

# SYLLABUS

## INFORMATION, SOURCES SYSTEMS AND SERVICES

M.Lib-07

### Unit – I

**INTRODUCTION TO INFORMATION SYSTEMS:** Information System - Concept & Characteristics - Components of Information Systems - Information Systems and Networks – Models - Planning and Designing National Information Systems.

### Unit – II

**INFORMATION SERVICES AND PRODUCTS:** Information Services & Products - An Overview - Reference, Literature search and Referral services - Document Backup Services - Standards for Documentation and Information Services.

### Unit – III

**GLOBAL INFORMATION SYSTEMS & PROGRAMMES :** UN -based Information Systems and Programmes - Regional Information Systems & Networks.

### Unit – IV

**NATIONAL INFORMATION SYSTEMS & PROGRAMMES:** National Information Systems and Programmes - Information Systems and Programmes in India - Library and Information Networks in India.

### Unit – V

**ORGANISATIONS PROMOTING INFORMATION SYSTEMS & PROGRAMMES:** International Organisations - Organisations Promoting Information Systems and Programmes in India - Role of Professional Associations in Promoting Information Systems and Services.

### References

1. **Manual of Reference and Information Sources**, Sewa Singh, B R Pub, 2004.
2. **Information System Management**, M.Y. Kamat, Pointer Pub, 2002.
3. **Introduction to Computers and Information System**, Sushila Madan, Taxmann, 2007.
4. **Web Based Information System**, S K Dass, Shree Pub, 2007.

## CONTENTS

<u>Units</u>	<u>Page No.</u>
I. Introduction to Information Systems	1
II. Information Services and Products	29
III. Global Information Systems and Programmes	94
IV. National Information Systems and Programmes	109
V. Organisations Promoting Information Systems and Programmes	147

---

# UNIT I      INTRODUCTION TO                  INFORMATION SYSTEMS

---

NOTES

## ★ STRUCTURE ★

- 1.1 Introduction
- 1.2 Information System
- 1.3 Components of Information System
- 1.4 General Systems Theory
- 1.5 Systems Study
- 1.6 Systems and Information Processing
- 1.7 Systems Analysis
- 1.8 Role of Systems Analyst
- 1.9 Planning and Designing National Information System
- 1.10 Systems Flowchart
- 1.11 System Implementation
- 1.12 System Evaluation
- 1.13 System Documentation
  - Summary
  - Review Questions
  - Further Readings

---

### LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define information system
- explain general systems theory
- describe role of systems analyst
- explain about system evaluation and documentation
- explain importance of system Implementation.

---

### 1.1 INTRODUCTION

---

In the past few decades, a new and dynamic activity has developed in organizations the design, operation and management of computer-

NOTES

based information systems. While many organizational activities and resources have been devoted to the acquisition and processing of information for a long time, the advent of the computer and its application in IS activities have greatly extended the information processing capabilities. Computer-based information systems have thus influenced the organizations of all types and sizes.

System concepts are very abstract and, therefore, are not always appealing to many people. But understanding the systems can lead to the same benefits as understanding the mathematics of abstract business concepts. Thus, the system concept is more a philosophy while systems analysis is a methodology for viewing complex wholes at a manageable level of abstraction. It presents systems abstractly, using just enough detail to allow the analyst to identify and specify alternatives for the design and modification of a system.

The reason for studying its systems is to identify the various characteristics that may vary from one system to another. Many of their characteristics of the systems are similar, and the strategies for analysing and improving them, are, therefore, similar. Various concepts related to systems are referred to collectively as general systems theory.

In this unit, we examine the general systems theory and the related aspects that are applicable to the environment for information systems.

---

## 1.2 INFORMATION SYSTEM

---

In the present day, Information systems are becoming crucial to the functioning of modern organizations and businesses. Organizations are using more and more information systems technology to gain competitive advantages over their rivals.

*Q.3* What is an information system? An information system is a formalized structure, which can, form various sources, collect, store, process and report data and the information necessary for management in decision-making and other purposes. Not all information systems and structures are formal, nor do information systems have to be computer-based. Thus, an information system is a set of organized procedures which, when executed, provides information to support decision-making. Here, we define information as a tangible or intangible entity which serves to reduce uncertainty about some future state or event.

The basic functions of an information system reveal that the most important aspect is the user who interprets information. It is to be noted here that information is not just raw data. Rather, data are processed by selecting/collecting, organising including collating and summarizing to produce output which is interpreted as information by the user-decision maker.

**NOTES**

Information systems have been there from the time people first inhabited in the earth. Early systems were quite rudimentary and subject to extensive distortion and delays. Individuals, organizations, and nations have always collected and processed information. Early information systems were highly informal, and involved the exchange of news, stories and anecdotes with neighbours. As economies progressed beyond the subsistence level, information on the changing value of goods and services for barter and trade became important.

Formal organizations, from their inception, have required information systems to operate successfully. Production, accounting, financial and external data on consumers and markets are vital to the operations of most modern businesses.

Information systems existed long before the development of computers. However, the explosion of information and the need to process large amounts of data to extract small identical and of useful information and the capability of the computer have contributed to the importance and development of computer-based information systems. The organizations thus look for computer-based information systems to operate and process data and to effectively use the output after interpretation.

---

### **1.3 COMPONENTS OF INFORMATION SYSTEM**

---

An information system has the following components:

- Inputs
- Processes
- Data files
- Outputs
- Personnel, and
- Hardware

All systems, including information systems and computer systems have inputs, processes and outputs. Processes transform inputs (data) into outputs (management information). Processes can be subdivided into computer programs and procedures. Computer programs are executed by the computer hardware, and the procedures are executed by people. For example, sometimes, data must be collected and checked manually before they are put into the information system. An information system also contains data files, which can be either computer-based or manual. Personnel are the most important component of an information system. System analysts and programmers design, implement and maintain the programs and procedures, while computer operators run the computer-based portion of the system. Accounting, finance, marketing and manufacturing personnel performs other aspects of an information

NOTES

system, many times without the use of computer hardware. Besides the above, management personnel set the overall policies that govern the operation of an information system.

The core of an information is, thus, made up of inputs, processes, data files and outputs. These components are executed and controlled by hardware and personnel.

### **Types of Information Systems**

Before computer applications came in a big way, information systems were classified as *data processing systems* and *Management Information Systems (MIS)*. *Data processing systems* were oriented towards capturing, processing and storing data, whereas MIS is oriented towards the generations of management information using the data. The *data processing system* performed transaction processing and was very much involved with collecting and storing of a large amount of detailed information. This information served as the database for the *management information system*.

With extensive use of computers and eventually, the development of computerised information systems, the term *data processing system* became out of date and was replaced with the term *transaction processing system*. Besides these two types of information systems, several new types of information systems started developing and began to be used widely. Let us study some of the important types of information systems.

#### ***Transaction Processing Systems***

Transaction processing systems keep track of the daily activities of an organization. These systems collect and store data concerning various aspect of the activities of an organization, provide the information necessary for the day-to-day control of events, and serve as the database for higher-level information systems that may be used by managers and executives at the middle and upper levels of an organization.

#### ***Office Automation Systems***

These systems use the computer to automate many of the routine tasks that are performed in a typical office. Besides word processing, other applications in the office include desktop publishing, electronic mail, facsimile transmission and image processing.

#### ***Executive Information Systems***

Executive information systems provide for the communication of summary-level information to executives. The information in these systems are normally brief, meant exclusively for executives of the organization and updated frequently, usually on a daily basis. The systems also provide the capability to display more detailed information if an

executive requires it. Many executives use these systems to keep track of pieces of information which are of much importance to the organization.

### ***Expert Systems***

An expert system is a computer programme that enables a computer to take decisions which are usually made by humans with special expertise. These systems store facts and data that are necessary and are used to arrive at a judgement in a particular case.

### ***Management Information Systems***

The term Management Information System (MIS) applies to a system that provides information to the upper and middle level management about routine and other anticipated activities concerning an organization. MIS is in widespread use and form the backbone of information systems in business and industrial organizations. In many situations, all the other types of information systems-transaction processing, decision support, expert systems and other are parts of the MIS.

### ***Database Management System***

A Database Management System (DBMS) is a software application that stores the structure of the database, the data itself, relationships among data in the database, as well as forms and reports pertaining to the database. DBMS thus is a system that generates, runs and maintains databases, and as such the system must include all the software needed for the purpose. Stored with actual data is the description of a database, which enables the DBMS to retrieve information from the database, and to store new data in appropriate places in database, establishing relationships with other data if relevant. The DBMS in essence is data oriented with more importance on data modeling and data design.

### ***Decision Support Systems***

A Decision Support System (DSS) is an integrated set of computer tools that allow a decision maker to interface directly with computers to create information which is useful in making semistructured and unstructured decisions. MIS in the past has been most successful in providing information for routine, structured and anticipated types of decisions. Although MIS has succeeded in acquiring and storing large quantities of detailed data, it has been less successful in providing information for semistructured or unstructured decisions, particularly when the computerised information system was designed. The basic idea underlying DSS is to provide a set of computer-based tools so that MIS can produce information to support semi-structured or unstructured decisions.

NOTES

## 1.4 GENERAL SYSTEMS THEORY

### NOTES

The area of systems analysis and design for information systems has its foundation in the general systems theory. The General Systems Theory emphasises the need to examine all parts of a system. Too often the analyst focuses only on one component of the system, and takes action which may sometimes lead to ineffectiveness of the system because some important components were ignored. In addition to focusing on all parts of a system, the General Systems Theory helps communications among specialist, in different fields. One field of study closely associated with the General Systems Theory is cybernetics, the field of communication and control in man-machine systems (including computer systems). Cybernetics represents a combination of the fields of physics, biology, electrical engineering, etc.

In the analysis and design of information systems, we have to apply our knowledge from diverse fields. An information system involves people from different levels of an organization, computers, programs, procedures and, also, the personnel to operate the system. Fields like management, organizational behaviour, industrial engineering, computer science, communications, psychology and many others have important contribution to make to the study and design of information systems. Before preparing for the study of the analysis and design of information systems let us briefly review the main elements of the general systems theory.

A system is an organized, interacting, interdependent, and integrated set of components or variables. A system has objectives or goals, and many times these goals are difficult to observe. The environment plays a vital role in the design of a system.

The environment is external to the system, it encompasses everything that is outside the system's control. The environment also determines in some way the performance of the system. So the system and its environment are interrelated and interdependent. Resources are all the means available to the system to execute activities necessary for goal attainment. In contrast to the environment, resources are inside the system and are under its control.

A system is made up of components such as the jobs, activities, missions or parts of the system that are required to realise the objectives. One should not look necessarily at the traditional components of a system such as a department. One's focus should rather be on thinking of the entire system. A focus on missions or activities makes it easier to understand a system.

A system may be a total system which may have different subsystems as components. Individual subsystems may also be a system which may have different subsystems and so on. In the context of libraries,

library automation may be a system whereas acquisition, cataloguing, circulation etc., may be subsystem. Similarly in the case of acquisition ordering, receiving, financial transaction may be subsystems.

The management of the system consists of activities aimed at planning and control. Planning encompasses setting goals, the utilisation of resources, and the development of a programme undertaking different activities, implementation and a strategy for dealing with the environment. Control deals with the execution of plan, and associated with control is the flow of information and feedback so that the system can evaluate its plans.

The basics of the General Systems Theory as suggested by various theorists are as follows:

## NOTES

- (a) The components of a system are interrelated and interdependent, unrelated and independent components do not *constitute* a system. One of the important aspects in studying a system is to determine the relationships amongst the components.
- (b) A system needs to be viewed as a whole, it should not be usually broken down into *constituent* parts, as one might lose sight of the system in its entirety. However, the focus should be on sub-systems that *constitute* a large system.
- (c) Systems are goal seeking in some way, the interacting components reach some final state or goal, an equilibrium position of goal attainment.
- (d) System have inputs and outputs, they are dependent on some set of inputs to process to attain the system's goals. All systems produce some output needed by other systems.
- (e) All systems transform inputs into outputs, usually the form of the output differs from that of the input.
- (f) Systems exhibit entropy. Entropy describes the state of a closed system (no inputs from outside the system) where all elements move towards disorganization and the inability to obtain and process inputs as a result of which the system is unable to produce outputs. Information processing is critical to the survival of systems.
- (g) The system must have a mechanism to regulate its interacting components so that its objectives will be realised. Planning, control and feedback are associated with this regulatory function.
- (h) A system usually consist of smaller subsystems. The nesting of smaller systems within larger ones forms a hierarchy that is characteristic of the systems theory.
- (i) We usually find differentiation in complex systems, that is, specialised units perform specialised tasks.

- (j) Systems generally exhibit equifinality, that is, some final state that can be reached from several different paths or starting points. In other words, there are multiple ways to achieve the goals of the system.

## NOTES

### The Systems Approach

The systems approach is an approach to the better understanding of systems so that analysis, design and evaluation may be carried out more effectively. It is an approach which has been usefully adopted in all areas, including those of libraries and in information centres. The systems approach, known also as systems thinking, is derived from the General Systems Theory (GST).

The systems approach has many facets of which some important ones are:

- All systems are composed of inter-related parts or subsystems and a system can only be explained as a whole.
- Systems are hierarchical in that the parts of the subsystems are made up of other smaller parts.
- The parts of a system cannot be altered without affecting other parts.
- The subsystems should work towards the goal of their higher systems and not pursue their own objectives independently.
- Organizational systems contain properties that can be assessed in an objective way and also according to individual values.

The systems approach is a series of problem-solving steps which should ensure that the problem is first understood, alternative solutions are considered, and the selected solution works. These problem solving steps are grouped in three phases, namely,

- preparation effort which prepares the manager for problem solving by providing a system orientation,
- definition effort, which consists of identifying a problem to be solved and then undertaking it, and
- solution effort which, involves identifying alternative solutions, evaluating them, selecting the one that appears to be the best, implementing that solution, and following up to ensure that the problem is solved.

The approach is defined by five elements:

- (i) the total system objectives
- (ii) the environment and fixed constraints
- (iii) the resources of the system
- (iv) the components of the system, their activities, goals and measures of performance, and
- (v) the management of the system.

Of the above, the total system objectives is most vague and difficult to define as it is either impossible to discover what are they or they are laid down in a general manner. It is, therefore, essential for a system designer to have a thorough understanding of the nature of the organization he works for, its structure and the management style.

The term environment used in this context refers to what lies outside the system and is outside the control of the manager.

---

## 1.5 SYSTEMS STUDY

---

Systems must be managed effectively if they are to give effective results. There is, thus, a need to examine some of the key issues and approaches associated with the management of the systems. Also required is a need to manage a system on a day-to-day basis. It is vital for every organization to have objectives, goals and targets so that users of the system are regarded as an important component. These measures provide control data for the systems approach, that is for the management of the system. For all these, systems study is required.

The systems study provides the detailed basis for the design of the new system in terms of what it should do and how it should do it. It is a useful way to describe organizational phenomenon, including the information systems, features of application and development processes.

While carrying out a systems study, the initial concern should be to convey to the users of the system the reasons for carrying out the study and also how the new system will benefit both the organization and the users.

Systems may be open or closed. Parts of a system and its environment include the system's components, boundaries, inputs, outputs, and interfaces.

Let us study some of these concepts in the subsequent sections.

### System

A system is defined as a set of interacting components that operate with a boundary for the purpose of achieving an objective. The boundary filters the types and flow rates of inputs and outputs between the system and the environment. The specifications of the boundary define both the system and the environment of the system.

Within the confines of the definition of the system given above, it is possible to conceive of a system within a system. For example, National Institute of Science Communication and Information Resources (NISCAIR) and Indian National Scientific Documentation Centre (INSDOC) can be viewed as system and the parent body the Council of Scientific and

**NOTES**

Industrial Research (CSIR), as a suprasystem. Alternatively, the CSIR can be defined as a system and NISCAIR as a subsystem. To carry the example a step further, the CSIR can be viewed as a subsystem under the Ministry of Science and Technology. Finally, the Ministry of Science and Technology can be viewed as a sub-system under the Government of India.

Parts of a system and its environment include the system's components, boundaries, inputs, outputs and interfaces. Systems are also described by using the input-output relationships, and a system may be open or closed. These are discussed in the subsequent sections.

### **Components**

The components of a system are units (subsystems) acting in combination with other units to modify inputs in order to produce outputs. Components within a system do not have to be homogeneous.

### **Boundary**

A boundary is the area separating one system from another. In information systems, the boundary is not physical in nature. It is a region through which inputs and outputs pass during exchanges with the system's environment. Defining the boundary of a system is an important step in systems analysis.

### **Environment**

The environment of a system is defined as anything outside the boundary of the system that influences the operation of the system and cannot be controlled by the analyst. The environment is of great importance to the organization as it is the very reason for its existence. The authorities controlling an organization see a need to provide products and services to meet specific environmental needs and they invest money so that the organization can perform this activity. The environment then provides the resources that are required to produce the products and services.

The environment of one organization differs from that of another. The various environmental elements include the users, suppliers of materials, financiers, community, competitors, geographical area, skilled and unskilled personnel of the organization and the government itself. These environmental elements exist in a larger system called society. The organization demonstrates its responsibility to the global community by respecting the natural environment, providing products and services that contribute to the quality of life and conducting its operations in an ethical manner.



NOTES

## Inputs

Input can be defined as the data received or to be received by a device or a computer programme. It is also the data to be processed. Inputs are the energies taken into the system and are classified as either maintenance or signal. Maintenance inputs energize the system and make it ready to operate. Signal inputs are the energies processed to produce the outputs. Usually computer programmes are maintenance inputs into a computerised information system and data are the raw materials or signal inputs, processed to produce outputs from the system.

## Outputs

Output is defined as the information produced by a system after processing of the input. Outputs are the energies discharged from the system into the suprasystem. They are generally classified as products useful to the suprasystem or as waste. Outputs are generally in the form of reports and can also be seen on computer screens.

## Interface

Interface is a term frequently used in systems analysis. The interface is the region between the boundaries of systems and is also the medium for transporting the output from one system to become the input of another system. It does not alter the output of one system that is input to another system.

## Open and Closed Systems

Open systems accept inputs from the environment, closed system are assumed not to interact with the environment. All systems are open to some degree, but it is often convenient to assume that a system is closed in order to simplify the analysis process.

Open and closed systems differ in terms of entropy. Entropy is a measure of disorder with a system. In an open system, order is maintained by maintenance of inputs. Depending on the quantity of the maintenance inputs, entropy can decrease, remain constant, or increase in an open system. In a closed system, entropy never decreases because maintenance inputs do not enter into the system.

