in documents with restricted circulation: Leading to inaccessibility of information; and
- S&T information is highly technical in nature with technical and trade jargons: Potential user with no technical background cannot comprehend it.

These and similar barriers led to finding solutions to overcome these barriers and developing new kind of information products. The products that emerged as solutions to above mentioned barriers to the use of information are scientific and technical reviews, state-of-the-art reports, handbooks, business, commerce and market summaries, technical writings, popularisation of science writings, extension services in agriculture for farmers and public health services for general population. Some of these products are directed towards specialists (e.g. S&T reviews), some towards people in business and industry (e.g. business, commerce and market summaries) and some are for farmers and general public (e.g. extension services and health services). In all of these products the concept of well-defined user group is clearly present. Hence, the analysis of barriers to the use of information and finding solutions led to the concept of consolidated information.

Self Check Exercise

1) Enumerate the barriers to the use of information.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

4.2.2 Information Consolidation: Definition

UNESCO Symposium on Information Analysis and Consolidation (held in Colombo, Sri Lanka, 12-15 September, 1978) gave the following definition:

"INFORMATION CONSOLIDATION ACTIVITIES is used to define the responsibilities exercised by individuals, departments or organizations for evaluating and compressing relevant documents in order to provide definite user groups with reliable and concise new body of knowledge. Individuals or groups of individuals performing information consolidation activities would each constitute an INFORMATION CONSOLIDATION UNIT."

Saracevic and Wood (1981) gave the following elaborate definition:

"CONSOLIDATED INFORMATION is public knowledge specifically selected, analyzed, evaluated, and possibly restructured and repackaged for the purpose of serving some of the immediate decisions, problems and information needs of a defined clientele or social group, who otherwise may not be able to effectively and efficiently access and use this knowledge as available in the great amounts of documents or in its original form. The criteria for selection, evaluation, restructuring, and repackaging of this knowledge are derived from the potential clientele."

Following is a little more concise definition given by Saracevic and Wood (1981):

"CONSOLIDATED INFORMATION is a text(s) or message(s) purposefully structured from existing public knowledge to affect the private knowledge and decisions of individuals who otherwise may not be able to effectively and efficiently access or use this public knowledge from the original amounts or in the original structure and form."

In other words consolidation of information refers to providing the right information for the right person in the right form and at the right time.

4.2.3 Objectives of Information Consolidation

The basic objectives of Information Consolidation can be enumerated as follows:

- To increase the effectiveness of *information transfer* to the target audience;
- To make the r*equired information* reach larger audience in accessible and usable form; and
- To encourage more *intensive use of information* in wide range of developmental activities.

Self Check Exercise

2) What is consolidation of information? Give definition of consolidated information.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

4.2.4 Users of Information Analysis and Consolidation Products

Different IAC products serve several distinct types of user groups. The users can be categorised into following six groups:

1) Scientists, engineers, professional engaged in R&D activities;

2) Policymakers/planners in government;

3) Managers and business people in industry and business;

4) Technicians, supervisors and paraprofessionals working in government departments, industries and other business concerns;

5) Communicators/intermediaries such as extension workers, teachers, etc. communicating new technology or practices to general public; and

6) General public: including both rural and urban population.

Education level of these groups varies from highly educated to illiterate group. While there are wide range of information services and products available for the first four groups, last two groups remained unserved till recently. Information requirements of these last two groups need particular attention from information analysis and consolidation efforts, if benefits of S&T knowledge are to be percolated to them.

4.2.5 Processes in Information Analysis and Consolidation

The basic processes involved in information analysis and consolidations activities are:

1) Study of potential users to find their information needs and decide on the information product(s) suitable to fulfil those needs.

2) Selection of relevant information sources, both primary as well secondary information sources, containing the most useful information for the given user's problems and information needs.

3) Evaluation of information contained in these sources for its merit, validity and reliability.

4) Analysis of information to identify and extract most salient features conveyed by the given source.

5) Restructuring (if necessary) the analysed and extracted information as a new whole, which differ from original presentation and can be used most effectively and efficiently by the user. This may involve synthesis, condensation, rewriting, simplifying, reviews, state-of-the-art presentation, etc. During synthesis the analysed information from one or more sources is condensed and presented in a new arrangement or structure with an interpretive or evaluative point of view. Condensation is derivation of short summary of information from a source or extraction of key statements i.e. sentences, paragraphs, figures, etc.

6) Packaging and/or repackaging of restructured information in a form that will increase its use. (Restructuring deals with contents or substance of information while packaging deals with the form of its presentation.)

7) Diffusion or Dissemination of information in ways that will encourage and promote its use. This may also involve educating the users in the use of information and marketing of information.

8) Feedback from the users and improve the product based on the feedback.

Fig.4.1. summarises the processes and elements involved in information analysis and consolidation.

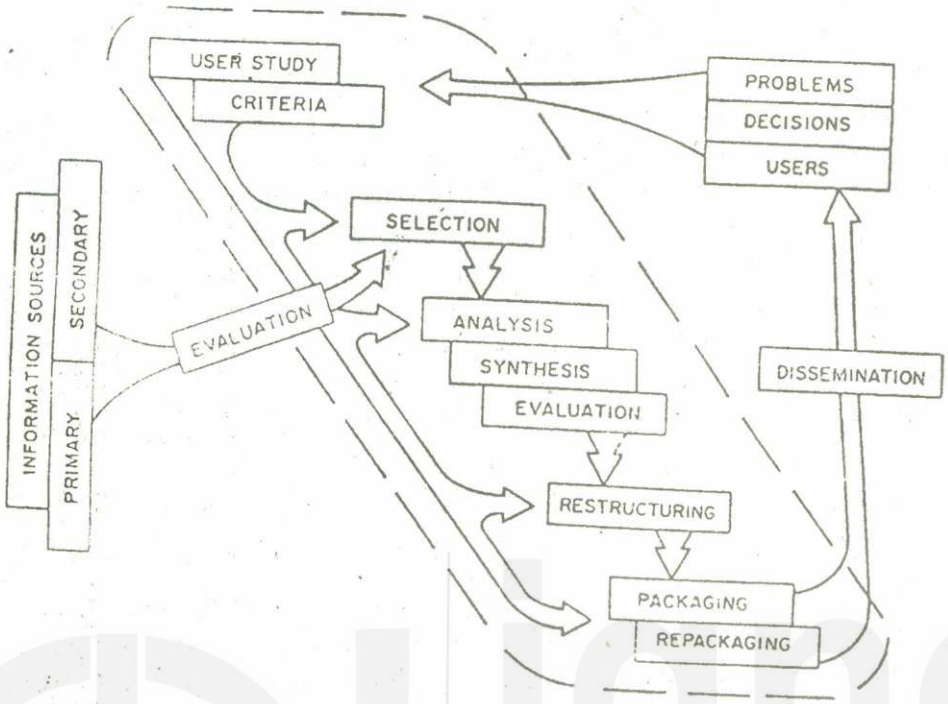


Fig. 4.1: Processes in Information Analysis and Consolidation (Source: Saracevic and Wood, 1981)

Self Check Exercise

3) Describe the processes involved in information analysis and consolidation.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

4.3 INFORMATION ANALYSIS AND CONSOLIDATION (IAC) CENTRES

Information analysis and consolidation activities are not of recent origin. Its history can be traced back to the 19th century and according to Kertesz (1983) these "are embedded in the tradition of 19th century scientists such as Beilstein and Gmelin, who accepted the challenge to bring some kind of order in the ever increasing flood of data, to make experimental findings conveniently available to other scientists" by means of handbooks and data compilations. According to Kertesz, Beilstein and Gmelin were one-man analysis centres in the truest meaning of the concept and their data compilations are precursors of data books and handbooks of 20th century. However, the term 'Information Analysis and Consolidation' is of recent origin. General Information Programme (PGI) of UNESCO, while seeking solutions to the

barriers to the use of information in developing countries, suggested 'information consolidation' as possible solution. PGI, UNESCO sponsored three meetings in the years 1975, 1978 and 1983 respectively on the above topic. In its second meeting, 'UNESCO Symposium on Information Analysis and Consolidation (1978)' the definitions and distinctions, particularly of the terms 'Analysis' and 'Information Consolidation Unit' in relation to their particular function, were discussed at great length. It was observed that 'Analysis' comprised a wide range of functions, such as abstracting, indexing, translation, reviewing, consolidation, etc. However, a number of analysis centres do not always perform the consolidation function. It was also pointed out that 'information consolidation activities' can be performed within institutions or systems other than information analysis centres, even by individuals or groups of individuals. It was therefore decided that the term 'information consolidation activities' should be used. Individuals or groups of individuals performing information consolidation activities would each constitute an 'INFORMATION CONSOLIDATION UNIT (ICU)'. It was pointed out that the most important consolidation function was evaluation, i.e. the retaining of reliable information only. Therefore, the resultant products of information consolidation activities are reliable and concise carrying usually an added value.

While origin of Information Analysis Centres (IACs) was due to untiring efforts of a few dedicated and devoted specialists, the present day Information Consolidation Units (ICUs) have been due to the interest and efforts of numerous sponsoring agencies belonging to both the private and public sectors. It is observed that most of these ICUs are located in the parent institutions and their activities are in conformity with the objectives of the parent institutions, though they may be sponsored or supported by other organisations. (Seetharama, 1997).

4.3.1 Activities, Products and Services of IAC Centres or ICUs

Products and services of Information Analysis Centres (IACs) or Information Consolidation Units (ICUs) vary with the needs of target group to be served, but the basic objectives and processes involved in information analysis and consolidation enumerated above, remain the same. IAC Centres are committed to provide users timely, authoritative, evaluated, information in most convenient and usable form. The staff of such centres has a high level of expertise, as they are actively involved in work in their subject field and also in information processing. Another distinguishing characteristic in the mode of operation of IAC centres is the use of specialists as consultants. The centres are in constant interaction with the specialists and keep track of research and development activities in the respective subject field. The activities of IAC centres in general are as follows:

Identifying Users and User's Needs

User constitutes the most important element in all information consolidation activities and perfect understanding of user's needs is a pre-requisite for any successful IAC product. As a matter of fact, it is now well recognised that information systems and services fail, if user's needs are not taken into account while designing these services. There are several methods available for user studies. Each method has some plus point and some limitations. It is observed that centres which make detailed plan for user studies carefully and carry out the study accordingly, bring out the successful IAC product. The plan consists of following steps:

i) Surveying the previous studies and literature in general to know about all aspects of user studies.

ii) Statement of the objectives of the study.

iii) Determining the variable to be studied and models to be followed.

iv) Selecting sample of the population to be studied.

v) Determining the methods for collection of data such as surveying through questionnaire or interview; observation, analysis of previous records or experimentation, etc.

vi) Determining the method of analysis of data.

vii) Determining the ways of presentation and utilisation of results.