The term open systems is widely used today in information systems. It refers to those systems that can interoperate directly with hardware and software from multiple vendors. Closed systems are those systems that can only use hardware and software from a single vendor. Open systems are more flexible, they can grow and adapt more readily than systems whose components are supplied by a single vendors. The use of the terms open and closed systems is derived from the general systems theory.

## **Feedback**

Systems survive and adapt to their environment through feedback. Feedback is a process by which the output of a system is measured against a standard. The difference between the two is corrected by altering the inputs. Feedback improves the system performance. Output from the feedback in an information system is used in decision-making. If the output is not relevant to the decisions, then the system is of little use to the management. Therefore, feedback loops are incorporated into a system to determine the relevance of output to the environment.

## **NOTES**

---

## **1.6 SYSTEMS AND INFORMATION PROCESSING**

---

As discussed above, an information system is a formalised computer system that can collect, store, process and report data from various sources to provide the information necessary for management decision-making. The information systems can operate only when the processing of information takes place. Information is knowledge concerning such things as facts, concepts, objects, events, ideas and processes, which within a certain context has a particular meaning. Information processing becomes meaningful to a decision-maker for use in a particular decision.

The traditional approach to information processing is file-oriented. Before the advent of database management systems, each application maintained its own master file and generally had its own set of transaction files. Files are custom designed for each application and generally there is little sharing of data among various applications. Here, programmes are dependent on the files and vice versa, that is, when the physical format of the file is changed, the programme also has to be changed. The traditional approach is file oriented because the primary purpose of many applications is to maintain, on the master file, the data required to produce management information. Therefore, the master file is the centerpiece of each application.

Although the file-oriented approach to information systems is still widely used, it does have some disadvantages that include:

- Data redundancy
- Lack of data integration
- Programme/data dependence
- Lack of flexibility

To overcome this traditional approach to information processing, the database approach to information processing is being suggested by systems analysts. A DBMS (Database Management System) provides the capabilities for creating, maintaining and changing a database.

In traditional data storage techniques, the programmer needs to be aware of the physical layout of data records on storage devices and,

NOTES

thus, needs to understand the technical characteristics of many kinds of hardware. A DBMS overcomes this problem by providing two views of data; that is physical and logical. The physical view is similar to the traditional file system, whereas, the logical view represents data in a format that is meaningful to the user and the application programmer. Thus, for information processing it is recommended that the DBMS be opted for, as the database approach integrates the data into one large storage structure that may be used by many different users and application programmes of the system.

---

## 1.7 SYSTEMS ANALYSIS

---

As stated earlier, systems and systems analysis are, respectively, a philosophy and a methodology for viewing complex wholes at a manageable level of abstraction. Systems analysis is also a method for dealing with complex systems. It presents systems abstractly, using just enough detail to allow the analyst to identify and specify alternatives for the design and modification of a system. Another reason for studying systems is that many of their characteristics are similar and the strategies for analyzing and improving them are therefore similar. When one begins to view complex phenomena as systems, analogies can be drawn between systems that initially might seem to be unrelated.

### Conceptual Strategy

System analysis can be defined as a conceptual strategy for problem solving. This broad functional definition of system analysis indicates that the term refers to the structuring of a methodology of an objective, namely, the articulation and resolution of a problem.

System analysis is the inquiry to assist decision-makers in choosing preferred future courses of action by:

- (a) systematically examining and re-examining the relevant objectives and the alternative policies or strategies for achieving them, and
- (b) comparing quantitatively, where possible, the economic costs, effectiveness (benefits), and risks of the alternatives.

From the above it can be concluded that system analysis is a process that analyses and compares alternative courses of action to achieve stated objectives, employing quantitative variables for comparison where possible.

### Procedural Components

System analysis consist of the following procedural components:

1. Problem definition in the system context
2. Statement of objectives

- overall system objectives
  - outcomes desired of the problem solution
  - performance indicators
3. Specification of resources and constraints on possible courses of action (*i.e.*, problem solution)
  4. Formulation of alternative courses of action
    - estimation of their advantages and disadvantages
    - rejection of the less feasible or desirable alternatives
  5. Collection and analysis of data on promising alternatives
  6. Selection of the most promising alternative (*i.e.*, decision-making)
  7. Implementation of the most promising alternative
  8. Performance monitoring, measurement and evaluation
  9. Correction or modification of the implementation as needed
  10. Performance monitoring, measurement and re-evaluation.

System analysis helps to decide what is the motivation for a system. Why is a new system desired? Whatever may be the specific reasons for a new system, there must be some dissatisfaction with the existing system, its information processing procedures or there would be no *demand for a new system*. Either current or expected demands for information processing cannot be met from the existing one, so a new system is needed, and therefore the effort to change existing information processing procedures and improve them in some way by designing a new system.

In systems analysis, the existing information processing procedures are documented in detail. During analysis, it is learnt what the users expect the system to do. One major task during this phase is to define the boundaries of the system. Data are also collected during analysis. All this leads to the *design of the new system*.

---

## 1.8 ROLE OF SYSTEMS ANALYST

---

We are entering the information age because of the emergence of computer-based information systems. A great percentage of the work-force is being employed as information workers. A large amount of information has to be made instantly available to decision-makers and this information can be easily made available by the computers or activities applicable with the help of computers. The largest impact of this computer revolution is seen on information systems carriers. The various kinds of information systems specialists include systems analysts, programmers and computer operators.

A systems analyst analyses and designs application systems. In carrying out this responsibility, the analyst is heavily involved with the systems

NOTES

development life cycle from analysis through implementation. Often the analyst is looked upon as an intermediary between the users and the programmers. Most analysts do not perform programming and they do not have to be highly skilled programmers too. However, the analyst should be familiar with the features of several different computer languages.

It is important that the systems analysts have more competence in the application area in which they are working than in programming. The analyst must deal directly with users and must understand their applications in order to design a new system. For these reasons, an analyst sometimes has a formal education in areas such as marketing, economics, accounting or management. But the best combination is to have an education in one of these application areas plus an information systems education. In fact, systems analysts often are employed by and report to the user organization rather than the information systems function. They analyse and design new systems and then turn the specifications over to the information systems organisation for programming.

Whereas programmers often work with machines and programme code, systems analysts work directly with people (that is the end-users and programmers) most of the time. A good systems analyst has highly developed communication skills. Listening, persuasion, teaching and consulting skills help ensure success for a systems analyst.

The job outlook for systems analysts is bright. They can initially pursue a career in systems analysis and then decide whether to remain in the information systems organization or to move into management in the application area in which they are trained, such as finance or marketing. They are usually actively recruited by end-user organizations because of their computer expertise. Even if end-users develop their own applications in the future, they will need individuals with the expertise of systems analysts to guide them in the use of new software such as application generators and database management systems.

The role of a systems analyst is different from that of a database administrator or an information systems consultant.

A Database Administrator (DBA) is responsible for the design and control of an organization's database and holds a management position. The major duties of the DBA are designing databases; developing database dictionaries; designing and implementing procedures that will ensure the accuracy, completeness and timeliness of data stored in the database; and advising programmers, analysts and users about the efficient use of the database.

An information systems consultant is very much like a systems analyst. This individual may be employed with an organization's information

department or by an outside management consulting firm. The consultant's role ranges from helping a user develop an application to performing a complete analysis, design and implementation of a system. These persons usually are information specialists having a high level of technical knowledge both in computer systems and computer applications.

NOTES

---

## 1.9 PLANNING AND DESIGNING NATIONAL INFORMATION SYSTEM

---

System design includes the organization of people, equipment, money and procedures to process the information. System analysis and design draw heavily on the General Systems Theory as a conceptual background. Given below are the general system theories and the importance of each one in the content of information system design.

<b>General Systems Theory System Design</b>	<b>Importance for Information</b>
1. Components of a system interact.	Delineate components and their interrelations during analysis.
2. A system is a whole.	Be sure to define the entire system before examining subsystems.
3. Systems are goal seeking.	What is the goal of an information system?
4. Systems have input and output.	A major design task is to specify input and output.
5. Systems transform input to yield output	A major design task is to specify processing to output. Produce from input.
6. Systems yield entropy.	Information processing is critical to an organization's success.
7. Systems must be controlled.	Information systems help control the organization, information systems must have feedback on their own performance and be controlled.
8. Systems form a hierarchy.	Information systems design is a hierarchical task, systems consist of hierarchies of subsystems.
9. Systems exhibit differentiation.	Information systems have many specialized parts.
10. Systems exhibit equifinality.	It is better that it is explained through example. There are many ways to design a system to achieve desired goals.

NOTES

## Principles of a Well-designed System

Just as in systems analysis, systems design too needs effective management and is the result of a series of principles. These underlying principles along with the need for creativity are as follows:

### **1. Principle of acceptability**

The success of a new system is highly dependent upon its acceptability by organizational personnel or the persons for whom it is designed. For a successful system, the people who use it should participate in its analysis, design and development.

### **2. Principle of enhancing the decision-making process**

The new system should enhance the decision-making ability of organizational personnel. This design approach allows more effective decisions.

### **3. Principle of economy**

For economy in the new system, no information service should be provided that cannot be cost-justified.

### **4. Principle of flexibility**

The new system should be adaptable in a changing environment by allowing easy expansion or contraction.

### **5. Principle of reliability**

Reliability in a new system refers to consistency over an extended period of operation. A high degree of reliability can be designed into the system by including good internal controls.

### **6. Principle of simplicity**

The simplicity of a system can be affected by providing a straight-line flow from one step to the next, avoiding needless backtracking. Additionally, a simplified system is easier to understand and use than a more complex system.

## Steps in System Design Process

The key steps in the system design process are:

- (a) Review new system requirements. Systems design, devising new system approaches, centers on determining the requirements for a new system. This initial step in systems design management takes into account the information compiled to date on the present system. After system analysts have reviewed appropriate data, they must specify the following:

- New policies consistent with the organization objectives
- Planned inputs
- New methods and procedures

- Data files to be maintained
- Output needs
- Internal control considerations
- Equipment considerations

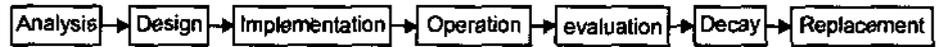
The foregoing requirements for newly designed systems are not complete until the human factors are considered.

#### NOTES

- (b) Design the new system. It is recommended that a methodical approach to systems design be undertaken initially during this critical phase. Recommended is the modular or building block approach wherein major system functions are successfully separated into distinct minor functions. When the functional analysis is complete, the systems analyst creates a structure for the functional modules that is capable of operating within whatever hardware constraints are imposed. The net result of the modular approach is that duplicated activities are eliminated and the complexity of the overall systems is reduced.
- (c) Flowchart and document the new system. An important step is preparation of the final system flowcharts for the recommended system, without specifying the equipment. Accuracy, simplicity and ease of understanding are the essential components since non-technical personnel may be reviewing and evaluating them.
- (d) Consider and review system design alternatives with proper personnel.
- (e) Select the more promising alternatives with the help of properly experienced personnel.
- (f) Compare the tangible and intangible benefits of the promising alternatives. Cost factors, volumes and requirements for equipment and personnel should be carefully analysed to check the validity.
- (g) Select the system design from among the promising alternatives that best meets the study's requirements.
- (h) Prepare the final system specifications for the recommended systems design. Relate the systems design to other appropriate parts of the information system.
- (i) Document the final design. One of greatest contributions of following the above steps in systems design is that the right hand knows what the left is doing. The final step remains the selection of the equipment.

### System Development Cycle

A system can be seen as a life cycle that passes through a number of standard phases. In each of these phases, different management activities are involved. The basic phases of a system's life cycle are shown as follows:



### The System Life Cycle

#### NOTES

First an analysis should be conducted in order to establish system requirements and options available in system design. In system design a specific system will be developed to match the application. Implementation leads to operation evaluation during which the system fulfills its objectives and is modified from time to time to reflect changes, if any, in requirements. With time the system becomes less effective, either due to any faults or because the system environment changes and the system is not able to meet its objectives. Thus, decay sets in and this calls for planning a new system. The final stage of the system's life cycle, thus, is its replacement.

The duration of each of these stages varies from system to system but the operation evolution phase is usually the longest, many times lasting a few years. The other stages like analysis usually last for a very short period. Rapid changes in the technology and the environment are the cause of the decay and eventually call for replacement of the system.

The various stages in system development are:

1. Definition of objectives
2. Definition of system requirements
3. Design phase
4. Implementation phase
5. Evaluation phase

Let us study each of these stages in detail.

#### Definition of Objectives

The first step is to engage in discussions leading to defining the objectives of any new system. This phase is valuable as it helps not only in evolving guidelines and requirements which may be invaluable later in the project, but also in commencing the communication process and ensuring that all points of view are considered. This phase should review established practices and procedures and attempt to identify where, when, why and how a change in system might be helpful. An initial conduct of needs analysis in cooperation with staff whose activities are going to be affected by any change is helpful.

The next step is to start gathering information on how to achieve the objectives identified in the first phase. This is basically about information gathering both from internal and external sources. This collected information should facilitate a decision about the type of system that is available to meet the requirements of the organization. The definition of objectives therefore helps in establishing the terms of reference to be developed, initial needs analysis, evaluation of options and analysis of existing systems.

## **Definition of Systems Requirements**

After having complete knowledge of the options available, and some insight into how the various solutions might be applied to meet the requirements in a specific application, it is necessary to go back and develop a full system specification. Usually this phase should seek to answer aspects like, the operations the system is likely to cover, regular users of the system, kind of information sought from the system, kinds of required records, vital features etc.

### **NOTES**

## **System Specification**

The objective of the analysis phase of a systems analysis and design exercise is the establishment of the requirements for the system that is to be acquired, developed and installed. The analysis and logical design of a system can be summarized in a system specification, or specification of operational requirements. Usually such a specification will include:

- Background information about the organization
- Details of the facilities to be provided by a computerised system, identifying which are mandatory and which are optional
- Details of the environment in which the system will operate, including any standards, protocols
- The size of the system in terms of the numbers of records and transactions to be handled, the number of workstations
- A timetable for implementation of the system
- Mandatory questions to be answered by suppliers, such as size of the hardware, systems support arrangements, costs, etc.
- Information concerning any specific constraints
- Information about terms or forms of contract and any acceptance tests.

The system requirements specification sources both as a communication document, as it supports discussion and development amongst those concerned with the system, and also a reference document during implementation, maintenance and review.

## **Design Phase**

The design phase is concerned with the analysis, flowcharting and other charting of the functions and operations that the system must perform. The design phase also includes the logical systems model, physical systems model, choice and ordering of hardware and software configuration.

## Implementation Phase

This phase involves planning and preparation, education and training of personnel, database creation, system installation and switch-over from old system to the new system.

### NOTES

## Evaluation Phase

The last stage of this exercise is a long way from the initial establishment of requirements, but after successful implementation it is necessary to complete the exercise by going back to the specifications and assessing the extent to which the system is meeting its stated objectives. This kind of assessment leads to improvements and refinements in the way in which a system is used or it may lead to decision for a new system. This phase also helps in maintenance and evolution.

---

## 1.10 SYSTEMS FLOWCHART

---

In each phase of the information system's development process the systems analyst relies on specific tools or techniques for accomplishing the goals and objectives. These include interview, questionnaire approach, observation, sampling and document gathering, charting on decision tables. Of these, charting is a technique which pictorially represents some dimension of the organization or an organizational activity. Of all the techniques utilized by systems personnel, charting is one technique most closely identified with systems efforts. Indeed it is not only an important fact finding technique but also a valuable one for performing analysis, synthesis and communication.

Amongst the most important of all charting techniques available to the analyst is the flowchart. A flowchart is a set of symbols representing an activity. Flowcharts are widely used in systems work because they can graphically represent the interrelationships among elements in a system to varying degrees of detail. Consequently, flowcharts can be used in problem definition, analysis, synthesis, communication and documentation. Three broad classifications of flowcharts are:

- (a) The *Systems Flowchart* (as its name implies) is a chart which depicts the system as a whole with only subsystems or major elements shown.
- (b) The *Procedural Flowchart* is a graphic representation of a specific operation or data flow with the system.
- (c) The *Logic Flowchart* is the most specific of all the flowcharts. The intent of this type of flowchart is to provide an in-depth analysis of a given set of logical processing steps.

## Flowcharting Symbols

For drawing flowcharts, a variety of symbols are used to represent certain logical or processing operations. The systems personnel for a number of reasons use these symbols:

- The symbols have specific connotations attached to them
- These connotations are standard among computer and technical persons, and
- These symbols can be drawn quickly

Although it is not necessary to use special symbols when flowcharting, the use of symbols can enhance the viewer's understanding.

Some of the important flowcharting symbols are:

### NOTES

---

Flowchart Preparation



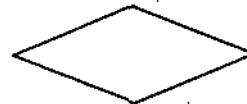
Process



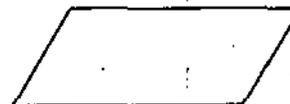
Flow lines



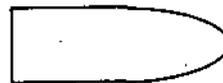
Decision



Input/Output



Delay



Terminal



Document



## 1.11 SYSTEM IMPLEMENTATION

### NOTES

Implementation refers to the entire change effort associated with a new system. We design a system to improve information processing, and improvement implies that we must change existing information processing procedures. Implementation is the part of the process of designing a system and considerable time should be spent in planning the installation and implementation of the system. Implementation can be lengthy and it is important not to underestimate the impact that the implementation of a new system may have on working practices and customer service.

The installation phase starts with a review of the way in which the system will affect the existing operations of the organization. If a thorough analysis has been made in the earlier stages of the systems analysis exercise, many of the jobs, issues and other matters concerned with the installation of the system will have been identified and planned already. At this point it is necessary to gather a quantitative picture of the work to be done in order to achieve implementation and to identify specific staff responsibilities.

A detailed timetable of training, installation and other activities needs to be agreed and finalized. Implementation process involves:

- (a) **Preparation and planning the implementation.** Various preparatory activities involving a good understanding of the work necessary to implement the system design help in developing a detailed implementation plan.
- (b) **Installing hardware.** The system design is made available to the suppliers of the computing equipment contained in the approved configuration. This includes the computer itself and the various workstations, as well as other peripherals.
- (c) **Installing software.** After installation of the hardware, the software is to be installed, run and tested on small trial databases.
- (d) **Preparation of the database.** Once the hardware and the software start performing satisfactorily, preparation of the database commences. In some cases, it will be necessary to gather new data, and in others it will be necessary to reformat existing data to conform to the new system design. Once these tasks are completed, the data is entered into the database.
- (e) **Educating the participants and the users.** The new system will most likely affect many people. Some will make the system work. These are the participants, which include data entry operators, coding, and other administrative personnel. Others will use the system's output. All these people must be educated about their roles in the system.

(f) **System conversion.** There are a number of implementation strategies that can be adopted for moving from one system to another. The options include:

- *Complete changeover*, which involves the old system being replaced by a new system on a specified date. This is risky if the system is central to the organization's operations and should only be contemplated if all aspects of the new system have been carefully tested and the changeover has been very carefully planned.
- *Phased approach*, in which the total system is divided into sections. Each section is installed individually and the sections are introduced one at a time. This approach allows staff to change gradually but on occasion there can be difficulties associated with maintaining parts of the old system, whilst introducing a new system.
- *Parallel running*, where both old and new systems are operated in parallel for some period of time, until there is confidence in the new system and the old system can cease to operate. Although this is a secure approach, it is expensive and staff can easily become impatient at having two systems.
- *Pilot operation* of a system in a more controlled environment, such as a smaller department, before full introduction at all sites. Pilot running allows the system to be tested in operation in a controlled environment upon which systems staff can focus their support, as a means of testing the system before it is released systemwise.

Besides the above, three more types of conversions with which an analyst should be familiar are the equipment conversion, the data processing method conversion and the procedural conversion. Once the system has been implemented, the systems analyst plays the role of a consultant.

---

## 1.12 SYSTEM EVALUATION

---

System evaluation is the last stage of the systems analysis and design process. Although it is a long way from the initial establishment of the requirements, it is important to emphasise that after successful implementation, it is necessary to complete the exercise by going back to the specifications and assessing the extent to which the system is meeting its stated objectives. Such an assessment may lead to improvements and refinements in the way in which a system is used.

The evaluation process also includes testing of the equipment as systems analyst, while selecting equipment, must be aware of modularity, compatibility, reliability, maintainability and vendor support. Here,

## NOTES

NOTES

vendor support refers to availability of training facilities; installation support; system development; conversion and testing assistance; experience level and competence; availability of a user group and availability of specialized software systems.

Evaluation helps to assess whether the operational characteristics of the subsystems have been made compatible with interrelated subsystem and with the overall system. While evaluating, the effectiveness of the system can be measured only after the following have been accomplished:

- Identification of user requirements at all levels of system design
- Measurement of subsystem and subsystem performance at all levels of operation.

The system user too dictates the criteria for evaluation. System effectiveness can be measured in terms of reliability, supportability, survivability, mobility, capability and dependability. Another aspect to be considered in evaluation is the costs both direct as well indirect. The various costs include the computer configuration costs, environment costs, physical installation costs, cost of conversion, cost of operations, programme and programme testing costs, training costs and documentation costs.

---

### 1.13 SYSTEM DOCUMENTATION

---

System analysts and users usually develop procedures concurrently with module coding and testing. A complete written set of manual procedures is developed by documenting all manual processes to be performed by the user and data processing personnel in the actual operation of the system. The procedures cover such items as input preparation, control and balancing, error correction, and computer operator instructions. Collectively, these procedures form a critical part of the system's documentation.

Documentation is sometimes the most neglected aspect of the systems development life cycle. Organizations frequently depend on a key individual or group of individuals to design and operate an information system. If these people rely on their memories for programming, systems and operating information and leave the organization for some reason the organization has to study and document the existing system before work can begin on modifying it or designing a new one. Rarely anyone remember all the detailed design information of a complex computer information system.

Adequate system documentation includes the following:

- All the specifications in the systems development life cycle
- Data flow diagrams and structure charts
- Data dictionaries

- Hardware specifications
- Performance specifications
- Job descriptions
- Procedure manuals

A successful documentation programme requires goals and procedures for creating and updating documentation. Some specific goals include a simplified yet comprehensive method for creating and updating documentation; a standard development of a manual whose format and organization would be a model for all documentation and a standardized approach to documenting all systems.

## NOTES

---

## SUMMARY

---

- The purpose of this unit is to help the students learn about the concepts of information systems. Information systems are crucial to the functioning of modern organizations. An information system is a formalised structure that can collect, store, process and report data from various sources so that it is able to provide the information necessary for management decision-making.
- The information systems have inputs, process and outputs. An information system also contains data files that can be either manual or computer-based. The unit also discusses various types of information systems.
- The field of systems analysis and design for information systems has its foundations in the General Systems Theory. General systems theory emphasises the need to examine all parts of the system. A system is made up of components that are the jobs, activities, missions or parts of the system that are performed to realize objectives.
- A systems analyst analyses and designs application systems and is involved with the systems development life cycle from analysis through implementation. He acts as a link between users and programmers.
- The analyst draws the boundary around the proposed information system to help isolate the problem with which he or she is dealing.
- The system design brings together the separate elements into a viable whole and by doing so shows how something can be accomplished. Knowledge required to perform the design phase encompasses the organizational resources, user information requirements, system requirements, data processing methods, data operations and design tools.
- An important aspect of the overall design of an information system is the establishment of effective controls. During the design phase, the systems analyst must identify and implement various controls to ensure the integrity and reliability of the information system. Specific design activities necessary for the development of an information system too are to be considered.

**NOTES**

- A frequently used tool for a systems analyst while designing a system is a flowchart. Flowcharts are widely used in systems as they can graphically represent the interrelationships among elements in a system to varying degrees of detail.
- Evaluation of a system helps an analyst to decide the merits of a system before its actual implementation. In order to implement a new system successfully, there are a few activities to be performed by the systems analyst. These include training and educating personnel, testing of the system, system conversion and finally a follow-up to implementation.

---

**REVIEW QUESTIONS**

---

1. Enumerate the various components of an information system.
2. List the different types of information systems.
3. Discuss the basics of the general systems theory as suggested by various theoreticians.
4. List the elements of the systems approach.
5. Differentiate between open and closed systems.
6. Distinguish between the traditional data storage technique and DBMS.
7. List the procedural components of systems analysis.
8. What are the skills needed to be a systems analyst?
9. How are database administrators and information systems analysts different from a systems analyst?
10. Give the importance of the General Systems Theory in the context of information system design.
11. Enumerate and discuss the principles of a well-designed system.
12. List the system specifications required in the system life cycle.
13. Enumerate the stages in systems development.
14. Enumerate the four approaches to system conversion.
15. Explain the need for system evaluation.
16. List the kinds of system documentation required in organizations.

---

**FURTHER READINGS**

---

1. Manual of Reference and Information Sources, Sewa Singh, B R Pub, 2004.
2. Information System Management, M.Y. Kamat, Pointer Pub, 2002.
3. Introduction of Computers and information System, Sushila Madan, Taxmann, 2007.
4. Web based Information System, S.K. Dass, Shree Pub, 2007.

## UNIT II INFORMATION SERVICES AND PRODUCTS

Information Services  
and Products

NOTES

### ★ STRUCTURE ★

- 2.1 Introduction
- 2.2 Literature Searches and Bibliography
- 2.3 Search Technique
- 2.4 Technical Enquiry Service
- 2.5 Reference Service
- 2.6 Searching
- 2.7 Document Delivery Service
- 2.8 Concepts and Process of Documentation
- 2.9 Different Standards for Documentation
- 2.10 Documentation and Quality of Software
  - *Summary*
  - *Review Questions*
  - *Further Readings*

### LEARNING OBJECTIVES

After going through this unit, you will be able to:

- define literature searches
- explain importance of search technique
- define technical enquiry service
- explain document delivery service
- understand the concept and process of documentation

### 2.1 INTRODUCTION

You are familiar with the phenomena of "information explosion" which has resulted due to the tremendous increase in published literature from all over the world in a wide range of disciplines and in diverse formats. The phenomena of "information explosion" can be traced back to 60 years, to be more precise, after the Second World War, when there was sudden increase in Government sponsored research in the field of science and technology. The increase in R & D activities resulted in an exponential growth of published literature. The literature in S & T is doubling every 7 to 8 years since then. Taking an example

**NOTES**

of one type of publication *i.e.*, S & T periodicals published in the world, we observe that till 1750 there were hardly 10 periodicals. Their number grew to about 1000 by middle of 19th century and to 10,000 by the end of 19th century.

Presently the output of current S & T periodicals is around 80,000. In addition to this there are S & T reports, conference proceedings, patents, standards, dissertations and monographs. To cope up with this gigantic problem of information explosion, a number of information institutions, information services and products have emerged over the years and new ones are being added each year. Information Services can be broadly

grouped into two categories:

- (i) Active or Anticipatory Information Services; and
- (ii) Passive or Responsive Information Services.

Anticipatory information services are offered in anticipation of the demands from the users while passive or responsive services are provided in response to a request from the users. Both types of services promote the use of library material, connect the users with library documents and meet the information requirements of the users. The depth and range of these services vary with the type of library and the kind of user a library or information centre is set up to serve. In this Unit you will learn about responsive information services like Literature Search and Compilation of Bibliography, Technical Enquiry Service, Document Delivery Service and Translation Service. In addition you will learn about Internet services.

---

## **2.2 LITERATURE SEARCHES AND BIBLIOGRAPHY**

---

### **Literature Search: Definition**

According to the Online Dictionary of Library and Information Science "Literature Search is an exhaustive search for published information conducted systematically using all bibliographic finding tools, aimed at locating as much material on the topic as possible, an important initial step in any research project."

Literature Search can be equated with Long Range Reference Service, which is generally provided to a specialist who is seeking information for research work or to solve a particular problem. This type of service is more common in a special library. The request may come from a professor, a business executive, a professional or a research scientist. In this type of service, information is searched in several sources like books, periodicals (primary as well as secondary periodicals), non-book material, etc., Sometimes to provide this service informal sources are also consulted. To provide this service a wide range of sources are consulted, the time taken is much longer than the Short

Range Reference Service or Ready Reference Service. Usually Ready Reference Service is concerned with providing answers to fact finding questions such as what, where, who, when, and how types. What is the population of Ethiopia? Where are the Alps Mountains located? Who discovered Penicillin? When will the next solar eclipse occur? How many bones are there in a human being? Where can I find a biography of Nobel Laureate Sir C.V. Raman? The requested information is located in standard reference books like dictionaries, encyclopaedias, yearbooks, almanacs, biographical sources, etc., Time required to answer these queries is very short ranging from a few minutes to half an hour. Ninety percent of these queries are simple to handle. Only 5 to 10 percent of the queries may take hours of research to find the answer. In "Literature Search", on the other hand, the search has to be more exhaustive, both in depth and range. More than one source has to be consulted to carry out adequately the search. Besides bibliographies, other secondary sources like indexing and abstracting periodicals, reviewing periodicals are consulted to find the information.

## NOTES

### **Literature Search: Need**

Literature Search plays an important role in research activities. Any research worker while initiating any new research project or at the time of writing his/her research results, needs to know in detail what has already been reported by other workers in his/her area of research. This requires exhaustive search of previously published literature and compilation of a bibliography. Literature searches are also carried out to solve any research problem to find out how others have handled the same problem. The literature search thus:

- helps in study and research;
- avoids duplication of research efforts;
- helps in solving research problems; and
- helps in identifying potential areas of research.

### **Compilation of Bibliography**

Literature search and compilation of subject bibliography is one of the important services of libraries. Bibliographies are compiled on request. Sometimes these bibliographies are compiled on a regular basis in anticipation of a user's needs. At times bibliographies

Literature search, on the other hand, can be equated to "long range reference service", where the search has to be more exhaustive, both in depth and extent. The range and complexity of reference sources to be consulted are wider and generally, more than one source has to be consulted to adequately carry out a literature search. Besides bibliographies, other secondary sources like abstracting and indexing services, reviewing periodicals are the main sources of information.

NOTES

The demand for this service has been growing with the growth of scientific and technical literature which has assumed frightening proportions in the post-Second-World-War era compiled on special occasions such as during seminars and workshops to provide participants with the latest literature on the subject. University and special libraries offer this service more frequently than the public libraries. For compiling a bibliography it is very important to know the basic steps involved in its preparation. In this Unit, you will learn how to carry out literature searches (manual as well using computers) and compile subject bibliographies.

### **Users-their Information Needs and Literature Search**

The ultimate objective of any documentation or information activity is to provide the user with the information he needs, to the extent he requires, within a reasonable time and cost frame. Let us now examine all these elements involved in information retrieval, and what literature search is all about. The user could be a layman who needs information to satisfy his curiosity, a student who needs more details than what is provided by the text book, a technical worker needing information to perform a certain task (*e.g.*, a new welding process or a special distillation or purification technique), a research worker embarking on a new area of research, a product manager contemplating a new product line, or an administrator who has/to give his decision on a new project report or formulate a new strategy. Obviously, the nature and extent of information required by each, of them are different. Moreover, the urgency for getting information varies in different circumstances. While some of the needs of most of the users can be satisfied by the routine reference service provided by a good library, the needs of some others, especially research workers and project managers, can be satisfied only by extensive literature search entailing the use of several resources of a modern information centre and the skill and ingenuity of the information scientists.

### **Reference Service and Literature Search**

A reference service, according to the A.I.A. Glossary of Library Terms, is "that phase of library work which is directly concerned with assistance to readers in securing information and in using the resources of the library in study and research". Usually a reference service responds to request for a specific piece of information—about a person, or place or an event, a method, procedure, or formula, etc., The nature of information sought in such a situation is very specific and quite often the answer could be found from the conventional reference tools like dictionaries, encyclopaedias, manuals, handbooks, gazetteers, directories, yearbooks, etc., Literature search, on the other hand, can be equated to "long range reference service", where the search

has to be more exhaustive, both in depth and extent. The range and complexity of reference sources to be consulted are wider and generally, more than one source has to be consulted to adequately carry out a literature search. Besides bibliographies, other secondary sources like abstracting and indexing services, reviewing periodicals are the main sources of information. The demand for this service has been growing with the growth of scientific and technical literature which has assumed frightening proportions in the post-Second-World-War era.

## NOTES

### *Steps Literature Search*

There are many points to consider in making an effective literature search. The first and foremost step is to ascertain the purpose, scope, depth and precise field of enquiry. This may entail a dialogue between the user and the information specialist. A quick assessment of the nature and extent of the enquiry will show whether the search is for specific factual information, mainly required by a technical worker, or for a few select references, normally adequate for an administrator or a policy maker, or for a comprehensive bibliographical search, which is usually the requirement of a research worker. Once the parameters of a query are fully understood, a proper search strategy should be chalked out. Haphazard searching of literature will lead not only to wastage of time and money, but also to the risk of missing a number of important documents. Much of the expertise in literature searching lies in choosing the most appropriate sources to consult with in each case and the order in which to consult them.

### *Selection of Sources*

A good approach to literature search is looking up a bibliography, an encyclopaedia or a review publication. This provides background information as also some useful references. After this preliminary search is over, searches should be carried out with secondary publications like abstracting and indexing services. Depending upon the topic, anyone of the following situations may arise

- (i) Secondary periodicals are available on the subject.
- (ii) Secondary periodicals are available on the subject as well as on the broader area encompassing it.
- (iii) No secondary periodical is available on the subject, but available on the broader area.
- (iv) No secondary periodical is available on the subject, or on the broader subject.

### *Search in Secondary Sources*

When secondary periodicals are available on the subject as well as on the broader subject, the search must first begin with the secondary periodical on the subject proper, supplemented by references collected

## NOTES

from the periodicals covering the broader subject. Usually, the secondary periodicals covering broader subjects would cover peripheral journals and some times quite alien to the main subject of search. But it is a well-known fact that there is a considerable scatter of information on a given topic over a whole range of periodicals covering core, peripheral and alien fields. Although a few core journals cover a considerable part (50-60%) of the published literature on a given topic, yet sizeable portion (30-40% or more) can be covered by scanning a large number of peripheral journals in alien fields (e.g., an article of medical interest, say malaria eradication, may be published in a sociology journal). Skills are to be developed for the consultation of secondary periodicals, since a wide variation is observed in the pattern of the arrangement of the entries as well as in the methods of indexing, and also the types of indexes provided. Usually, the indexing method used is explained in the introduction to the index. Pertinent subject headings vary from one secondary periodical to another. The searcher should acquaint himself not only with the scientific nomenclature and terminology, but also with the popular and trade names.

### *Search in Other Sources*

No search will be complete without a look at other sources of information, specially for topics for which there are no secondary periodicals available. Such other sources are conference proceedings, research reports, theses, patents, standards and specifications, trade literature and in some cases monographs and treatises. There may be cases where information will be available from non-documentary sources like institutions and experts.

Whatever may be the type of information, sources may be needed to consult at sometime or the other. So, some knowledge of the main characteristics of different of source's is, needed. As mentioned earlier, much of the expertise in searching for information lies in choosing the appropriate sources to consult in each case and the order in which to consult them.

### *Recording of References or Information*

Every literature searcher develops his own style of taking notes of references, While every effort should be made to optimise the time and efficiency of search, it is good to remember that a few extra seconds spent to make proper preliminary records may save many frustrating hours later. The first principle in saving search time is to use a single operation to serve multiple purposes. For example, references recorded on sheets of paper can serve only one purpose providing a list of references without any order. But records on cards or slips, with one reference per card or slip, can serve several purposes. Abstracts can be added under each reference, if required, and the cards can be arranged by subject, author or chronologically, as may be required.

### ***Presentation of Results***

Proper presentation of search results requires as much skill and care as in defining the subject and parameters of search. Reading lists need only be selective and may require brief introduction. But a search on behalf of a researcher will need exhaustive treatment, and may need slanted abstracts conforming to the user's need. The choice of arrangement also depends on what the user needs—alphabetical (by author's surname), chronological, source-wise (monographs, periodicals), non-conventional (microfilms, audio visuals, etc.), classified, or some other arrangement. The best arrangement is that which the user finds most helpful. An indication should be given as to how complete the bibliography is. The sources should be stated giving the exact references.

### **NOTES**

### ***Skills in Literature Search***

Expertise in literature search can be gained only by experience. Some attitudes or traits conducive to a good literature search are: imagination, mental flexibility, thoroughness and orderliness, persistency, judgement in resolving contradictory information and accuracy in recording. A basic knowledge of the field of search is considered helpful though not absolutely essential.