Selection of Relevant Information Sources

Based on the information needs of the user and the type of IAC product, relevant information sources are selected. Information sources can be categorised into : i) Documentary sources, ii) Institutional sources, and iii) Human sources. Documentary sources are primary, secondary and tertiary sources. While primary and secondary sources contain information on a subject, tertiary sources are used as an aid for selection of primary, secondary, institutional as well as human sources. Among documentary sources, advanced treatises from reputed institutions/publishers, primary peer reviewed periodicals, ad-hoc bibliographies, indexing and abstracting periodicals on the subject concerned, annual reviews or advances in particular subject series from reputed publishers should be selected for consolidation purposes. Publications (like research reports, conference proceedings, etc.) of the institutions actively engaged in research in that subject area should also be considered among the selection of sources. Last but not the least human resources, i.e. specialists in the subject concerned should be identified for consultation purposes. Such specialists, when consulted may provide information on the subject concerned which is not readily available from any other source. Persons involved in selection process are information specialists/librarians, experts in given subject area, or committees involving either one or both.

Evaluation of Information

Evaluation involves judging the intrinsic merit, validity and reliability of information contained in the sources selected for consolidation. Procedures for judging intrinsic values are examination of : i) Reviews and state-of-the-arts publications on that topic: to see if the selected sources are covered by them. ii) Refereeing and peer review: to see if the selected sources have undergone refereeing and peer review process prior to publication, as is the normal practice in scholarly scientific publications. iii) Citation indexes: analysis of amount of citations received by the selected sources which may be author, journal, or institution. The above mentioned procedures can also be used for selection of relevant material for IAC product. Data provided by the given sources also should be examined for its validity and reliability. Besides the expert judgement or the general consensus, there are other procedures for data evaluation such as: i) Comparison of data on the same aspect from different sources, and ii) Testing of data i.e. critical evaluation of data. Many information centres have come up that are concerned with testing the validity and reliability of S&T data. One such centre is Center for Numerical Data Analysis and Synthesis, Purdue University, USA. However, both these procedures are costly.

Analysis of Information Involves Following Steps:

1) Study of total contents of selected document or set of documents.

2) Identification and extraction of the most relevant information conveyed by them.

3) Assessment and verification of extracted information.

4) Selection of a scheme for organising and systematising information.

5) Sorting of extracted information into heading and subheading according to the table of contents, classification scheme or typology for the subject or mission.

Synthesis of Information (Following Analysis) Involves Following Steps:

1) Comparative arrangement and merging of extracted information from many sources.

2) Comparison of data from different sources, derivation of consensus and resolution of possible conflicting information.

3) Compression of information into structure or form most suited for target users.

4) Evaluation of the final product according to criteria related to users and use.

Restructuring and Type of Product

After analysis and synthesis of information from various sources, decision is taken on the type of product. Repackaging and type of product depends on the target audience. Results of user studies should be taken into account while determining the type of IAC product that will satisfy target user's needs. At the same time product should meet the comprehension level of target audience as well as reliably reflect the state of knowledge of data on the given subject. A large number of products are possible. Some of them are:

Reviews: Critical reviews; state-of-the-art reports; case studies; literature reviews, etc.

Reports: Assessment, market and technical reports; alerting bulletins or newsletters.

Databases: Expert databases; subject knowledge databases.

Tailoring and Reduction of Information Material: Abstracts, extracts/excerpts, executive summary.

Data: Data compilation and tables; statistical abstracts, correlations and composites; critical data.

Briefing Paper: To summarise facts to support a conclusion.

Technical Writing: Guides, manuals, instruction sheets, popular articles about a scientific or technical topic.

Handbooks: Compilation of essential data and information on a subject.

Manuals: Book of instruction e.g. repairing a car or operating a machine.

Critical Studies: Comparison of different practices and policies with merits and demerits; impact or future studies.

In addition to above listed products **Newsletters, Translations, Directories, Brochures, Posters, and News Stories** also come under IAC products.

Depending upon the target audience, sources covered, subject treatment and purpose it is going to serve, each of the product has its own requirements, criteria and procedures for the preparation. Many of these products require completely new form of presentation in order to make these products most compatible with user's needs and situation. The process involves determination of extent to which available contents are to be presented, degree of details in information, degree of changes in sequence of presentation in relation to the original, technical sophistication and editorial qualities. For more information on some of these IAC products, please refer to Block 3 of this course.

Packaging and/or Repackaging of Information

After deciding the contents of the IAC product decision is taken on the media and formats in which information is to be presented. The media can be print, microform, audio/visual, electronic as well as interpersonal contact. Format is the arrangement

and presentation of consolidated information in any of the media. The format chosen should not only enhance the use of IAC product but also should contribute to the comprehension, assimilation and recall of its contents by the user.

According to Saracevic and Wood (1981) "Packaging of information is physical recording, arrangement and presentation of information on a given medium and in a given form. Repackaging of information is arrangement of physical media and/or form in which information has been presented, which is tailored to the requirement of a specific clientele. The aim of repackaging is to enhance the acceptance and use of information products and the assimilation and recall of their contents."

Dissemination and Communication

The work of IAC centre is not complete with the making of a product or provision of a service. Its active and effective dissemination through appropriate channels to the target audience and its effective utilisation by the user form the integral part of the whole information consolidation process. The important channels for communication are:

i) Interpersonal delivery: The product is delivered personally to the users either on request or in anticipation of demand.

ii) Group personal delivery: The product is delivered to a whole group of users in a meeting or through a demonstration.

iii) Strategic placement: The product is placed in locations frequently visited by the users to take notice of and pick it up on their own.

iv) Local depositories: The product is disseminated through local information centres and libraries.

v) Mass Media: The product delivered or announced through mass media – newspapers, magazines, through broadcasting i.e. radio or television.

vi) Mail: The product is delivered through direct or mass mailing.

vii) Computer networks: The product is delivered through computers via telecommunication networks; online databases; electronic mail; or computer conferencing.