---

## **2.3 SEARCH TECHNIQUE**

---

### **Manual**

In a manual search and compilation of a subject bibliography the basic steps can be summarised as follows:

1. Understanding the subject
2. Decision on the scope, coverage and period
3. Formulation of search strategy
4. Scanning  
Searching of Tertiary, Secondary and Primary Sources
5. Entry making
6. Arrangement
7. Indexing

#### **Step 1: Understanding the Subject**

In this step you should gather the knowledge on the subject. You should know the exact topic to be covered and related areas to be included. For this subject dictionaries and subject encyclopaedias are helpful. Here personal interaction with the user is very important, as it helps to know his/her exact subject requirements.

#### **Step 2: Decision on the Scope, Coverage and Period**

The next step is to decide on the scope, coverage and period of the bibliography.

NOTES

**Scope.** The bibliography to be Comprehensive or Selective.

**Coverage.** The types of documents to be covered (e.g., Periodical articles, Conference papers, Dissertations, Research reports, Monographs, etc.,).

**Period.** The bibliography to be Current or Retrospective.

For making the above decisions, it is very important to have personal interaction with the user. Personal interaction with the user is known as 'Reference Interview'. This will help to know:

The query thoroughly.

The purpose for which information is required.

Background of the user.

Scope, coverage and period of the documents to be included.

What sources user has already consulted?

The time frame within which information is required.

**Step 3: Formulation of Search Strategy**

In this step you formulate a systematic plan for conducting a search. First you formulate a clear and concise topic statement. The next step is to identify the main concepts in the topic. Lists of authorised subject headings and descriptors in the appropriate indexing system can be consulted to find preferred terms to represent the main concepts. Then most appropriate finding tools for searching are identified. Normally one has to start from tertiary sources to identify secondary and primary sources for searching. First and foremost is to check whether any bibliography exists already on this topic. If there is one already compiled/published, it will save time of searching the previous years literature. There are four such sources for locating already compiled subject bibliographies:

1. Besterman T. Physical Sciences Bibliography of Bibliographies, Totowa, N.J., Rowman and Little field, 1971, 2 Vol. (A reprint of Besterman's bibliography of bibliographies (4th ed. 1965-66 4v. and index).
2. Bibliographic Index: A Cumulative Bibliography of Bibliographies. N.Y. H.W.Wilson Company, 1937 to date.
3. Walford's Guide to Reference Material. 8th ed. London: Library Association. 3 Vol.

**Vol.1:** Science and Technology (Ed. By Mulley M., Schlicke, 1999).

**Vol. 2:** Social and Historical Sciences, Philosophy and Religion ( Ed. By Day A and Welsh M, 2000).

**Vol. 3:** Generalia, Language and Literature ( Ed. By Chalcraft A, Prytherch R and Willis S, 1998).

4. Sheehy, Eugene P. *Guide to Reference Books*. 10th ed. Chicago: American Library Association, 1986.

Besterman's *Bibliography of Bibliographies* is helpful for searching retrospective bibliographies, while other sources help you to find more current bibliographies. In the next step you should look for a review article on the topic. A good review prepared by an expert contains a *fairly comprehensive list of important references*. This list can serve as a starting point for the bibliography. In case, the review article is recent and bibliography appended is exhaustive, only updating of the aforesaid bibliography is required. This not only saves time but also reduces labour and cost. The next step is to select appropriate indexing and abstracting periodicals to carry out actual searching.

The following two sources are helpful in identifying A/I periodicals on the subject.

1. Ulrich's Periodical Directory. 42nd ed., New Providence, N. J. etc., R R Bowker. 2004 . in 5 Vols. Published annually since 1932 . Ulrich's on Disc (Window-based CD-ROM Version since 1986, updated quarterly), Web version ( <http://www.ulrichsweb.com>) updated weekly.
2. Abstracting and Indexing Directory. Detroit( Michigan), Gale Research Corp., 1982. 3 Vol.

#### Step 4: Scanning

In this step actual searching is carried out. A/I-periodicals are scanned to retrieve relevant items for bibliography and finally primary sources are consulted to find more current information.

Since the coverage of conference papers, research reports, theses, patents and standards is not very comprehensive by most of the international A/I services, it is advisable to consult specific sources exercising bibliographical control of the above mentioned literature. Following Publications should be consulted to cover these items:

**Conference Papers.** *Index to Scientific and Technical Proceedings*. Philadelphia, Institute for Scientific Information, 1978-. (Monthly): This publication indexes published conference proceedings at individual paper level with permuterm index of keywords from titles of papers, author/editor index and an index of author's corporate affiliation.

*Conference Papers Index*. Louisville, K.Y., *Data Courier*, 1978- (Monthly) with cumulated annual index available separately. Monthly issues of this publication have programmes of scientific and technological conferences grouped by subject. Information includes full title of the meeting, inclusive dates, location, names of sponsoring organisations, ordering information for publications and a list of papers presented.

**Research Reports.** National Technical Information Service (NTIS), US Department of Commerce, 1964. NTIS is the federal government's central resource for government funded scientific, technical, engineering

#### NOTES

NOTES

and business related research reports by or for the U.S. government it also covers report literature from other international sources. Approx. 2.5 million products are available in a variety of formats including online, electronic, multimedia, CD-ROM, paper, and microfiche.

**Theses.** Dissertation Abstracts International. Ann Arbor, Mich., University Microfilms, 1861- Dissertation Abstracts International is guide to doctoral dissertations and master's theses in every academic discipline ( approx. 3000 subject areas). Covers more than 90% of doctoral dissertations accepted each year in North America. Since 1980 the coverage was expanded to include European institutions. Over 200 other institutions are covered. Its online product is Dissertation Abstract Online (<http://www.lib.umi.com/dissertation>). Produced by ProQuest Information Learning, the database contains about 1.6 million records and is updated monthly.

The information about doctoral theses awarded by Indian universities is disseminated by Association of Indian Universities through the column "Thesis of the Month" in its newsletter "University News". University News is published weekly.

**Patents.** EPIDOS-INPADOC databases are the largest patents databases in the world covering bibliography of all the patents applied and granted in 65 countries and international patenting organisations, consisting of over 33 million references. Almost 3 million references are added every year.

Indian patents filed and granted are published in Gazette of India, Part III; Section II. This is a weekly publication. NISCAIR (Formerly INSDOC) has brought out Indian patents on CD-ROM (INPAT) covering Indian patents granted and published since 1975 to 2002. INPAT database has over 52,600 records.

**Standards.** Standard bodies all over the world formulate standards and bring out periodical publications in the form of catalogues, handbooks, etc., They may be consulted for tracing standards on the subject. Bureau of Indian Standards (BIS), brings out BIS Catalogue annually. BIS standards can be searched online using BIS e-Catalogue (<http://www.bis.org.in>). Similarly standards of International Organisation for Standardisation (ISO) can be searched using ISO Catalogue 2004, or ISO CataloguePlus on CD-ROM, or its online catalogue (<http://www.iso.org>).

**Citation Indexes.** Sometimes, some articles, which cannot be retrieved through conventional A/I services can be retrieved through citation indexes. The three citation indexes which are covering world literature of different disciplines are Science Citation.

Index, Social Science Citation Index, and Humanities Citation Index. Here searching should be done by author's old but outstanding paper.

Citations received by this paper over the years will produce a good bibliography.

### **Step 5: Entry Making**

In this step entry is prepared for each item that is identified as relevant. The entry should contain all bibliographical details of the document in a standard pattern. For this following International or National standards may be followed:

**IS: 2381:1978:** Bibliographical References Essential and supplementary items.

**ISO: 690:1975:** Documentation-Bibliographical References-Essential and supplementary elements.

Each entry should be recorded on 5X3" cards, so that the entries can be arranged in a systematic order.

### **Step 6: Arrangement**

The entries should be arranged in some convenient order *i.e.*, alphabetical, chronological or systematic order. If number of entries in a bibliography is small, the entries may be arranged alphabetically author wise or chronologically by year of publication of the document. But if the number of entries is large, it is better to arrange them in a classified order or under broad subject headings in alphabetical or systematic order.

### **Step 7: Indexing**

In this step various indexes (title index, author index, subject index) are prepared to satisfy various approaches of the user. For a small bibliography, there is no need to provide an index. But for a large bibliography author, subject and title indexes may be prepared as per the need.

### **Computer-based**

Advent of computers and communication technologies and their applications in bibliographical organisation of published literature have opened up new vistas for searching and retrieving information at an amazingly great speed and with much more efficiency.

Nowadays all major primary, secondary and tertiary publications are available in machine readable form. Most of the National and International A/I periodicals are available in four different versions as follows:

- (i) CD-ROM Disc Version;
- (i) Remote Access Online Version through vendors (*e.g.*, DIALOG, SDC, *etc.*);
- (ii) Remote Access Web Version; and
- (iv) Print Version.

### **NOTES**

## NOTES

While print version of these periodicals can be searched manually through various printed indexes provided by the publication, the other three versions offer searching on computer. In this section you will learn about computerised searching and various techniques of online searching.

### Development of Computer-based Searching

Development of computer based searching can be traced back to mid 1960s when indexing and abstracting services first used computers to print their paper products. They created magnetic tapes that were interpreted by computers and printed their products. These magnetic tapes could be read by computers for other purposes also.

Companies and Government agencies developed computer software that could manipulate information on these tapes in new ways. This software allowed searching the tape for indexed term or group of terms on the computer and retrieving articles bearing these terms. In the beginning, Computers required much time in processing of these requests and work was done on delayed basis called "Batch Processing". A request was submitted to the computer centre on one day and the results were available on the next day. If there were any typographical or logical errors in the request, the same had to be corrected and request resubmitted for processing the next day, which delayed the results for another day.

During late 1960s and mid 1970s, computer power, speed and memory increased, as did the ability to communicate with other remote computers over the existing telephone lines. Thus, online searching became feasible. Online searching is the process of interrogating a computer system to resolve particular request for information. The search process is interactive and user can modify the search until desired results are obtained. The number of computerised files called, databases for online searching also grew. The first major online dial-up service was MEDLINE, the online version of MEDLARS (Medical Literature Analysis and Retrieval System), which was followed by other commercial online services from DIALOG (Lockheed) and ORBIT (SDC) (Walker & James 1993). Since then many organisations have started offering online and database search services. By 1975 there were 300 public access databases from a range of different vendors. Database industry has been growing since then. From 1975 to 2004, the number of databases grew from 301 to more than 18,000 and number of records grew from 52 million to over 12 billion. The New 2004 edition of Gale Directory of Databases lists more than 18,000 online databases. The directory comprises two volumes Vol. I: Online Databases and Vol. II: CD-ROM, Diskette, Magnetic tape, Handheld and Batch Access Database Products.

Initially a majority of online databases provided bibliographical references as output of search session(s) and were called bibliographical or reference

databases. More recently increasing number of databases are becoming available that retrieve actual information rather than bibliographical references. These databases are either Full -Text, where the complete text of the documents including graphics and pictures are available or Numeric where machine-readable numeric data is available. With the development optical disc systems, CD-ROM (Compact Disc Read Only Memory) systems proliferated. Each CD-ROM disc stores approximately 650 million bytes of information. Optical imaging systems, because of relatively inexpensive equipment and the speed of processing, offered libraries and database producers to store large quantities of data on durable CDs in all formats (text, numbers, images, or combination of all these in digital form). Information sources available on CD-ROM range from common reference sources like dictionaries, encyclopaedias, etc., to subject specific bibliographic, full text and multimedia databases. Over 10,000 information sources are available on CD-ROM. With the advent of Internet and World Wide Web, online searches can be conducted on information sources that are distributed all over the world. To search these information sources one can straight go to the web page where information is located, provided one knows the URL (Uniform Resource Locator) of the web page.

## NOTES

Rowley (1999) has identified three generations of online searching to which fourth one was added later by Chowdhury and Chowdhury (2001). These four generations are:

1. The first generation upto 1981, was characterised by dumb terminals, slow transmission speed, and mostly bibliographic databases.
2. The second generation, which continued through 1980s was characterised by PCs and workstations, medium transmission speeds, bibliographic and full-text databases and interfaces directed to end-users.
3. Third generation, which started at the beginning of 1990s, has been characterised by multimedia PCs, higher transmission speeds, bibliographic as well as full-text databases, and improved user interfaces, with help and tutorial facilities.
4. Fourth generation, which started at the beginning of 1990s, with web access to online search services. User can go directly to the web address of an online services provider to log on to the service and retrieve the required information. Web based online search services such as Dialog web, Ovid online, OCLC first Search, etc., provide fast and easy access to online databases with a number of search and retrieval facilities.

Earlier online searches were very expensive and one had to take help of intermediary to conduct an effective and efficient online search. Over the years online searching became less expensive and with improved user interface and step-by-step instructions provided by the online

NOTES

service provider enabled the end users to conduct the searches themselves without the help of intermediary. Major advantage of online searching is its speed and currency of data. Another additional advantage is that its each search session is costed and while you are online you know how much you have to pay. However, every time you conduct an online search, you have to pay. The charges include (i) vendor system usage charges, (ii) telecommunication charges, (iii) database access charges, (iv) citations royalty charges offline/online, (v) vendor's shipping or minimum printing charges and (vi) vendor subscription charges. Charges for the first three items are on hourly basis, for the fourth one per citation basis, for fifth one per transaction basis and last one on yearly basis. This is not the case with CD-ROM databases. Once the CD-ROM product is purchased one can search it unlimited number of times without paying any additional charges. Most of the CD-Rom provides search software to user with much of the power of multiple indexes and Boolean logic available in commercial online search environment, without the time and cost pressures. In end-user searching, users are able to explore the database, see the search results, and print out citations during the search.

***Advantages of Computer-based Searching***

**1. Improved Searching Capability**

In a printed reference source, searching is limited to the indexes (author, subject, keywords, etc.,) provided by the publication. Cumulated indexes as well as the indexes in each current issues of the publication have to be searched and entry number of each relevant item is to be noted down. Then volumes as well as issues of the publication carrying those entry numbers are physically located and each entry number is searched for noting down bibliographical details of the items found relevant to the search. The process is really laborious and time consuming. When the same publication (reference source) is converted into electronic form, it is fundamentally altered by the expanded capabilities and speed of the computer. Sitting at the computer terminal one can search cumulated database of the same source and retrieve hundreds and thousands of records in one go. For instance LISA (Library and Information Science Abstracts), an international abstracting periodical is published fortnightly in print form. While its electronic version, comprising all LISA records from 1969 onwards is available for online searching on the web as well as on commercial online service provider such as DIALOG. In addition, one can view the search results, modify the search, select the relevant items and get the list printed. The power of computer to scan, list, and record information is growing day by day. Search options provided by

electronic databases are also far more than that of their print counterparts. Some of the search options provided by electronic databases are as follows:

**Keyword and Phrase Search**

- (b) Boolean Search
- (c) Truncation
- (d) Proximity Search
- (e) Limiting Search
- (f) Range Search

**Keyword and Phrase Search.** A search can be conducted by entering single search term or phrase comprising more than one term.

**Boolean Search.** This search enables search terms according to Boolean logic. Three types of Boolean searches are possible: AND search, OR search and NOT search. The AND search allows user to combine two or more search terms using AND operator. The search will retrieve all those items that contain all the constituent terms. The OR search allows user to combine two or more search terms such that the system retrieve all those items that contain either one or all the constituent terms. NOT search allows the user to specify those terms that they do not want to occur in retrieved records.

**Truncation.** Truncation is a facility that enables search to be conducted for all different forms of a word having same root. Various systems allow searching terms with right, left and centre truncation.

**Proximity Search.** This search facility allows the user to specify (i) whether two search terms should occur adjacent to each other (ii) or one or more words occur between the search terms (iii) or the search terms should occur in the paragraph irrespective of intervening words.

**Field Specific Search.** A search can be conducted on all the fields of a database or it may be restricted one or more chosen fields to produce more specific results.

**Limiting Search.** This facility allows the search to be limited by specific criteria such as language, year of publication, type of information source, etc.

**Range Search.** This facility allows selecting records within certain data range. Range searches are useful with numeric information. Range searches can be limited by publication year.

2. **Displaying the Index.** In electronic databases there is a facility to display range of terms in context. Here a primary index, called the inverted index or inverted file is built on an alphabetical

NOTES

NOTES

basis, in which each retrievable word in the database is listed in a single sequence. This facility allows one to see a term, in context with terms immediately preceding or succeeding it alphabetically. In addition to this, this index also shows number of records in the database that contain that term. This feature allows one to identify most productive terms to retrieve a particular concept and also the terms that are in close proximity, which the searcher had not earlier anticipated. It also allows one to preview the effect of truncation.

- 3. Improved Speed.** Searching electronic databases is much faster than printed sources. Searching electronic databases allows the searcher to be in command of his/ her own searches, relieves him/her the burden of writing down the citations and provides him/her with more citations in less time than a manual search. These citations can be printed on paper or downloaded to the searcher's diskette for later handling and printing.

***Basic Steps for Computer-based Searching***

As discussed earlier electronic databases are available in three different formats for online searching viz., on CD-ROM, through commercial online search service provider (such as DIALOG etc.) and on the Web. The electronic databases in all the three formats offer more search options, can be searched speedily, and are updated more frequently than their print counterparts. The difference between Online, Web and CD-ROM versions is their update frequency. Online and Web versions are updated more frequently than their CD-ROM version. For example print product of Ulrich's Periodical Directory is updated and issued once a year, CD-ROM version (Ulrich's On Disc) is updated and issued quarterly and its Web version (ulrichsweb.com) is updated weekly. Moreover, web version of electronic databases provides some additional search facilities as well as link facilities. For instance, web version of Ulrich's Periodical Directory contains search and browse indexes (such as language and frequency) not found on the CD-ROM or in the print version. In addition, the web version links the users to related serials for alternate titles and alternate media formats; contains URLs and e-mail addresses for link journals and publishers; gives users access to serials information such as tables of contents, article abstracts, full-text journals and document delivery. It also provides usage statistics.

The steps involved in searching electronic databases vary from system to system because each system has its own custom-built interface that allows specific type of search and specific operators and specific search command. Nevertheless, with the introduction of web-based graphical user interfaces the task of online searching has become quite easy. Most of the online service providers and CD-ROM producers offer free training modules, where a novice user can search the database

NOTES

step-by-step and retrieve the required information. Some CD-ROM products from one company can be searched using a common interface designed for all the product of the company. For instance, WINSPIRS is the search interface for all the Silver Platter products on CD-ROM. The search fields, search syntax, operators, etc., vary from one CD-ROM to another. The same is the case with online databases. In addition, online search services have various other components such as database producers, who provide the resources to be accessed online, search service provider or vendors, which provide access to the databases and software for conducting search, the telecommunication link such as Internet, which connect the searcher with the search service provider and the databases, and a local workstation through which the user is linked to the service. Whereas CD-ROM systems are distributed to the users and mounted on CD-ROM workstations. The basic components of CD-ROM station include a drive to read the CD-ROM, a personal computer or workstation to run the drive, a search software to manipulate the data on the CD-ROM. CD-ROM systems are frequently linked together in a LAN (Local Area Network) that combines a powerful computer as a central processor for a centrally located set of CD-ROM drives with multiple workstations at various locations for users. When libraries use LANs, multiple users get the advantage of a fast computer at a much lower cost to the library. A printer is often associated with a CD-ROM station. Sometimes all the associated equipment is leased from the database producer as part of subscription package to the CD-ROM product. In some cases, the library owns the equipment, and only discs are acquired on subscription basis.

To conduct effective and efficient searches one has to familiarise oneself with various search and retrieval options available with the specific electronic database in question. But, there are some basic steps you must know for conducting CD-ROM or Online searching for general searches as well as for compiling a bibliography on a specific topic. These steps are as follows:

1. Understanding the subject;
2. Decision on scope, coverage and period;
3. Internet access to online search service arranged;
4. Log on to the online search service provider;
5. Select the appropriate database;
6. Formulate the search expression;
7. Select appropriate format to display the retrieved records;
8. Reformulate the query, if necessary; and
9. Select the mode of delivery.

First two steps (Step 1 and 2) are same as in manual search. Step 3 and 4 are not required while searching CD-ROM databases.

NOTES

**Step 3: To Arrange Access to Online Search Service**

This involves registration with Internet service providers like BSNL, MTNL, Satyam, VSNL, etc., The connection may be Dial-up connection, ISDN connection or through leased lines. Next is to register with online search service provider, which may be a vendor like DIALOG, SDC (Providing access to a number of databases from different publishers) or a publisher providing web access to its own databases (e.g., H. W. Wilson). This can be done through subscription or licensing agreement. On registration you will get user ID and password. The access rights have to be obtained before the search begins.

**Step 4. Log on to the Online Search Service Provider**

This is usually done through the web interfaces of the online search service providers. At this stage you need to know the relevant web address (e.g., for DIALOG it is <http://www.dialog.web.com>), user ID and password. Many online search service providers offer online registration as well.

**Step 5: Select the Appropriate Database**

Next step is to select appropriate database to search. Most search services allow users to browse through database categories to select the appropriate database(s). DIALOG has DAILINDEX, a facility which allows users to see how many times a given search term occurs in a set of chosen databases. This information helps user to select appropriate database to conduct actual search.

**Step 6: Formulate the Search Expression**

This involves selection of appropriate terms or phrases for searching the database. This is normally done before one begins the search. First pre search interview is carried out with the user. Here the user is asked to fill a form in which search question is stated. User is asked to write a paragraph on the search topic, give title and purpose of search, list one or two important references, write names of important people in the field, and a note indicating maximum cost. The use of this form saves valuable time. The filling up of the form forces user to consider the question and be precise in its formulation. Then make a list of keywords and synonyms before the search begins. Here one must understand the difference between a controlled vocabulary search and a free text search. A controlled vocabulary exists when subject headings or descriptors are assigned. In a manual search, if one wants to know what subjects have been used, a list of subject headings, such as Library of Congress or Sears List, is consulted while in online search thesaurus is consulted. Many bibliographic databases have their own specialised thesaurus. Several vendors have loaded the thesauri online. Searchers have the option of requesting a list of alphabetically related terms to select appropriate terms or phrases for conducting search. At the same time you should have the

NOTES

knowledge of nature, content and structure of the database, fields that are searchable, what search facilities are available (such as word or phrase search, etc.), and what appropriate operators are. The search operators and syntax for formulating search expression vary from one search service to the other. Most of the online search service providers offer two types of searches, one for a novice searcher and other for expert searchers. For novice searchers there is a graphic user interface and for expert searchers the interface is command driven. Users wishing to use expert search interface must have knowledge of the various search commands and their order of execution. Once search expression is formulated, then actual online searches are conducted.

**Step 7: Select the Appropriate Format**

When the proper command is entered, the online system gives the searcher an alphabetical display of retrieved records. To see the records, you have to specify appropriate format, that is, brief display format or display of full record. In the case of CD-ROM searching display of full record may not incur extra cost, but in case of online searching, charges are time related and if the option to display full record is chosen the process may be time consuming depending on the network traffic. Hence, it is more efficient to choose brief display option for scanning and selection of the retrieved records from the list and going in for full display format for selected records. The ability of online system to display sample citations is one of the prime advantages of online search. It allows immediate modification of the search.

**Step 8: Reformulate Search Expression, if Necessary**

In case search results are not satisfactory, you can reformulate your search statement. Online searching is usually a repetitive process, that is, user conducts several searches, compares the results and modifies search statements or conducts a new search in order to get better results. For instance, if no citations for the subject are found or if number of citations are too limited, you can broaden the search by using "OR", *i.e.*, by adding related yet relevant terms. When search turns up too many citations, then other parameters can be introduced to limit the response. The number of citations can be restricted to certain year of publication or languages. Employing the Boolean "AND" causes the search to be more specific. Truncation permits searching of word stem. It is used for a variety of purposes, including the elimination of need to think all possible variations of a single term. A word stem may be specified and computer will retrieve any term beginning with that stem. For example "waste\$" on the keyboard will result in retrieving "waste", "wastes", "wasted" or the multi-term "waste-material", "waste-management", etc., *Depending* on the system, it may be possible to retrieve terms for middle of descriptor.

**Step 9: Select the Mode of Delivery**

NOTES

You may download all the selected records online on to your local computer or select an offline printout by mail.

**Search Failures.** The search failures or poor results are mainly due to the searcher's lack of familiarity with the indexing vocabularies. Each database has its own vocabulary; the searcher's grasp must be broad. In the case of science and technology, new terms are introduced very frequently and searcher's lack of knowledge of new terms leads to search failures. In computer produced indexes, synonymous terms are not covered adequately, which gives poor results. Here, thesaurus can help, if updated regularly.

When to Conduct Manual or Online Search:

Manual search is a better method when

- Only one or two citations are required or
- Search is to be conducted on a broad subject area or
- An overview of a topic is required or
- Search is to be conducted on a single index.

Whereas, online search is a preferable method when:

- There is an exhaustive search on a topic pertaining to last many years or
- Search is to be conducted on more than one databases or
- While searching a complicated and highly specific topic.

Lastly, one must take into account the benefit of online searching *i.e.*, the speed, depth of indexing, ability to coordinate terms, free text searching, etc., while making a decision on manual or online search.

In brief, in this section, we have discussed the need and importance of literature search in R&D related activities. Explained how literature search and compilation of a comprehensive bibliography differs from searching the literature to find answers to fact-finding questions. Described basic steps for conducting manual as well as computer-based search for compilation of comprehensive subject bibliography. Described briefly the development of computer based online searching during the past four decades. Pointed out the advantages of computer-based search over manual search. Listed the information sources to be consulted for compiling a subject bibliography, starting from tertiary to secondary and primary sources of information. Importance of citation indexes, conference papers, research reports, theses, patents and standards for making bibliography comprehensive, has been pointed out and sources exercising bibliographical control over these publications have been listed.

## 2.4 TECHNICAL ENQUIRY SERVICE

### Definition, Purpose and Scope

The special library generally provides technical enquiry service to people in business and industry. The definition of the term "Technical" as given in the World Book Dictionary states:

- (i) Of having something to do with special facts of science or art: 'Electrolysis', 'Protein' are technical words.
- (ii) Or having something to do with mechanical or industrial arts or applied sciences.

In the present context we may define a technical query as a query, which is related to mechanical/industrial arts and applied sciences and emanates from the specialists working in business and industrial sector. Information requirements of people in business and industry vary widely. It may be as simple as requiring the name and address of a particular industry or firm to the complex ones like marketing strategy, financial performance, product development strategy, marketing share, credit rating, *etc.*, of rival companies or techno-economic feasibility of setting up of an enterprise. In general, information requirements of people in industry can be broadly grouped into following three categories: (i) Technical and technological information, (ii) Developmental information including marketing and (iii) Regulatory information. Technical and technological information cover information about new products, process of manufacture, raw materials and machinery, testing facilities, techno-economic feasibility and managerial aspects of running an enterprise. Developmental information covers data on existing capacity, production, import/export, and investment, marketing trends, future demands and distribution channels. Whereas regulatory information covers policies and programmes of the government, getting licenses, import regulation relating to a product or machinery, sources for raising funds, registration with and clearance from health authorities, drug controller, *etc.*, To meet these information needs various information sources, documentary sources as well as non-documentary sources such as experts are required to be tapped. The technical query may pertain to any of the above-mentioned areas. While many of these queries may be easily handled by an experienced reference librarian, but for some the help of an expert is required. In this Unit you will study about various documentary as well non-documentary sources that are required to provide technical enquiry service in a library.

### *Purpose and Scope*

Purpose of the query may be for solving a technical problem, repairing or setting up machinery, or for planning, decision making, implementing a decision, *etc.*,

NOTES

NOTES

The scope of the query varies with the type of query. For example, for technology development, the query may relate to comprehensive search of literature. On the other hand if the query is for simple fact or data finding information such as chemical formula of a chemical compound or functioning, repairing and maintenance of industrial machinery, searching in the relevant handbook or a manual will suffice.

---

## 2.5 REFERENCE SERVICE

---

According to Dr. SR Ranganathan, "reference service is a personal service to each reader in helping him to find the documents answering his interest at the moment pinpointedly, exhaustively and expeditiously". In his view, providing reference service means making contact between the right user and the right book at the right time and in the right personal way.

CA Bunge says, "Reference service, sometimes referred to as reference and information service, which refers to the personal assistance provided to the information seekers in the pursuit of information". Further, he categorised the reference service in the following three broader categories

That which involves either finding the required information on behalf of the information seekers or assisting them in searching information.

That which develops information seeking skills in the users.

That which guides information seekers in selecting most relevant appropriate information sources and services.

According to DJ Foskett, "Reference service is currently humanism in practice because the aim is to help people, in a way or other, to secure great happiness through the possession of knowledge".

Margaret Hutchins equated the term reference service with reference work. She says, "reference service includes direct personal aid, within a library, to persons in search of information whatever purpose, and also various library activities especially aimed at making information as easily available as possible".

In the present electronic and communication environment reference service is not only confined to the library users but also to remote users. Some times, it is termed as electronic reference (*e*-reference) service, digital reference (*d*-reference) service, virtual reference (*v*-reference) service, etc., Whatsoever may be the nomenclature, its basic function is to provide point-of-need reference service to information seekers at the place where they are and when they have a query.

### Need for Reference Service

Information is recorded in a variety of documents like books, reports, periodicals, digests, theses, standards, patents and so on. A reader



**NOTES**

may need a specific type of information for a specific purpose. The number of documents produced is very large, so large that it is impossible for the reader to keep track of its variety and location. Users, often spend much time in locating information required by them. After making a lot of efforts, users sometimes fail to retrieve required information due to not following the proper search strategy or not having the subject knowledge in the field. Reference librarians are also finding it a daunting task to keep abreast of the new resources that appear daily on various types of recordable media. Here, the reference librarian's main functions are: (1) to keep track of the outpouring of documents in the subjects of the clientele, which his library hopes to serve and (2) to study as closely as possible the information needs of the clientele. He needs to provide instructions, both individual or in groups with the aim of helping the users to become more self-reliant in accessing information sources, to suit the Chinese proverb 'give a man a fish, he will eat for a day, teach a man to fish, he will eat through out his life'. Thus, one can summarise the need and purpose of the reference service as follows:

To satisfy the information requirements of the users and demand for intensive services.

To be in pace with modern tools and techniques developed for providing information services to the information seekers.

To know the availability and location of required documents in print and non-print formats.

To evaluate multidimensional growth of libraries and their complexities.

Now, there is an increasing trend towards replacement of human-delivered reference service by the machine-assisted reference service to make it available to remote users.

These will be discussed in the later parts of this Unit.

### **Reference Service Process**

For providing efficient reference service, the reference librarian needs to adopt a systematic approach. This approach involves interaction with the user, understanding of the query and adequate knowledge of reference sources. Sometimes, a very simple question asked by the user becomes unnecessarily complicated due to many reasons-lack of knowledge of reference librarian, communication gap between the reference librarian and the user, for instance, the question was not properly stated by the user or understood by the reference librarian and so on. Therefore, the reference needs to avoid such a situation by getting necessary clarification before the search is started. After proper understanding of question, the reference librarian begins his search from in-house sources, then if the information available is not adequate, searches external sources and finally collects the required

**NOTES**

information wherever available. During the search process or at the end of the search, the reference librarian should establish dialogue for seeking more clarifications about the relevance of the search results to the user's query. In case the user cannot provide background information on the subject, the reference librarian may consult encyclopaedias, handbooks, textbooks, Internet sources or any other relevant source. The complete reference process, *i.e.*, from the receipt of an information request till the required information is communicated to the user, can be broken down into a series of decision-making steps. These steps are briefly discussed below:

***Query Analysis***

When the reference librarian receives a request or query for information, he/she must understand the query in as much depth as is necessary or possible. If subject of the query is not familiar, the reference librarian must get an idea on it by consulting dictionaries, encyclopaedias, handbooks or textbooks. Then he must analyse the query as deep as possible, and prepare a rough search strategy.

***Reference Interview***

After getting a basic idea of the subject of the query or an understanding of the query (or request), the reference library must make efforts to have a personal interaction with the information seeker or the user to get a precise understanding of the query. He must ask all the questions necessary to get a clear understanding of the query. The questions put to the user must be open-ended, as they allow the user to take off and start talking on the other hand, closed questions limit possible responses to 'yes' or 'no' type answers.

Such an understanding obtained through the interview helps the librarian to formulate his/her search strategy in specific and clear terms and in quickly tapping the right information.

However, if the request for information is from a senior level official or executive, the librarian may not be able to get the opportunity for the interview. In such cases, the librarian must get above information about the subject specialisation of the user or if he is a top official, the context of the information requirement and this information will help in providing the required information with some (acceptable) relevance.

Even if the reference librarian is able to get the reference interview, before conducting the search, he may often need to seek further clarifications during the course of the search to improve the relevance of the information he supplies. To minimize the efforts of seeking clarifications again and again, the reference librarian must design Information Search Request forms and gets it filled up by the requester before conducting the reference interview.

## Digital Reference Service

### NOTES

In this fast changing technology era, researchers need to find relevant, usable, authentic and verifiable information as quickly as possible. To meet this requirement, libraries and information centres need to augment their conventional reference service using ICT. Using these technologies, libraries maintain digital collections and also access digital or electronic information sources and provide information in digital/electronic mode. With the emergence of digital libraries and Internet, the concept of traditional reference service has changed. Even many non-library commercial organisations now offering digital reference service to their clientele. While some are free, others need payment. In digital reference service, the web is used as a medium of communication for sending the questions and receiving answers, which is quite useful in providing fast answers to the questions. However, the reference librarian needs different skills for accessing digital information sources and communicating the information to the users.

In the process of providing digital reference service, the reference librarian receives questions via e-mail or web interface, identifies the query and then decides appropriate course of action. He analyses the request and gets the type of information required. The question may also be checked with the archive file, which is usually called Frequently Asked Questions (FAQ) File. The answer may be supplied to him through appropriate mode of communication. Based on the mode of receiving question and delivering information, the digital reference service can be broadly categorized into two groups:

1. E-Mail Reference Service.
2. Real Time Digital Reference Service.

### *E-Mail Reference Service*

The e-mail reference transaction involves back-and-forth exchange of information, users would not get any immediate answer. But users can ask a question when they think of it, at any time of the day or night. And they do not have to take time to make a special trip to the library. In other words, the users send e-mail to the library with a reference question, asking whatever information they feel necessary. The library sends reply by e-mail, fax, phone or letter as it finds convenient. In such a case, the controller of all questions initially receives and examines and then routes them to appropriate staff. Technical questions are forwarded to technical staff, circulation related questions to the circulation staff, reference questions to the reference librarian, and so on.

Initially, this service was adapted by the health and engineering libraries, now it has established itself as a basic service in majority of libraries having Internet connectivity. This service has certain advantages to the users:

Who feel shy and uneasy about asking questions in person, face-to-face or by telephone.

Who are poor in oral communication.

Who may not be able to visit library due to certain difficulties in physical movement, living at a long distance from the library, and so on.

Besides above advantages, there are certain disadvantages also:

Reference librarian cannot establish eye contact or conduct face-to-face reference interview to seek any clarification with the user.

It is difficult to judge the urgency of the requirement of information.

To know the degree of the user's satisfaction for further modification of search strategy for providing more relevant answer.

Speed of asking a question and getting an answer depends upon the volume of e-mail traffic and communication link over the Internet.

Reference librarian needs to make more efforts in understanding the meaning of the asked question. Sometimes, he misses the focus of the asked question because users often do not clearly express the question.

E-mail reference service also offers the following advantages for the reference librarian as well:

Reference librarian finds more time to think, plan, chalk out search strategy and finally search the answer.

Simple or easy questions can also be answered by other staff.

Reference librarian can devote more time on questions of complex nature. This way the workload of reference process can be distributed among other staff.

Question can also be diverted to the experts, if required.

There is no restriction on working time. Question can be answered any time after working hours.

This mode of receiving and answering questions is very cost-effective.

Library can design a user-friendly request form, which can be filled up by the users through downloading from the library's web site. The user can send a completed request form to the library by clicking a button on the web labeled 'submit' or 'send'. A well-designed Request form will eliminate problems and provide right framework for finding out what the user really wants to know. There should be a standard format for the Request Form for all types of questions. The Request Form should bear essential instructions and advice about how to complete it. It should be as short as possible so that it takes a little time to complete. Library can reply users by e-mail or in any other appropriate form, acceptable to the users.

## NOTES

### ***Real Time Digital Reference Service***

#### **NOTES**

In real time digital reference service, the exchange of information is live (it takes place in real time) between user and reference librarian. This service is still on experimental stage in developing countries because it requires advanced computer technology, faster and better communication connectivity, interactive audio and video capacity and availability of computers at home and work place. This service is not a replacement of conventional or e-mail reference service but a supplement to these services. This service is gaining popularity due to many advantages over the other two services. These include the following:

This is a synchronous service in which reference librarian responds immediately in real time.