For active and effective dissemination, not only choice of channel is important, equally important is marketing of the IAC product. Conscious and deliberate efforts should be made to market the product and make users aware of its services and benefits.

Feedback

Regular feedback from the users of the product and improve the product based on the feedback is an essential part of information analysis and consolidation process.

Self Check Exercise

4) List information analysis and consolidation products.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

.....

.....

.....

.....

.....

4.3.2 User Groups and Types of IAC Products

Users of IAC products can be broadly categorised into six groups as discussed in section 4.2.4 of this Unit. Not only information requirements of each user group differ from each other, within each group different types of IAC products are needed by the users depending upon the area of their work as well as stage of that work. Even if similar type of IAC product carrying the same message e.g. creating awareness of a new technology useful for all level of users or a breakthrough in cure of some chronic disease, is to be prepared for different groups of users, the level of treatment of the subject, technical details covered, media and format of the product will be different for each group, though the message conveyed may be the same. The aspect which is equally important to be considered while preparing an IAC product is the communication aspect. The communication is a process by which information is transferred through a given channel (or channels) from a source or a sender to a destination or recipient. The process can be in both directions involving feedback from the recipient. There are many types of communication processes (instituted for specific purposes, audiences, times, circumstances, etc.) such as mass communication, scientific and technical communication, interpersonal communication, teaching, advertising, etc.

Diffusion is a specific type of communication of a special interest in the context of consolidated information. Diffusion is a communication process by which a new idea or an innovation spreads among the members of a social system (or among a defined social group). The process of diffusion is a type of decision making process, which passes through various stages, and each stage has different characteristics and may require different type of consolidated information and different communication channels. According to Roger (1962, 1971), the process of diffusion of information and associated decision making involves five stages :

i) awareness,

ii) interest/knowledge,

iii) attitude formation,

iv) trial/decision, and

v) adoption/confirmation.

Let us study what each stage mean. Awareness: An individual (or group) is exposed to an idea or innovation. Interest/knowledge: The individual (or group) becomes interested in the new idea or activity and seeks additional information so an attitude towards it can be formed. Attitude formation: The individual (or group) forms a favourable or unfavourable attitude towards the idea or innovation and assesses it in terms of his/her own or anticipated future situation. Trial/Decision: The individual (or group) seeks information for testing and trying the idea or innovation. Adoption/ Confirmation: The individual (or group) decides to continue full use of idea or innovation. The type of IAC product for a user (or user group) will depend upon user's needs for that stage. As users proceed through the diffusion stages (from awareness to confirmation), information requirements become more specific and IAC products become more specific and even more personal. More specific products can serve less specific needs but not the reverse. For instance, an IAC product directed towards attitude formation can also serve as an awareness product but not vice versa. Table 4.1 provides examples of IAC products as they are appropriate for a number of different types of user organisations and as they relate to five stages in the diffusion of ideas or innovations.

Table 4.1 : Examples of IAC Products by Diffusion Stages (Source : Saracevic and Wood, 1981)

Type of Organisation	Awareness	Interest/ Knowledge	Attitude Formation	Trial/ Decision	Adoption/ Confirmation
Small Industry	Advertising. Product/process announcement. Promotional brochure. Newsletter. Data.	Reports. Group Seminar. Visits. Briefings. Exhibit. Synthesis of requirements.	Seminar on effects. Comparative statistics. Report on alternatives and experiences. Videotapes, films.	Demonstration. Technical manuals. Graphics displays. Databooks. Handbooks.	Operational manuals. Market reports. Handbooks.
Medium Industry	Brochure describing product/process of interest to technical personnel. Market description for managers.	State-or-the-art review describing technology. Resource and economic analysis or summary.	Comparative experiences. Critiques. Market analysis.	Demonstration. Technical assistance manuals. Films, tapes, pictures. Data books.	Operational manuals. Updates. Trends. Synthesis of advances. Handbooks.
Large Industry	Alerting bulletins. Newsletter. Technical news synthesis. Market trends.	Individual seminar on new developments. State-of – the –art. Economic analysis. Synthesis of research results. Critical data. Reply to inquiry.	Competitive analysis. Impact analysis. Historical review of similar efforts. Evaluations.	Demonstration. Testing reports. Technical manuals. Training manuals. Tables of recommended data.	Operational manuals for different levels of personnel. SDI synthesis of advances. Continuous critical and recommended data.
Local Governments	Promotional brochure. Press release. Newsletter announcing reports on topics of local interest.	Workshop for officials. Reviews. Statistical synthesis. Visits. Analysis / synthesis of practices.	Impact analysis. Comparative data. Demonstration. Briefing.	Manuals for implementation. Comparative experiences. Referral. Documentation.	Recurring supply of synthesized information. Establishment of question-answer in procedures.
State Governments	Announcements. Form Letters. Presentation at meetings. Newsletter. Alerting bulletin.	Slide/tape descriptions. Briefing. Reviews. Statistical composites. Synthesis of research findings. Data tables.	Historical data. Comparison with other countries. Demonstration. Impact analysis. Evaluations. Integrative future studies.	Synthesis of practices and trials. Manuals. Referral. Documentation.	Recurring supply of synthesized information. Evaluation reports.
Mass Urban Population	Newspaper articles. Announcements on radio, TV.	Radio and TV, shows. Popularization articles.	Comparing with other practices. Demonstrations.	Show-how information simplified manuals.	Synthesized information fortifying and refining