Reference interview is conducted at a faster pace than e-mail.

Clarification can be sought online.

Reference librarian can demonstrate to the user about how to use reference sources, web sites, expert or whom the user should contact. This allows user to walk through the reference source to find answer. In addition to this, Voice Over Internet Protocol (VOIP) allows reference librarian to talk to users and hear them while connected and while locating the sources.

This service can be offered at any time, any day (24/7 basis).

Reference librarian can chat with several persons simultaneously.

Against the above advantages, there are several disadvantages also as compared to e-mail reference service.

The technology is still at premature stage.

It is a labour-intensive service.

It makes reference librarian busy in answering the questions because it involves several back-and-forth message transactions. He may not find time to answer the urgently needed questions.

It is stressful for reference librarian as well as user because one is waiting for other's message.

For every inquiry, user needs to type questions every time and reference librarian also need to answer in typed form.

Typing speed and errors occurring during typing in the text cause, both reference librarian and user, difficulties in communicating their messages because real time chatting demands fast and accurate typing speed.

In case the question is found complex in nature and requires more time for searching, the user should be requested to fill the proper form or visit the reference desk.

Real time digital reference service can be provided using chat software, live interactive communication utilities, call centre management software,

interactive customer assistance system, bulletin board services software, customer interaction management software, web contact centre software and other Internet technologies. The following are some of the commonly available real time digital reference technologies and these have been used in academic and research libraries in the western countries.

**NOTES**

***Real Time Digital Reference Technologies:***

24/7 Reference

Anexa.com

AOL Instant Messenger

ConferenceRoom

Desktop Streaming

DigiChat

eGain Live

e-Gain Voice

Group Board

HumanClick

LiveAssistance

Livehelper

LivePerson

***NetMeeting***

Netscape IRC

OnDemand

QuestionPoint

Rakim

RightNow Live

Virtual Reference Software

Virtual Reference Librarian

Web Line

***Examples of Real Time Digital Reference Services:***

The following are some of the frequently used real time digital reference services available for providing reference services:

Ask A Question

Ask Now!

Ask The Librarian

Ask Us Now

Ask-A-Librarian

**NOTES**

Chat Reference Assistance

Chat With A Librarian

Chat With Us

Click For Live Help

E-gateway

Infochat

Librarians Online

Library Chat

Live Assistance

Live Library Reference

Live Online Assistance

Live Online Reference

Live Reference Help

Livehelp

Need Help?Ask A Librarian

Questions?

Real Time Help

Real Time Reference

Real Time Reference Help

Refchat

RefDesk Live

Reference Chat

Reference Librarian Online

Request It Online

Talk To A Librarian

Virtual Reference Desk

### **Evaluation of Digital Reference Service**

Assessing the quality means judging the quality standard of services that should be provided to the users and how quickly and accurately. The degree of quality varies from library to library because it depends upon a number of internal and external factors directly affecting the library services.

Lankes has laid down the following measures/components for assessing the quality of digital reference services rendered by any library or information centre or organisation.

**Outcome Measures (Quality of Answers):** Accuracy of response, appropriateness to user audience, opportunities for interactivity, instructiveness, and impacts resulting from the digital reference process.

**Process Measures (Effectiveness and Efficiency of Process):** Service accessibility, timeliness of response, clarity of service procedures, service extensiveness (percentage of questions answered), staff training and review, service review and evaluation, privacy of user information, user awareness (publicity).

**Economic Measures (Costing and Cost-effectiveness):** Cost to conduct a digital reference session, infrastructure needed to support quality digital reference service, and impact of these costs on other library expenditures.

**User Satisfaction (Degree of Satisfaction):** Satisfaction indicators, *i.e.*, accuracy, behaviour of staff, facilities, *etc.*,

## NOTES

### **Major Digital Reference Services Projects**

Brief information about some of the prominent digital reference services projects being undertaken for providing reference services is presented in the following sections:

#### ***Collaborative Digital Reference Service (CDRS)***

The Library of Congress launched the Collaborative Digital Reference Service in June 2000. At present, more than 100 libraries from various countries are participating in this collaborative venture. Some of the major libraries are Library of Congress, National Library of Australia, National Agricultural Library, National Library of Canada, Cornell University Library, University of Texas Library at Austin, University of Washington, University of Southern California, Metropolitan Cooperative Library System at Los Angeles, *etc.*, The mission of this project is to provide professional reference service to the users at any time and any where through an international digital network of libraries and information centres. It is a library to library network for asking and answering reference questions. It is an international web-based cooperative network of librarians and experts in various disciplines. It is a worldwide network of libraries in which OCLC builds and maintains a database of profiles of participating institutions, maintains a question and answer database system that enables participants to catalogue answers and store them in a searchable/browsable database and provides help in marketing, registration, training and user support.

There are three main components of CDRS:

1. **Members Profiles (MP)**, which contain information on strengths and features of the members. It include addresses (including e-mail), hours of services, collection strengths, staff strengths, what is out of scope, geographical locations of the users served, any special service, average number of questions received, *etc.*,
2. **Request Manager (RM)**, software for entering, routing and answering reference questions. It receives, sorts out routes

and tracks down the incoming questions and delivers the credible answers to the end user.

3. Knowledge Base (KB), a searchable database for questions and answers sets. It is an archive of questions and answers for future use.

## NOTES

An end user can request information through CDRS member-library and then the member-library sends question to the Reference Manager software for processing and routing. The Reference Manager will then search the database of CDRS member-libraries profiles looking for the member-libraries best suited to answer the question. The matches will be made on the basis of data elements as hours of service, including time zones, subject strengths, scope of collections, type of patron served, etc., The matching process will end within a fraction of second. Once the match on a member-library has been made, the question will be sent to that library for answering. Once the question has been answered, it is routed back to original CDRS requesting library via Reference Manager to allow for closing out the case and completing other administrative jobs. The response is sent to the requesting library by e-mail. Simultaneously, the question and answer are stored in the Knowledge Base. The strength of the reference service lies in the strength of the member libraries, RM and KB.

Currently, this is a free service and it delivers reference assistance to researchers any time and any place. It supports reference efforts by combining the power of resources and manpower with the diversity and availability of libraries and librarians everywhere. Using advanced technology that directs questions to the appropriate library based on the subject profiles, this digital network pools librarians' expertise to bring quality and professionalism in online reference service. The following are some of the advantages of this service:

One library is linked to the other libraries for subjects, languages and collections outside its scope and coverage.

Experienced reference librarians are always available to provide access to collections and resources available in more than hundred libraries and information centres worldwide.

Librarians and information scientists can add value to reference interactions by obtaining answers to difficult questions from expert librarians at other institutions and organisations.

Librarian can improve his library's ability to respond more quickly and accurately on a broader spectrum of research.

Reference service is available beyond normal working hours of the library, *i.e.*, 24 hours a day and 7 days a week.

Reference transactions are stored in a question-answer knowledge database that can be accessed for ready reference.

Reference questions can be answered from books, monographs, journals, magazines, citations from online catalogues and licensed databases and references to web sites.

The requesting library is notified by e-mail to retrieve the answer from the server.

This service provides opportunity to highlight the strength of the collections of participating libraries.

Virtually, an information seeker can access not only his library where he is a bona fide member but also a union of libraries, which has many, times bigger collection than his library.

### ***Automatic Reference Librarians for the World Wide Web***

This project was sponsored by the University of Washington to create software agents that possess reference intelligence—a limited understanding of complex technical topics, but a very sophisticated understanding of how and where to find high quality information on the World Wide Web. It works on the basis of wrapper technology. Wrapper technology is a data that precedes or frames the main data or a program that sets up another program so that it can run successfully. This service involves the following steps:

The user asks a question.

The Query Router assigns a topic to the query.

The topic maps to a number of relevant wrappers.

The parallel web search module sends request via wrappers to the sites.

Responses from the sites are obtained and sent to the fusion engine for collation.

User gets the response.

It explores web directories such as YAHOO to find out searchable sites. It queries each searchable site and obtains responses from them. The responses and other information about a given site are used to assign topics to that site. Thus, each searchable site gets a wrapper containing some assigned topics, which are used for matching the topics of the users queries.

### ***Virtual Reference Desk (VRD)***

This project is sponsored by the US Department of Education. It is dedicated to the advancement of digital reference and the successful creation and operation of human-mediated, Internet-based information service. The VRD project organizes and provides conferences on digital reference issues for information professionals in libraries and other contexts. The VRD does not actually answer questions, but provides resources and links to experts that offer these services. The basic idea of VRD is that when a user asks a question and that cannot be

NOTES

NOTES

answered by a participating library then it is forwarded to the VRD network for assistance. This service includes:

**Collaborative Ask A Service.** A network of Ask A Services and volunteer information professionals that ensure users' questions are addressed by the most appropriate experts.

**The Learning Centre.** A web site for the K-12 community with curriculum-related websites, frequently asked questions, and other previously asked questions.

**Ask A+ Locator.** A searchable database of high quality K-12 Ask A Services.

The following are some of the Ask A Services, which are Internet based question and answer services that connect users with experts and subject expertise.

Ask a Hydrologist

Ask a Linguist

Ask a Parenting Expert

Ask a Question

Ask a Reporter

Ask a Scientist

Ask an Archaeologist

Ask Dr Math

Ask Mr Calculus

Ask the Dentist

Ask the Space Scientist

24/7 Reference

A pilot network established in the California, Los Angeles and Orange County areas to provide real time reference services directly to the library patrons over the Internet. To avail this service a librarian needs a computer with Windows 98, NT or 2000 and a direct Internet connection. This service can be used to:

Guide the user's browser to the best resources on the Internet with collaborative browsing.

Communicate with users real time chat.

Send files, images, power point presentations, etc., to the patron's computer.

Conduct meetings with up to 20 participants, while sharing web pages.

Network with others by transferring complex questions to a local or remote expert.

Access reports, transcripts of sessions with users, and a wide variety of usage statistics on demand.

Customise the software to integrate with user's website.

Besides the above, there are other projects like, AskERIC, the Internet Public Library, the MAD Scientist Network, etc., which are also in operation.

### Future of Reference Service

It may be very difficult to make certain predictions about the future of reference services. Earlier, the mode of providing reference service was quite different from what libraries and information centres are providing after the advent of Internet. Electronic databases, and particularly on-line databases have replaced printed reference works. A good number of reference sources, *i.e.*, encyclopedias, dictionaries, thesauri, handbooks, directories, etc are available on Internet. Similarly, major abstracting services like, *Chemical Abstracts*, *Physics Abstracts*, *Engineering Abstracts*, etc., are also available on Internet. Thus, in the future users will be less dependent on library and more on the online sources and service agencies providing real time reference services. Users may also tap required information at home by means of a computer. At the same time, the cost of the services will be quite high to afford by the users. And users will continue to get the information at less cost from the library. Also specific and accurate information will be on great demand. Since users often may not be able to find specific information, they have to depend on trained reference specialists. So more expert reference librarians will be needed in the future.

For researchers to be productive and to be able to use information round the clock on 24/7 basis, from any location, the information has to be organised accordingly and made available to the users by the reference librarian. No library can provide reference service entirely based on its own collections, on all types of queries. Therefore, there will be a need to have collaborative ventures for reference service, in which location of reference sources, location of users, time, etc., will not be the constraints. Survivability of reference professionals and existence of libraries and information centres will depend upon the quality and efficiency of reference services provided by them. The future of reference service will also be based on the digital collections and communication links through web, because digital technology has opened new ways of storing and accessing information. Whatever direction and which shape the new technology is going to take in future; it will always help the reference librarian. In the coming era, the reference librarian will need the ability to read the situation in which a user will be able to find the right information on his own, as and when he requires. Since many non-library organizations have started providing digital reference services to their clientele, libraries and information centres should turn their attention and to compete in the new environment to provide e-reference services and real time reference services. For users, the reference librarian is going to act as a hub if the library is

### NOTES

well equipped with computer, Internet and CD-ROMs. Reference librarian and reference service will be a centre of the universe of information in the future.

## NOTES

### ***Refining user Statement***

Once the reference interview process is over, the next step is to refine the statement of user and transform the user's query into the searchable statement. It involves selection of appropriate terms to be used for searching. Reference librarian may also consult controlled vocabularies, *i.e.*, thesauri, subject heading lists, classification schedules, etc. in this regard.

### ***Formulation of Search Strategy***

Formulation of search strategy is a plan for hitting on the right information that answers the user's query. Generally, reference librarian tends to jump immediately into an unfocussed search using 'piece meal' or 'hit and miss search' without analysing the search request and formulating systematic search strategy. It is good to spend some time at the beginning of a search in organising and formulating a proper search strategy for a much more productive and efficient search. Such a strategy would involve identifying potential sources, selection among these sources, searching within the sources chosen, etc., He should systematically comb the sources to dig out information. There are a number of steps involved in this process from selection of relevant source or databases, selection of appropriate web sites on Internet, standardizing and grouping of selected terms, combining them using Boolean operators AND, OR, NOT to make a final search statement for searching.

---

## **2.6 SEARCHING**

---

A quotation from Alice in the Wonder Land:

'If you do not know where you are going, then it does not matter where you end up. If you do not know where you want to go, you probably would not get there. If you do not know where you are going, any road will take you there'.

It means the reference librarian must be precisely clear on what he is going to search; otherwise, he may end up with some other result or irrelevant information. There are different types of searching mechanism—exhaustive, precision, pearl growing, snowball, and situational. The reference librarian can use one or combination of more than one mechanism to formulate search strategy. In an exhaustive type search, efforts can be made to focus on collection of all possible information, which may be of peripheral interest to the user. The 'precision' search is focused to identify the targeted information, which is directly relevant to the user's need. Using the 'pearl growing'

**NOTES**

technique, the reference librarian starts search from the point where he knows a little on the topic. He begins his search using whatever facts are available and then refines the search strategy step by step. In case the reference librarian is new to the topic being searched, he may consult an expert in the field before search process is started. This type of search is called 'snowball' search. The process of searching may be changed with the change of situation during the course of searching. It depends upon the changing needs of the user, interpretation given by the user during the reference interview, availability and accessibility of resources, permissible time for searching, cost involved and many other factors. This type of search is called 'situational' search. The reference librarian should also make record of information sources consulted or to be consulted. The record should be very clear and systematic enough to allow someone else to continue the work in the absence of the person who received the question.

If the request can not be fulfilled by the sources available in the library, the reference librarian should not give it up because the world of information do not start and end at his library. He may be able to help the user by drawing the resources of other libraries through data transmission networks. Advantage of information and communication technology, like telephone, e-mail, fax, Internet, etc. may also be taken for the purpose.

### **Notification to the User**

After search process is over, the reference librarian should inform the user and disseminate information in appropriate form as quickly as possible as speed of supply is critically important. Also, the result of the search should be appropriately formatted because presentation and delivery of the result reflects the efficiency and involvement of reference librarian in answering the query. It may be given in printed, audio-visual or any other form acceptable to the user. Supplied information must fulfill the requirements of the user. It must have relevance for him.

### **Feedback Analysis and Evaluation**

No improvement can be made in any system, including reference service, unless it is properly evaluated.

A main component of such evaluation is obtaining feedback from the user on the relevance of the information provided. The reference librarian should therefore seek invariably feedback on the relevance of the information supplied and try to improve the service for further requests so that he can satisfy the users better. It is important to design a feedback mechanism, say, using a performa, and seek feedback against every supply of information. The search methodology or process is to be improved continually based on such feedback. Other components

NOTES

of the evaluation are the speed of supply, the courtesy extended, initiative taken to continue to supply information like the requirement is met, and so on. He should make sure that information provided to the user has been well accepted by him. He should politely ask the user to provide feedback about the relevance of the information, satisfactory level of the service rendered to him, etc. User may make certain comments/suggestions, which may be taken in a positive way for the improvement of the reference service.

### Unanswered Questions

No system can be perfect and much less so is the reference service system. As long as reference service is done by humans, errors or deficiencies are bound to occur. However, the reference librarian should always endeavour to create an effective and efficient system. The reference librarian may not be able to provide answers of all questions asked by the user. He might have overlooked the answer in the available sources; the answer might not be available in the in-house collection; or the question might not have definite meaning and answer. If the unanswerable questions of a similar type seem to be recurring, the reference librarian should try to fill the gap in the reference collection through the acquisition group. If the desired information cannot be located from in-house collection, the same may be tried through cooperative or networking arrangement. There are other agencies which have specialisation in certain types of reference services and products, e.g., Ask A Librarian, Ask A Scientist, Ask A Teacher, 24/7 Reference, etc., These agencies may be contacted for such type of questions. The user should not be left with negative response even the question is not answered. He may be suggested the places where he can go and find answer. Even making a telephone call, if necessary, to fix an appointment with another information provider may help to increase satisfaction level of the users. Providing reference service is a complex and multi-process activity therefore, errors are bound to occur. Focus should be on the elimination of errors and to improve the efficiency and quality of reference service.

---

## 2.7 DOCUMENT DELIVERY SERVICE

---

### Definition

Document Delivery Service (DDS) is actually concerned with the supply of document(s) to the users on demand, either the original or its copy in print or non-print form, irrespective of the location and form of the original. Most of the information services such as current awareness service, SDI service, indexing and abstracting service, literature search service, etc. are aimed at guiding the users to the documents where required information is likely to be available. Whereas DDS

NOTES

actually locates the required document and supplies it to the requester either the original or its copy in print or in non-print form. DDS is an important service, since the value and important of other access services are directly dependent on the efficiency of this service. For instance if a user, alerted by a current awareness service, requires a document and efforts are not made to supply the same to him/her in time, then the availability of any alerting service however efficient it may be, will have no value for him/her. Thus, DDS adds value to other information services.

Earlier DDS was mainly concerned with "lending" of a document to the user over a specified period of time by a library or an information centre from its own resources and if not available within the library, then borrowing it from other libraries on inter library loan and lending it to the user. With the introduction of xerography in mid 1950s and the large scale use of photocopiers in libraries by 1970s, the DDS was not just confined to lending or inter lending of documents, but documents could be duplicated and permanently supplied to the users. The libraries started using photocopier for the supply of copies of documents, particularly of journal articles and part of books. Most of the libraries still prefer supplying copies of journal article rather than giving the original, so that the original may always remain in the library and not get damaged with excessive use. The advent of computers, scanners and telecommunication technologies in 1980s made it possible to store the documents in electronic form and transfer the same electronically to long distances via telecommunication networks almost instantly. Now many libraries and information centres are using this technology for the delivery of documents to the intended users. This has greatly improved the speed of the service. Another trend is being observed, that is the availability of full-text electronic journals and books on the Internet by many publishers and aggregators, offering online ordering and instantaneous delivery of books as well as articles from the journals. The user can request an item directly from the publisher and receive the article at the location of his/her choice. The scope of DDS has expanded beyond the traditional libraries and specialised document delivery centres. The database producers, commercial online vendors, commercial publishers and e-journal service providers have also joined the document delivery market. The "ISI Document Solution" from Institute of Scientific Information, DIALORDER service from DIALOG, "Document Detective Service" from Chemical Abstracts Service (CAS) are some of the examples.

## Need

### *Increase in Demand*

The primary objective of any information system is to provide its users with timely access to the information they need so that it may

NOTES

be utilised by them to accrue maximum benefit. In recent years, due to advances in computer and telecommunication technologies the access to primary literature has vastly improved. A large number of electronic bibliographic databases accessible online as well as on CD-ROM in all the disciplines have emerged. The availability of these databases providing easy and timely access to published information has resulted in a great increase in demand for the original documents. Access to other libraries' online catalogues (OPAC) on the Internet, has further boosted up the demand.

### **Characteristics**

The efficiency of DDS is determined by three factors, namely, speed, cost and satisfaction level. Ideally the DDS should be cost-effective, speedily delivered and should satisfy all the requests it receives.

#### ***Speed***

The method of receiving the request and mode of delivery of documents directly affect the speed of DDS. Request may be received by post, telephone, fax, electronic-mail or online systems. Documents may also be supplied by any of the above mentioned methods. Of the above methods, online request and electronic delivery of document is the fastest, though delivery of documents in this way is expensive. However speed of supply of documents depends on many other factors such as, time taken to locate the document from within the institution, and if not available, then time taken to find its location, transmitting the request, processing the request by the supplying library, receipt of the document by the requesting library and finally delivering the document to the user. All these procedures affect the speed of the service. If the service is operated from a centralised collection, the delivery is quick, ranging from two hours to two days. With the availability of online databases, online public access catalogues, etc., it is possible to search for information from remote locations on the networks, request the selected document and receive the required document electronically almost instantly. Electronic document delivery systems offer a great promise. Here speed is the major attraction. However, copyright issues and high costs are some of the constraints, which are attracting worldwide attention.

#### ***Cost***

DDS should be cost-effective. In devising a cost-effective service, all types of costs viz. direct as well indirect costs should be taken into consideration. Direct cost is cost of operating the service *i.e.*, cost of processing the requests, copying the document, postage, etc., while indirect cost includes cost of building and maintaining the collection, salaries of staff, cost of equipment, etc. The service is more cost-effective if it is offered from a centralised collection and the number

**NOTES**

of requests is very large. Conversely, it is less cost-effective if it is offered from a decentralised collection. It is increasingly being realised that the service can be more cost effective if it is operated from building a core collection to meet primary needs of the users and for residual requests, accessing the material speedily from external sources electronically.

***Satisfaction Level***

Ideally, the DDS should satisfy all the requests it receives for the supply of documents. However, in practice this target is not achievable even from the most comprehensive centralised collection. In general, a satisfaction level of 90–95 per cent is recommended and considered very good. A high satisfaction level depends not on the availability of the required document in the centre that offers the service but also on the ability of the centre to locate and supply it from elsewhere in the world as quickly as possible.

**Types of Document Delivery Systems/Models**

As mentioned in the preceding section, availability of electronic bibliographic databases providing 'instant' access to information and easy access to library catalogues (OPAC) around the world on the Internet have not only increased the demands for original documents but have increased user's expectations for early as well as cent per cent delivery. On the other hand exponential growth of published literature, increasing cost of publications and declining library budgets have been making it more and more difficult for libraries to meet the demands of their patrons from their own resources. Libraries have been finding ways and means to meet the demands of their users despite these limitations. Some of the efforts made by the libraries are improvement in inter library loan services, resource sharing among libraries of common interests, development of specialised document delivery centres, and more recently of joining library consortia to provide access to full-text electronic resources to their patrons. In this Unit you will study how DDS has changed over a period of time and what are the recent trends.

There are a number of national document delivery centres operating in the world providing document delivery service in a planned manner. Some of these centres operating in different countries are British Library Document Supply Centre (BLDSC), Boston Spa, U.K.; Institute de l' Information Scientifique et Technique (INIST), France; National library of Medicine (NLM), U.S.A.; Canadian Institute for Scientific and Technical Information (CISTI), Canada; and NISCAIR (National Institute for Scientific Communication and Information Resources, Formerly INSDOC), New Delhi, India. These centres offer the service drawing upon resources ranging from comprehensive centralised planned collection to decentralised unplanned collection.

NOTES

A number of national document delivery service models have also been suggested by information workers in the field. Four basic national models suggested by Line (*et al.*) in 1980 in UNESCO document are: (i) A dedicated centralised collection, (ii) Concentration on a few libraries, (iii) Planned decentralisation, and (iv) Unplanned decentralisation. In 1984 Vickers and Line described six types of models in an IFLA UAP programme document. These are: (i) Dedicated centralised service, (ii) Central shared service, (iii) Concentration on a few libraries, (iv) Decentralised planned provision, supply and retention, (v) Decentralised unplanned access, and (vi) A regionally based system. In a conference on Inter Lending and Document Supply held in London in 1988, Hope E.A. Clement (International Conference on Interlending and Document Supply (1988: London)) suggested following six composite models: (i) A centralised lending collection, (ii) A centralised lending collection with backup libraries, (iii) A national lending centre, (iv) A network of interlinked networks, (v) Separate networks, and (vi) Unlinked and total decentralisation.

These variant models/systems have been suggested because of the introduction and use of new technology. All these models have their own merits and demerits. The extreme models *i.e.* completely centralised and completely decentralised models are not very efficient. Because in the former case cost of building and maintaining centralised collection in terms of stock, staff, equipment, *etc.*, is very high and it also leads to unnecessary duplication of resources, while in the latter case *i.e.*, service from unplanned decentralised collection, the speed of the service is affected. The service is more efficient if it is operated from a strong centralised collection with some backup libraries like British Library Document Supply Centre.

### Examples of Document Supply Centres

#### *British Library Document Supply Centre (BLDSC)*

BLDSC (<http://www.bl.uk/services/>..) is an example of partially centralised model with some backup libraries. It handles on an average 14,000 requests per day and over 90% of them are satisfied. Over 87% requests are filled from BLDSCs own collection, 2.4% from backup libraries in U.K. and 0.3% from location outside the country. Most of the requests are processed within 2 hours (for 2-hour service) to 2-5 days (for standard service) from local collection. Delivery for standard service is by mail, courier, fax or Ariel within 2-5 days of receipt. While for 2-hour or 24-hour delivery, the documents are delivered by fax or Ariel. British Library collection covers all subjects and languages and include books (over 3 million), journals (over 260,000 titles), technical reports (5 million), patents (50 million), conference proceedings (433,000),

musical scores and dissertations. The whole collection is international with 30% published in U.S. and 70% of the total stock collected from outside U.K. Its 74% requests are related to S&T. Of these 67% are for serials, 22% for monographs, 11% for conferences, theses, music and official publications. Many other major commercial suppliers (e.g., Research Libraries Group's CitaDel, UNCOVER, etc.) use BLDSC as a resource due to its excellent collection. Automation has been progressing at BLDSC which includes, among other things, scanning and digitisation of print and microform resources for document delivery purposes. One of the services offered from its electronic collection is "Inside". This is an integrated copyright fee paid document delivery and current awareness service. Offered since 1993, Inside provides online access to table of contents of 20,000 highly used journals of BLDSC, together with title level information for 250,000 journals held in British Library. It also includes details of papers from over 70,000 conference proceedings. The service allows to search and order directly over the web and receive article within as early as 2 hours. Another service, "Secure Electronic Delivery" service, provides fast access to over 100 million documents that are available for digital scanning. Almost anything from library's huge catalogue collection whether digital, in print, or in microform can be delivered electronically to the requester's desktop within 2-hours, if requested. The Secure Electronic Delivery Service, started in December 1, 2003, is based on Adobe Reader 6.0 software and Relias international scanning and delivery technology. On receiving the request the document is scanned and sent as encrypted PDF (Portable Document Format), which the requester can download, from British Library server within 14 days. British Library sends an e-mail message to tell the requester that the document is available. The electronic copy is available for collection from BL server for 14 days after which the file is deleted. The requester can make a single paper copy from electronic copy. Since, BL was the first one to launch the world's fully copyright compliant secure electronic document delivery service for digital documents in December 2002, it succeeded in obtaining extensive agreements for "secure electronic delivery" with many of the world's leading scientific publishers for digitisation and electronic delivery of documents from its entire paper based or microform collection.

#### ***Document Delivery Service of NISCAIR (Formerly INSDOC)***

INSDOC (NISCAIR since 30 September, 2002) has been offering DDS at the national level since its inception in 1952. This service is based on the decentralized collection of resources held in major libraries in India including National Science Library and Electronic Library of NISCAIR. The requests are received by mail, fax or e-mail. The location of required document is identified by using the computerised Union Catalogue of Scientific Serials in India (NUCSSI), compiled and maintained by NISCAIR. NUCSSI database contains serials holding information

#### **NOTES**

NOTES

of about 850 science libraries in India. When requests for document delivery are received, they are sorted out on the basis of availability of source documents. Firstly the requests are serviced from NISCAIR's own library collection, then from Delhi based libraries and finally the requests are met from other libraries from India or foreign countries. Some of the important Delhi based libraries utilised for document delivery purposes are Indian Agricultural Research Institute Library, National Medical Library and Delhi University Library. Requests are received from universities, industries, R&D centres, from foreign countries and from individuals. Maximum number of demands (over 80%) is for journal articles. Another form of document delivery service offered by NISCAIR is Contents, Abstracts and Photocopy Service (CAPS). Under CAPS service, subscribers receive tables of contents of selected journals (15 titles for individual subscription and 30 titles for institutional subscription) every month from a list of 7500 Indian and foreign periodicals. CAPS service is available to subscribers on paper, through e-mail and on diskette. On browsing through the contents, users can place order for abstracts or copies of full paper. Users also have an option to place a standing order for abstracts of all the articles appearing in one or more chosen journals through Standing Order Abstract Service (SOAS). By subscribing to CAPS and SOAS, libraries can keep their users abreast of contents of latest journals of their interest at a nominal cost. Users on browsing the contents can place order for full copies of paper, which are provided under Document Supply Service of NISCAIR.

E-journals Consortium: NISCAIR is the nodal organisation for developing a "Consortium for CSIR laboratories for accessing e-journals". The activity, range from creation to monitoring the access facility of scientific periodicals published by international institutions. To start with, an agreement has been signed with M/S Elsevier Science publisher for 4 years to provide online access to 1500+ full-text e-journals through Science Direct to all CSIR scientists in 38 CSIR laboratories. The scientists can search, view and download articles for R&D purposes. The genesis for setting up e-journal consortium for CSIR laboratories goes back to year 2001. CSIR is a network of 38 R&D laboratories in the field of science and technology. For R&D purposes laboratories were subscribing to foreign S&T periodicals. Till 1993 CSIR laboratories were acquiring 8000+ foreign periodical titles of which 6000 were unique *i.e.*, acquired by a single laboratory. Due to rising subscription cost of foreign periodicals and severe budget constraints, the CSIR laboratories had to cut down the subscription to many important S&T periodicals. By the year 2000 the subscription to periodicals came down to 3356 titles of which 2500 were unique titles. With the availability of full-text e-journals on the Internet and the growing demands of research scientists for access to these periodicals, an informal meeting of the heads of library and information centres of

NOTES

these laboratories was held in the year 2001 to find out solution to this problem. Following the meeting, a Study Group was set up under the Chairmanship of Director, INSDOC (Now NISCAIR). The Study Group submitted the report suggesting that an e-journal consortium should be set up to meet R&D information needs of CSIR scientists. To begin with, an agreement may be made with the publishers to provide access to full-text e-journals to all the CSIR scientists. The proposal was submitted to Planning Commission for 10th Five Year Plan 2001–2006 on October 2001. The proposal was accepted. To begin with an agreement was signed with Elsevier Science publisher on June, 2002. CSIR labs at present are subscribing to 550 print journals. By paying 9% additional cost on the subscription cost of print journals, all the scientists in 38 CSIR laboratories have now unlimited access to 1800 full-text e-journals of Elsevier Science. The NISCAIR serves as a nodal agency, dealing with publishers and CSIR laboratories, monitoring the usage statistics etc. It has been observed that over 1400 (70%) of these e-journals are being accessed by the scientists for their study and research. With the success of this Consortium, it is planned to increase the access to 3000 more e-journals from 11 publishers.

### **Electronic Document Delivery Systems**

The system employing electronic technology for the receipt of requests and supply of documents are known as Electronic Document Delivery Systems (EDDS). "Inside" and "Secure Electronic Delivery" of BLDS are examples of EDDS. In this section you will study some of the EDDS operating in the world.

In most of the Document Delivery Centres, maximum demand (ranging from 70% to 80%) is for journal articles. This is because; the scholarly journal is considered the most preferred medium for publishing the R&D results by the researchers. The scholarly journal and its associated services such as current awareness services, indexing and abstracting services are undergoing significant changes due to electronic publishing and the Internet. The emergence of e-journals has made most significant impact. Traditional publishers are making available electronic version of their journals on the Internet. New generation of e-journal service providers have emerged. These include aggregators like Ingenta and Catchword, subscription-cum-aggregation agencies like EBSCO, portal-cum-aggregation services like Biomednet, bibliographic-cum-document delivery service like Infotrieve and Proquest online information service. Citation linking, across journals, and from bibliographic to full-text articles, has been another major development. New pricing models like pay-per-view and transaction-based models are emerging.

### **Article Delivery Over Network Information System (ADONIS)**

ADONIS, a full-text, CD-ROM storage and retrieval system is widely known example of an electronic document delivery product, initiated

NOTES

and developed by a consortium of biomedical publishers. ADONIS started as a trial project. Ten international publishers, concerned about the widespread photocopying of their material, developed an optical disk system to create journal archives for sale of single article on demand. By joining together, the publishers were able to provide a comprehensive service for frequently requested titles in the field of biomedical and life sciences. In ADONIS process, the journals were scanned as soon as they were published. The machine-readable images were stored on CD-ROM, which were shipped to participating libraries and document delivery centres along with cumulated indexes for searching the articles. ADONIS also supplied two sets of software, one for article retrieval management and other for generating the statistics of usage. ADONIS system provided on-screen page browsing as well as printing facilities. Libraries receiving CD-ROM disks searched the articles on their personal computers (PC/AT) with compatible CD-ROM drive and laser printer. The required article thus printed could be sent to the requester by mail or by fax. The printing was automatically monitored on site in the libraries and a quarterly report generated and sent to ADONIS on floppy disk to be decoded for per article billing. ADONIS was commercially launched in 1991, after 10 years of development. By the middle of 1997, ADONIS was providing full-text articles of 850 biomedical journals from over 70 publishers to the subscribing libraries. The annual subscription fee was about 16,000 U.S. dollars. ADONIS stopped this CD-ROM product sometime in the year 1997. The availability of full-text journals on the Internet providing wide range of options such as online searching, viewing and ordering the electronic delivery of single article and paying-per-article basis, probably led to the closure of this product.

***Inter-Library Loan Service of Online Computer Library Centre (OCLC ILL)***

The Inter-library Loan Service of OCLC, is world's largest online computerised ILL service used by over 6928 libraries, resource centres and document suppliers around the world. OCLC, an online library network was set up in 1969 in USA to facilitate co-operative computerised cataloguing. Over the years the number of libraries increased and size of its online union catalogue (called WorldCat) grew many folds. At present WorldCat, a worldwide union catalogue created and maintained by 9000 member institutions, has over 52 million records. As WorldCat grew, the combination of bibliographic records and library holdings made it a useful resource for inter lending purposes as well. OCLC started its OCLC ILL subsystem in January 1979. At present more than 45,000 libraries in 84 countries around the world use OCLC services to locate acquire, catalogue, lend and preserve library materials. OCLC ILL system handles about 8 million requests a year. OCLC ILL is fully automatic networked borrowing and lending system. A

NOTES

borrowing library sends an online request to potential lending libraries. Each lending library in the system has a total of 4 system days to respond to the request before it is passed on to the next lending library. The ILL system, as online communication mechanism, automatically forwards the request in turn to the next lender until the request is fulfilled. After agreeing to supply the item, the lender adds to the ILL record information concerning the restriction of use of loaned item, the mode of delivery, due date and instructions, charges to the borrower and any special notes about the loan. The request, thus, does not get blocked in the system while the lender does nothing. In terms of level of service, as the system is library-to-library, this is negotiated between borrower and lender. Generally turn around times are quick, although, may be slower for international loans. OCLC pricing is based on the transaction. There are two pricing issues: The cost of ILL (which is between libraries), and OCLC system cost. OCLC charges on transaction bases, so libraries only pay as they use the system. OCLC ILL Fee Management software tracks and reconciles ILL charges automatically and sends the bill to the concerned library. OCLC ILL is integrated with OCLCs FirstSearch reference service (providing access to over 60 databases) as well as WorldCat. The overall satisfaction rate is 95%.