Type of Organisation	Awareness	Interest/ Knowledge	Attitude Formation	Trial/ Decision	Adoption/ Confirmation
	Popular talks on a given practice or product. Question-answer sheets.	Simplified pamphlets, brochures. Comic Strips. Photo novels. Demonstrations. Exhibits. Popularized journals. Fields Manuals.	Synthesis of fitting with daily life. Possible impacts, positive and negative.	Do-it-yourself booklet.	the practice.
Mass Village Population	Radio announcements. Visits with opinion leaders. Posters and graphic displays. School talks. Training sessions for extension workers.	Extension service demonstrations. Simplified pamphlets. Field manuals in various media (e.g. picture books, comic strips). Graphic displays Films. Talks.	Talks by opinion leaders. Comparison with other villages. Synthesis of fitting with village life. Impacts. Summary.	Show-how information field manuals. Experimental information. Markets for cash crops. Do-it-yourself booklets.	Reinforcement information. Comparisons. Refinements. Increased know-how information. Market enlargement information.
News Media	Press release. Invitation to demonstration. Press clippings from foreign or technical press. Alerting bulletin.	Demonstration. Popularized articles. Synthesis of findings and results elsewhere. Timetables. Plans.	Graphic material. Comparative data. Briefings and news conferences.	Short guides. Interviews with experts, leaders.	Reports on application. Articles on refinement. Result analysis. Impact analysis.
Academic/ Research Institutions	Journal notices. Short announcement in professional newsletters. Acquisition notices.	State-of-the-art and critical reviews. Synthesized research results. Referral. Journal articles. Text excerpts. Critical data. Data Survey.	Synthesis of critical reports and evaluations. Comparative results. Resource requirements information.	Research data. Training/ education materials. Know-why information Experiences at other institutions.	Continuing synthesized SDI reports. Selective current contents. Refinements in advance. Critical data.

4.4 PLANNING AND MANAGEMENT OF IAC CENTRES

Chambers 21st century dictionary defines management as "the skill or practice of controlling, directing or planning something, especially a commercial enterprise or activity." American Management Association defines management as "The guiding of human physical resources into dynamic organisation units that attain their objectives to the satisfaction of those served, and with a high degree of morale and sense of attainment on the part of those rendering the service." In the context of planning and

management of IAC Centres or ICUs, the second definition seems more appropriate as it explicitly focuses on the target audience, which is of the prime most concern of any IAC centre while developing an IAC product. Planning and management of IAC centres has been dealt in detail by Seetharama (1997) in the publication 'Information Consolidation and Repackaging'. The basic processes involved in planning and management of IAC centres are as follows:

Management involves policy formulation, planning, control, resource allocation, marketing of products and performance evaluation of IAC centres.

Policy Formulation: Policies which act as guide for management to take decisions should be formulated. Polices formulated may be used to direct, or improve, on long term basis, the operations, programme of services, and resources. Policies should be so formulated that they are generally applicable and flexible in meeting a number of contingencies, and at the same time they must clearly indicate the intention of IAC centre in regard to specific areas of concern. Policies formulated should cover four areas viz. collection of materials, IAC products and clientele to be served, staff resources and overall management consideration like administrative and working relationship with the parent institution and cooperative relationship with other information services.

Planning: Basic components of IAC centre should be carefully planned and developed. These components are : i) Information sources, databases, etc. required for providing services, ii) IAC services, iii) Manpower for operation and management of IAC centre, iv) Furniture and equipment, v) Building to house the IAC centre, and vi) Finance.

Resources Needed: Resources needed for the operation and management of IAC centre can be broadly categorised into: i) Human resources, ii) Technical resources, iii) Physical resources, iv) Informational resources, and v) Financial resources.

Human Resources: Performance and efficiency of IAC centre will mainly depend upon the competency of the staff, facilities and environment provided for their work and development. Since, IAC centre is expected to provide variety of information services in specialised subject field and interact with R & D personnel, management personnel, and extension workers, etc. the professional staff of the centre should have high qualification in subject field as well as in library and information science field. Beside, the professional staff should have knowledge and skill pertaining to information consolidation activities.

Technical and Technological Resources: Here decisions on the requirement of computers and telecommunication equipments or printing technology needed for the preparation and dissemination of the services and products of IAC centres are taken. Here most important criteria to be considered is, how these technologies can be combined and integrated to achieve maximum productivity in the operation of IAC centre.

Physical Resources: Physical resources needed for IAC centre include furniture, equipment, building/space facility, etc. The estimate for furniture and equipment should be based on the document collection, number of readers, number of professional/ nonprofessional staff. List and specification of major items of furniture/equipment should be made along with the cost estimates and list of selling agents and suppliers.

Information Sources: Information sources required for IAC centre need to be identified depending on the users to be served and their information requirement. This will involve preparation of check list of information sources to suit needs, identification

of the extent to which these needs are currently met by the available sources and the context to which resources have to be augmented and identification of volume, variety, scope of required information sources.

Financial Resources: Financial resources required for the establishment, operation and maintenance of IAC centre should be estimated. It is essential to analyse costs and determine sources and ways of financing. The cost analysis should be based on the assessment of expenditure i.e. capital expenditure and recurring expenditure. Capital expenditure covers expenditure for the acquisition of building, furniture, permanent collection of materials, vehicles, etc. Recurring expenditure covers salaries of staff, running costs (electricity, communication, etc.), maintenance costs (building, equipment, furniture, transport vehicles, etc.), expenses for materials (documents etc.) and supplies, miscellaneous expenses (printing, production, distribution, insurance, hiring of building, etc.).

IAC Products and Services: Work out the details of IAC products and services to be offered, target audience to be served, dissemination channels to be used.

Feedback: A feedback mechanism should be such that regular feedback from the target audience may be obtained to improve the service and product.

Evaluation: IAC centre should be evaluated periodically for its efficiency and productivity. The process of evaluation should be done on continual basis and cover all operations, services and products of IAC centre.

4.5 EXAMPLES OF IAC CENTRES IN INDIA

There is no national level IAC Centre per se operating in the country. However, information analysis and consolidation activities are being carried out by many national level information centres as well as R&D institutions particularly in the field of science and technology in the country and they are bringing out various IAC products for the benefit of different user groups. Some such examples are as follows:

Tata Energy Research Institute (TERI): The institute is engaged in research activities in the field of energy, environment and sustainable development. The institute provides solution to rural energy problems, enhance forest conservation efforts among local communities and promote energy efficiency in the Indian industry. TERI brings out several publications including research periodicals, newsletters, abstract journal, directories, handbooks, manuals, popular publications, and books and audio/visual products like CDs and films for different levels of user groups. Some representative IAC products of TERI are listed below:

Research/Peer Reviewed Journals: 1. *Resources, Energy and Development*. 2. *International Journal of Regulation and Governance*. 3. *Journal of Solar Energy Society of India.*

Abstract journal: *TIDEE – TERI Information Digest on Energy and Environment.*

Newsletters: 1. *TERI Newswire*- Fortnightly newsletter providing current economy-energy-environment scenario based on many newspapers from India. 2. *TERISCOPE*- A bimonthly newsletter on TERI'S activities. 3. *Terragreen* – A popular magazine on environment, published quarterly. 4. *Regulateri* – Published quarterly, the magazine provides information and knowledge to those in business of regulation and provides forum for discussion and debate on issues relating to regulation. 5. *Mycorrhiza News* - Publishes papers by scientists on mycorrhiza research, covers latest news, breakthrough and debate on the subject.

Directory: *TEDDY 2003-04* – TERI Data Directory and Yearbook, published annually. TEDDY is a comprehensive source of information on energy data pertaining to India. *TEDDY Online* is a computerised statistical database on Indian economy with specific reference to energy, environment and economic indicators and some aspects of international economy.

Manuals: 1. *Sustainable Building Design Manual- 2 Vols.* The first volume focuses on policy and regulatory mechanisms and serves as a guide to policy makers and local authorities. The volume 2 targets practitioners and focuses on 'green architecture' by combining concepts and technologies with best practices for each integral design component. 2. *Microplanning Manual for Joint Forest Management Areas* – Manual for those involved in participatory planning and management of natural resources like village communities/institutions/ forest departments/ extension workers and training institutions.

Handbook: *Handbook on Energy, Audit and Management.*

Popular Publications: 1.*TERI's Technologies for Sustainable Development: Tomorrows Solutions Served Today.* 2. *Plastic Waste Management for Delhi.* 3. *Terrapin* – Story books for children with special emphasis on environment education prepared at three levels, level 1 for children between 4-7 years, level 2 for children between 8-11 years, level 3 for children between 12-14 years.

Audio/Visuals: 1. *TERI Uttam Urja* – A documentary film bringing out the benefits of renewable energy technology. 2. *Rural Resources* – The film carries five short duration capsules on fuel wood crises, livestock, the green revolution, irrigation and drinking water for rural households. 3. *Learning to Dream Again* – The film traces the relationship communities have with the forests and involves local people to protect and nurture it. 4. *The ABC of Water Pumping Efficiency* – The educative CD highlights the basics of many pumping systems, methodologies, of energy audits and many opportunities for energy saving.

National Institute of Science Communication and Information Resources (NISCAIR): A constituent unit of Council of Scientific and Industrial Research is providing information services at the national level. The centre publishes research periodicals, R&D newsletters, popular science magazines, abstract journals, state-of-the-art reports on specialised subjects and popular science books. Some of the examples are as follows:

Research/Peer Reviewed Periodicals: 17 in number in different areas of S&T and Information science.

Abstracting Periodicals: 1. *Indian Science Abstracts* (Fortnightly). 2. *Medicinal and Aromatic Plant Abstracts* (Bimonthly).

R&D Newsletters: 1. *CSIR Newsletter* (fortnightly in English) 2. *CSIR Samachar* (monthly in Hindi).

Popular Science Periodicals: 1. *Science Reporter* (monthly in English). 2. *Vigyan Pragati* (monthly in Hindi). 3. *Science- ki- Duniya* (quarterly in Urdu).

Wealth of India: A – Raw Material Series (11 Volumes, 1 Supplement), B – Industrial Products Series (9 Volumes). Wealth of India is in true sense information analysis and consolidation product. It is an encyclopaedia on India's raw material resources covering plants, animals and minerals. Each resource profile is a monographic representation beginning with correct nomenclature, the known names in vernacular, gives brief description of areas of distribution in India, broad parameters of cultivation

in case of plants, pathological problems in case of plants and animals; chemical constituents, products, utilisation, production, consumption (in case of minerals) and trade details. In addition to the above mentioned volumes, 3 volumes plus a supplement was brought out during 1985-1992 and first supplement series comprising 5 volumes (covering period 1987-94) were brought out during 2000-2004.

Bharat Ki Sampada: An encyclopaedia in Hindi on Indian raw materials based on flora, fauna and minerals. Publication is in 17 volumes and 2 supplements.

State-of-the-art Publications: Published over 20 state-of-the-art publications on specialised subjects such as advances in nanoscience and nanotechnology and some popular series like Mango in India, Groundnut in India, Citrus in India, Useful Plants in India, Plant Fruit Flavours, etc.

Popular Science Books: NISCAIR has brought out as many as 60 popular science books under different series like Science Fun Series, Q Series, Vistas in Biotechnology Series, Foundation of Biotechnology Series, Information Technology for All Series, etc.

Indian Council of Agricultural Research (ICAR) : The Council supports study and research in agricultural sciences including agriculture, horticulture, animal sciences, agricultural engineering, fisheries and home sciences. The council co-ordinates agricultural R&D programmes and develops linkages at national and international level with related organisations to enhance the quality of life of the farmers. ICAR has established various research centres to meet the agricultural research and education needs of the country. It has set up 38 state agricultural universities (SAUs) spanning the entire country for teaching, research and extension activities. The Technology Intervention Programme of ICAR is integral part of ICAR's agenda which establishes Krishi Vigyan Kendras (KVKs) for training, research and demonstration of improved technologies to farmers.

Agricultural Extension Division of ICAR has a mandate to take the technology developed at various agricultural research centres to the people at grass-root level i.e. farmers. For that it provides: i) Vocational training to the farmers, ii) Train extension personnel to update their knowledge and skill, iii) Provides single window delivery system of technology, products, services and information through Agricultural Technology Information Centres, and iv) Through Institute-Village-Linkage-Programme (IVLP) it assesses the newly developed technology and carries out necessary refinement to make the technology location specific under various farming systems. ICAR has a large network of frontline ICAR-SAUs extension system consisting of 415 Krishi Vigyan Kendras (KVKs), 10 Trainers Training Institutes (TTCs), 70 Institute-Village-Linkage-Programme (IVLP) Cetntres and 44 Agricultural Technology Information Centres.

ICAR brings out following publications:

Research/Peer Reviewed Journals: 1. *Indian Journal of Animal Sciences* (monthly). 2. *Indian Journal of Agricultural Sciences* (monthly). 3. *Indian Horticulture* (quarterly).

Popular Journals: 1. *Indian Farming* (monthly in English). 2. *Phal Phool* (quarterly in Hindi). 3. *Kheti* (monthly in Hindi).

Digest: *Krishi Chayanica* (quarterly digests in Hindi).

Newsletters: 1. *ICAR-News* (monthly). 2. *ICAR- Reporter* (quarterly).

Handbooks: 1. *Handbook of Agriculture*. 2. *Handbook of Animal Husbandry*. 3. *Handbook of Horticulture*. 4. *Handbook of Plant Tissue Culture*. 5. *Handbook of Rock Gardening on the Hills*.

Text Books: Published over 8 text-books in different areas of agricultural sciences and technology.

Films: Produced 44 films in areas like Crop Sciences (13 films), Fisheries (7 films), Animal Sciences (9 films), Natural Resources Management (8 films), Horticulture (4 films) and Agricultural Engineering (3 films).

Centre for Monitoring of Indian Economy (CMIE) Pvt. Ltd.: CMIE is an IAC centre which based on economic and business data of India carries out research and brings out several IAC products and services in different sectors of economy such as agriculture, energy, infrastructure, industry, corporate, capital market, investments, trade, etc. CMIE's research and its databases are offered in the form of well designed services. These are available in print as well as in electronic formats. Some of its services and databases are Business Beacon, Industry Analysis Service, Economic Intelligence Service, India Trades, Mergers and Acquisitions, Indian Harvest, etc.

4.6 SUMMARY

It has been observed that non-use or relatively less use of literature in science and technology, health, business, education and related fields are not only due to overabundance and scattering of literature in diverse sources, but also due to the fact that information is not packaged in a form useful to different group of users. Users at different levels require appropriate information, restructured and repackaged, in a form which they can understand and immediately use for decision making, problem solving or any other purpose in hand. This led to the concept of information analysis and consolidation. This Unit deals with definition of information consolidation, benefits of information consolidation, processes involved in information consolidation and products of information analysis and consolidation activities. Activities and services of IAC centres, planning and management of IAC centres, user groups and types of IAC products have been dealt with. Activities and products of representative IAC centres in India have also been covered.

4.7 ANSWERS TO SELF CHECK EXERCISES

1) Barriers to the use of information are as follows:

- Exponential growth of information and increasing rate of obsolescence;
- Interdisciplinary nature of information leading to scattering and seepage of information;
- Wide variation in quality and reliability of information;
- Language barrier;
- Information available in a wide range of standards and formats unfamiliar for particular group of users;
- Required information is published in documents with restricted circulation; and
- S&T information is highly technical in nature with technical and trade jargons.

2) Consolidation of information involves gathering of information about a clearly defined subject field, analysing and evaluating this information, condensing and restructuring the information, and packaging and repackaging it in appropriate form for a well defined user group. UNESCO Symposium on Information Analysis and Consolidation (held in Colombo, Sri Lanka, 12-15 September, 1978) gave the following definition:

"INFORMATION CONSOLIDATION ACTIVITIES is used to define the responsibilities exercised by individuals, departments or organizations for evaluating and compressing relevant documents in order to provide definite user groups with reliable and concise new body of knowledge. Individuals or groups of individuals performing information consolidation activities would each constitute an INFORMATION CONSOLIDATION UNIT."

"CONSOLIDATED INFORMATION is public knowledge specifically selected, analyzed, evaluated, and possibly restructured and repackaged for the purpose of serving some of the immediate decisions, problems and information needs of a defined clientele or social group, who otherwise may not be able to effectively and efficiently access and use this knowledge as available in the great amounts of documents or in its original form. The criteria for selection, evaluation, restructuring, and repackaging of this knowledge are derived from the potential clientele." (Saracevic and Wood, 1981).

3) The basic processes involved in information analysis and consolidation are:

i) Study of potential users to find their information needs and decide on the information product (s) suitable to fulfill those needs;

ii) Selection of relevant information sources, both primary as well secondary information sources, containing the most useful information for the given user's problems and information needs;

iii) Evaluation of information contained in these sources for its merit, validity and reliability;

iv) Analysis of information to identify and extract most salient features conveyed by the given source;

v) Restructuring (if necessary) the analysed and extracted information as a new whole which differ from original presentation and can be used most effectively and efficiently by the user. This may involve synthesis, condensation, rewriting, simplifying, reviews, state-of-the-art presentation, etc. During synthesis the analysed information from one or more sources is condensed and presented in a new arrangement or structure with an interpretive or evaluative point of view. Condensation is derivation of short summary of information from a source or extraction of key statements i.e. sentences, paragraphs, figures, etc.

vi) Packaging and/or repackaging of restructured information in a form that will increase its use. (Restructuring deals with contents or substance of information while packaging deals with the form of its presentation.)

vii) Diffusion or Dissemination of information in ways that will encourage and promote its use. This may also involve educating the users in the use of information and marketing of information.

viii) Feedback from the users and improve the product based on the feedback.

4) Information analysis and consolidation products are as follows:

Reviews: Critical reviews; state-of-the-arts reports; case studies; literature reviews, etc.

Reports: Assessment, market and technical reports; alerting bulletins or newsletters.

Databases: Expert databases; subject knowledge databases.

Tailoring and Reduction of Information Material: Abstracts, extracts/ excerpts, executive summary.

Data: Data compilation and tables; statistical abstracts, correlations and composites; critical data.

Briefing Paper: To summarise facts to support a conclusion.

Technical Writing: Guides, manuals, instruction sheets, popular articles about a scientific or technical topic.

Handbooks: Compilation of essential data and information on a subject.

Manuals: Book of instruction e.g. repairing a car or operating a machine.

Critical Studies: Comparison of different practices and policies with merits and demerits; impact or future studies.

In addition to above listed products **Newsletters, Translations, Directories, Brochures, Posters, and News Stories** also come under IAC products.

4.8 KEYWORDS

Analysis of Information : It is a process of determining and isolating most salient information conveyed by an information source and separating this information in its constituent elements on the basis of predetermined evaluation and other criteria.

Evaluation of Information : It is a process of ascertaining and appraising the intrinsic merit, validity and reliability of information conveyed, comparison of information on the same topic from variety of sources and if possible a resolution or reconciliation of conflicting information.

Consolidation of Information : It is a process of merging of information from one or more sources and presenting in a new arrangement tailored to the requirement of a specific clientele.

Information Analysis Centre : It is a formally structured organisational unit specifically (but not necessarily exclusively) established for the purpose of acquiring, selecting, storing, retrieving, evaluating, analysing, and synthesising a body of information in a clearly defined specialised field or pertaining to a specified mission with the intent of compiling, digesting, repackaging, or otherwise organising and presenting pertinent information in a form most authoritative, timely, and useful to a society of peers and management.

4.9 REFERENCES AND FURTHER READING

Atherton, Pauline (1977). *Handbook for Information Systems and Services*. Paris: UNESCO.

Carroll, Bonnie T. and Maskewitz, Betty F. (1980). *Annual Review of Information Science and Technology*. 15,147-89.

First Meeting of the UNISIST Working Group on Information Analysis Centres. UNESCO House. Paris. 3-5 November, 1975.

Kertsz, F. (1983). *Draft Guidelines for the Establishment of Information Analysis Centres and Information Consolidation Units.* Paper presented at the third meeting of UNISIST Working Group on Information Analysis and Consolidation. Kuala Lumpur. 12-16 September, 1983.

Rogers, Everett M. (1962). *Diffusion of I nnovation*. New York: Free Press of Glencoe.

Rogers, Everett M. and Shoemaker, F. Floyd (1971). *Communication of Innovations: A Cross-Cultural Approach.* 2nd ed. New York: The Free Press.

Symposium on Information Analysis and Consolidation (second meeting). Colombo, Sri Lanka. 12-15 September, 1978.

Seethrama, S. (1997). *Information Consolidation and Repackaging- Framework, Methodology, Planning.* New Delhi: Ess Ess Publications.

Saracevic, Tefco and Wood, J. (1981). *Consolidation of Information: A Handbook of Evaluation, Restructuring and Repackaging of Scientific and Technical Information.* Paris: UNESCO. (PGI-81/WS/16).

Saracevic, Tefco (1986). *A Course in Information Consolidation: A Handbook for Education and Training in Analysis, Synthesis and Repackaging of Information.* Paris: UNESCO. (PGI-86/WS/14).

Saracevic, Tefco (1986). Processes and Problems in Information Consolidation. *Information Processing and Management.* 22(1), 45-60.

Third Meeting of the UNISIST Working Group on Information Analysis and Consolidation. Kuala Lumpur. Malaysia. 12-16 September, 1983.

Websites:

http://www.niscair.res.in

http://www.teriin.org

http://www.icar.org.in

http://www.cmie.com