OCLC ILLiad is web-based resource sharing management software, which automates routine inter library loan functions, manages borrowing, lending, and document delivery of journal articles through a single window based interface. It has seamless, integrated interface to both, WorldCat and OCLC ILL. It is also integrated with OCLCs FirstSearch search service and ILL Direct Request Service. Library users can send request directly and track the request electronically through the web. ILLiad processes requests and contacts users when request is completed and delivers documents to users desktops electronically. It generates detailed reports in real time that helps users to track the workflow. Lending reports help the borrowing-libraries to view up-to-date tracking information sent through online systems. Copyright management system in ILLiad software allows inter-library loan staff to track and monitor all user-based requests for journal articles. ILLiad can send and receive request through National Library of Medicine's DOCLINE and ISO ILL. The inter-library loan staff of Virginia Polytechnic Institute and State University developed OCLC ILLiad software. It has been expanded and enhanced by Atlas Systems Inc. Atlas continues to be provider to OCLC for support and development of this software product. (<http://www.oclc.org/>)

**DOCLINE: ILL System of National Library of Medicine, USA**

DOCLINE is National Library of Medicine's (NLM) automated Inter-Library Loan (ILL), request and order referral system. The system

NOTES

was developed to improve DDS by linking journal holdings of National Network of Medical Libraries (NN/LM) by routing requests quickly throughout the network. NN/LM is a network of health science libraries and information centres throughout U.S. Requests can be created, edited, routed, received and filled in by using the DOCLINE system. DOCLINE participants can also check the status of their requests for which they are either the borrowing or lending library. DOCLINE covers over 3200 U.S., Canadian and Mexican Medical libraries at no cost. DOCLINE consists of three main functions: (i) DOCUSER- user institutional information including address, contact name, ILL services, NN/LM membership information and routing tables; (ii) SERHOLD- journal holdings information. SERHOLD contains over 1.4 million journal holdings of about 3200 libraries; and (iii) REQUESTS- the functions of borrow, lend and status/cancel. Each DOCLINE member library receives quarterly summary reports on its activities as a lender and as a borrower. These reports are available online. The Electronic Fund Transfer System (EFTS) is a billing system used by medical libraries in U.S. and Canada. Participants establish an account with University of Connecticut Health Centre. Lenders upload billing data for DOCLINE or other transactions. Their accounts are credited and borrower's accounts are debited. Lenders pay a 3% fee of the amount collected. EFTS has virtually eliminated the need to create invoice and write cheques for reimbursement for ILL and document delivery between participants. EFTS generates monthly transaction reports, can handle variable charges and non- DOCLINE transactions.

PubMed service of NLM, USA provides access to over 15 million citations for biomedical articles dating back to 1950s. The citations are from MEDLINE and additional life science journals. PubMed includes links to many sites providing full-text articles and other related resources. PubMed Central (PMC) is free digital archive of biomedical and life sciences journal literature maintained by NLM. All journals in PMC provide free access to full-text articles. One can use PMC OAI Service to download XML for the full-text open access articles and PMC FTP Service to download a complete set of files - XML, images, PDF and supplementary data files if any. A list of 92 open access journal titles is available on the site.

Relias is electronic document delivery and ILL management system used by the National Library of Medicine and National Institute of Health. Relias International Inc. provides systems and software to automate and streamline operations in traditional ILL and Document Delivery Services. Documents are scanned and automatically delivered by the system via the borrower's requested delivery method. Delivery options include Ariel, E-mail, Fax, Mail and Web. Electronically delivered articles can be supplied in either PDF or TIFF format. (<http://www.nlm.nih.gov/>)

### ***E-Journal Service Providers***

The availability of full-text electronic journals on the Internet has changed the document delivery scenario significantly. Full-text e-journals on the Internet provide a wide range of options for the user, ranging from searching the bibliographic databases, selecting the retrieved citations, viewing the relevant article(s) to the delivery of the article(s) electronically on the user's desktop. The publishers either themselves are providing their e-journals on the Internet (e.g., SpringerLink and ScienceDirect from Springer-Verlag and Elsevier Science publishers) or making them accessible through e-journal service providers (EBSCO, Infotrieve, Proquest, etc.). This section provides a brief account of such services available on the Internet.

### NOTES

ScienceDirect (<http://www.sciencedirect.com>): Launched since 1997, Science Direct has evolved from web database of Elsevier journals to one of the world's largest providers of scientific, technical and medical (STM) literature online. ScienceDirect provides online access to about 1900 full-text (STM) journals, 12 bibliographic S&T databases (like MEDLINE, BIOBASE, BIOSIS Previews, EMBASE, COMPENDEX, INSPEC, etc.) and over 27 reference works (S&T Encyclopaedias and Dictionaries). ScienceDirect Web Edition service, provides subscribers to browse all Elsevier journals available on ScienceDirect platform, link to table of contents and access abstracts. Link from abstracts to full-text article(s) is provided for most Elsevier journals and subscribers can download full-text articles in PDF or HTML format on their desktop. Nearly 6 million articles are available online, including articles in press which offer rapid access to recently accepted manuscripts. The coverage includes 1800 journals published by Elsevier and dynamic linking to journals published by other 170 STM publishers through CrossRef (a Publishers' Consortia). Elsevier publisher offers a variety of subscription and access options to libraries and information institutions, such as ScienceDirect Onsite, ScienceDirect Limited, ScienceDirect Complete, ScienceDirect Article Choice, etc.,

SpringerLink (<http://www.springerlink.com>): This is online information service for scientific, technical and medical journals and books from Springer-Verlag publisher. Springerlink currently offers to the subscribers online full-text access to 500 (as on September 2004) STM journals and over 2000 book series. Free access is provided to search functions, table of contents as well as keywords and table of contents alerts. SpringerAlert is free of charge service that notifies users via e-mail whenever a new article or journal is electronically available. It sends table of contents and provide direct link to the abstracts. Users can sign up for *Table of Contents Alert*, *Keyword Alert* and *Subject Alert* also. Onlinefirst service provides users to access peer reviewed articles well before print publication. Users can also expand their search with reference linking found within articles in SpringerLink by clicking on references within the article. Springerlink also offers a pay-per-

NOTES

view option to non subscribers for its journals and some book series articles.

J-Gate (<http://www.informindia.co.in>): J-gate is an electronic gateway to global e-journal literature. Launched in 2001 by Informatics India Ltd., J-Gate provides access to over 4 million articles of e-journals available online. It has a database of journal literature indexed from 11880 + e-journals with links to full-text articles at publishers' sites. J-Gate presently hosts contents of 11800 + e-journals, provides access to 820 online journals and captures and indexes articles from 2910 open access journals and maintains link to them. J-Gate offers two types of services: (i) J-Gate Portal and (ii) J-gate customized services. J-Gate portal service provides table of contents of latest issues of journals and a comprehensive online searchable database of over 4 million articles with daily addition of over 4000+ articles. Table of Contents (TOC) provides link to full-text articles at publishers site. Presently link to e-journals from over 3500 publishers are available. J-Gate customized services offer J-Gate Custom Content (JCC) and J-Gate Custom Contents for Consortia (JCCC). JCC is local Intranet/Internet solution to libraries providing e-access for subscribed journals. The service provides TOC and database service to all the journals subscribed by the library. Customised software is installed at library's premises. TOC and database contents are updated weekly. JCCC service is for homogeneous group of libraries that wish to share resources. JCC software is installed at participating libraries. Common TOC and database service is provided to all the libraries, which have formed a consortium, and provides link to union catalogue for resource sharing. E-mail request for article delivery can be sent directly by the user while browsing articles/abstracts to any chosen library participating in the consortia. J-Gate plans to support online subscription to journals, electronic document delivery, and archiving and other related services.

Infotrieve Inc.'s Document Delivery Service and Ariel: Infotrieve is a commercial company providing research information services to corporations, academic institutions, and professionals engaged in R&D activities in science, technology and medicine (STM).

Company's services include full-text document retrieval and delivery service, outsourced library services such as contract staffing and specialised library management and software application for document ordering, management and electronic delivery. The company's databases include ArticleFinder, eContents, Table Of Contents (TOC), and alerting service such as Table of Contents alert. In addition to that it provides links to MEDLINE, PubMed, Ovid, Silver Platter, and Web of Science through gateway. ArticleFinder database provides access to over 26 million articles. eContents database contains journal titles available for electronic article delivery. TOC is database of journal titles, which

NOTES

offer table of contents for over 21000 titles. Users using bibliographic citation and abstract databases and alerting services can order full-text article in paper or electronic form on a pay per article basis. Infotrieve offers multiple payment options including standard credit card payment, through deposit account or through invoice account. Cost per article includes service fee (varies from 12 to 14 US \$) plus royalty charges and delivery charges. Delivery options are through mail, e-mail, Ariel, Fax or Courier services. Ariel is an Internet document transmission system owned and supported by Infotrieve, Inc. The Ariel was originally developed by Research Library Group as a component of its "Shared Resources Program" (now called SHARES) after a beta test in 1990-1991 at 6 sites, it was released for sale and now being used worldwide for electronic document delivery purposes. As a part of a "Document transmission workstation" which includes IBM compatible microcomputer, scanner and laser printer, Ariel software permits user to scan, store, transmit, and print material. With the Ariel software an article in a paper journal can be scanned into PC and the image transmitted over the Internet to the other Ariel workstations anywhere in the world-using FTP or e-mail and convert them to PDF for easy patron delivery. Infotrieve has announced the release of Ariel version 3.4 (<http://www.infotrieve.com/ariel>), which has many additional features compared to the earlier versions of Ariel.

EBSCO Information Services (<http://www.ebsco.com>): EBSCO Information services is a division of EBSCO Industries Inc., providing information access and management solutions through print and electronic journal subscription services, research database development and production, online access to more than 100 databases and thousands of e-journals and e-commerce book procurement. EBSCO has specialised products and services for academic, medical, government, public and school libraries as well as corporations and other organizations. EBSCO maintains comprehensive database of more than 282,000 serial titles and has active relationship with over 60,000 publishers worldwide to distribute their products. EBSCO host Electronic Journal Service (EJS) handles electronic journals access and management needs of a library such as tracking the registration status of e-journals, authentication, assistance to facilitate both on campus and remote access to e-journal contents, automatic management of e-journal URLs, etc., EJS enhanced serves as a consolidated gateway that allows users to search and link to more than 10,000 journals and 5 million articles with desktop delivery. Access to TOCs/Abstracts of non-subscribed journals is also provided. Pay-per-view article purchasing option is available for more than one million articles. A basic version of this service is also offered to a library with a single site for accessing those journals to which the library subscribes through EBSCO. EBSCO A to Z service provides library patrons with a single comprehensive list of electronic journal

**NOTES**

titles. The Master A to Z database provide link and coverage information for 55,000 unique titles from more than 600 databases and e-journal packages from approximately 100 different providers. All major database vendors and publishers are represented. Free online journals (such as PubMed Central) and stand-alone e-journals are also included. The list is hosted on EBSCO's web servers requiring only a single hyperlink to the list on subscribing library's website. Pricing for EBSCO's A to Z service is based on number of unique titles (print or electronic) on the library's list. Several discounts are available.

ProQuest Information and Learning (<http://www.proquest.com>): ProQuest Information and Learning is a subscription based service from ProQuest Company, providing web access to more than 4000 newspapers and periodicals, many updated daily, and containing full-text articles from 1986. In addition, the ProQuest offers over a million of Doctoral and Master's dissertations (full-text) in print, microform or digital form and more than 100 products and services including indexing/abstracting services and full-text databases, for research and learning at all levels. These products and services are specifically designed for the needs of school, university, public library, government departments and companies around the world. Currently students, faculty, researchers and library patrons from U.S.A., Canada and 100 other countries, are using ProQuest services at the rate of 2.5 million page views per day. The UMI (formerly University Microfilm International) was the first commercial publisher of microforms, which provided microfilm version of scholarly publications to libraries for archival purposes and document delivery. Bell & Howell's acquisition of UMI in 1985, propelled company's expansion from microforms to electronic access products, first with CD-ROM products, and later with web-based ProQuest Information Service. In 2001, in recognition of ProQuest name and strength, Bell & Howell changed its name to ProQuest Company and UMI division became ProQuest Information and Learning.

### **Role of International Organisations in DDS**

Copyright issues, Inter-Library Lending (ILL) at national and international level, incompatibility of ILL protocols for electronic document delivery and restrictions imposed on the storage and delivery of documents electronically by publishers are some of the problems faced by DDS operators. International Convention on Copyright and Universal Convention on Copyright, of which India is also a signatory, acknowledge the exclusive rights of authors or publishers over their literary work, but at the same time permit to make single copy of the document for educational purposes for the benefit of the users. However Copyright laws in relation to electronic media are ambiguous and are continuously changing. To prevent unauthorised use and exploitation of electronic material, most of the publishers are selling their e-publications under

licensed agreement. The license agreements have rigid clauses, which impose number of restrictions on the library on the use of these e-publications. These problems are discussed at international forums and many international agencies are actively involved in finding solutions to them.

## NOTES

Internationally, IFLA (International Federation of Library Associations and Institutions) under its Universal Availability of Publications (UAP) Programme and Office for International Lending, has been promoting the availability of publications. It issued standard request forms for ILL, issued voucher scheme to facilitate overseas international inter library loan transactions, and published guidelines for international lending. The Guidelines, "International Lending and Document Delivery: Principles and Guidelines for Procedure" were important step forward in attempting to establish key standards for inter-lending between countries. The guidelines were first published in 1954; they were revised in 1978 and again in 2001. Under IFLA's Voucher Scheme, IFLA issues plastic vouchers for US \$8 and US \$4 to facilitate international inter-library loan transactions. Libraries purchase and use these vouchers for paying inter-library loans or photocopies. Vouchers are valid indefinitely and can be used again and again by participating libraries. Libraries, which accumulate vouchers by doing more lending than borrowing, can redeem vouchers from IFLA for original purchase price with no administration fee. The IFLA voucher scheme was launched in 1995 and has continued to expand ever since. This is, because, it avoids involving library's finance department in ILL payments, gives libraries far greater flexibility in making ILL requests, and helps them to overcome the difficulties in sending small amounts of money overseas for ILL, which include lack of access to hard currency, high banking charges, exchange difficulties and administrative costs. IFLA Office for UAP and International Lending was setup in British Library, Boston Spa in 1974 and closed at the end of March 2003. With the closure of the office, the management of IFLA voucher scheme has moved to IFLA headquarters in The Hague. The value of existing vouchers has changed from US \$8 and US \$4 to Euro8 and Euro4. All the vouchers in circulation, however, remain valid and can be used in the usual way. IFLA Committee on Copyright and other Legal Matters (CLM) represents the voice of international library community in copyright concerns. The Joint Steering Group of IFLA and IPA (International Publishers Association) promote common principles on copyright and electronic environment. IFLA Document Delivery and Inter-lending Section is the forum in IFLA for libraries and associations concerned with making information in all formats available throughout the world through a variety of resource sharing and document supply techniques. The Section's prime objective is to extend and improve document delivery and inter-lending, both nationally and internationally

NOTES

through the use of new technologies and increased cooperation among libraries. (<http://www.ifla.org>)

**ISO ILL.** The International Standard for Inter-library Loan: ISO ILL 10160 and 10161 are ISO standards for inter-library loan. These standards provide technical definition of messages as well as set of rules on how to use those messages between the systems. Many libraries that use multiple ILL methods, are implementing ISO ILL compliant systems, because they enable the libraries to manage all their ILL transactions in a single database. Depending on the system, this allows them to take advantage of other system features such as copyright tracking or searching bibliographic databases. (<http://www.iso.org>)

**COUNTER** (<http://www.projectcounter.org>). In recent years there has been growing awareness of the need for an international effort, involving vendors, librarians and intermediaries, to develop acceptable global standards for measuring online usage. Launched in March 2002, COUNTER (Counting Online Usage of Networked Electronic Resources) is an international initiative designed to serve librarians, publishers, and intermediaries by facilitating the recording and exchange of online usage statistics. In December 2002, COUNTER released a Code of Practice that provide among other things, guidance in data elements to be measured, definition of these data elements, usage report content and formats, as well as on data processing. COUNTER will initially focus on journals and databases. E-books and other types of material will be covered in subsequent releases of Code of Practice. COUNTER is developed with the joint efforts of library associations, publishers associations, NISO, etc. COUNTER will also establish an organisational framework and technical/business model for ongoing implementation and development of Code of Practice.

International Coalition of Library Consortia (ICOLC) is an informal organisation comprising about 60 library consortia in USA, Canada, UK, The Netherlands, Germany, Israel and Australia, promoting the interest of library consortia. The Coalition represents over 5000 member libraries worldwide. Recently the ICOLC has issued Statement of Current Perspective and Preferred Practices for Selection and Purchase of Electronic Information. It states that " Licenses should permit the 'fair use' of all e-information for non-commercial, instructional and scientific purposes by authorised users, including unlimited viewing, downloading and printing in agreement with the provisions in current copyright practices as applicable in the country of origin. Providers should allow e-information (such as electronic copies of journal articles) to be used (to generate whether in print or electronic form) for non-commercial inter-library loan between two academic libraries in support of teaching, learning and research missions." (<http://www.library.yale.edu/consortia/icolcpr.htm>)

## Document Delivery Service: Emerging Trends

Two contradictory trends in document supply are being observed. Firstly, libraries have option to purchase information in smaller units, like articles (of periodicals) rather than subscribing to these journals and this information can be obtained via document delivery, inter-library loan or pay-per-view download. Secondly, libraries are becoming part of library consortia for site licensing of electronic scholarly publications (Like e-journal consortium of CSIR), which is making increased amount of contents available to individual library, thereby reducing the need for document supply. Watts (2003) has identified first trend as "Separate Economy" and second as "Big Deal". National document delivery centres like BLDS, CISTI in Canada and INIST in France are witnessing decline in requests for document supply. Cambell (2003) has identified three threats to future of document delivery centres: (i) Journal Legacy, (ii) Aggregated Databases and (iii) The Open Archives Initiatives. "Journal Legacy"- The publishers are digitising their back runs of journals. This will reduce the demands for document supply from older journal issues by the patrons from document delivery centres. "Aggregated Databases"—Agencies like EBSCO and ProQuest, with license rights from primary publishers are providing online access to full-text online aggregated databases. They are also providing links from secondary services to the full-text article online. "The Open Archive Initiative"- availability of open access journals on the web like PubMed Centre are also reducing the demands for document supply. It is also felt that libraries may take the role of archiving material from its faculty and offer free access to research community over the web.

In brief, in this section we have described how document delivery is the culminating point of all the access services and plays a vital role in information access and dissemination. The meaning of document delivery service, need and essential characteristics of the service have been discussed. Various document delivery systems/models have been described. Highlighted how modern computers, telecommunication technologies, Internet and World Wide Web are exerting great impact on document delivery systems. Problems associated with document delivery services and role of international organizations in finding solutions to these problems have been highlighted.

---

## 2.8 CONCEPTS AND PROCESS OF DOCUMENTATION

---

Documentation may be defined as the process of communicating about the system. The person who is responsible for this communication is called documenter. It may be noted that documenter is not responsible for the accuracy of the information, and his job is just to communicate or transfer the information.

NOTES

The ISO standard ISO/IEC 12207:1995 describes documentation "as a supporting activity to record information produced by a system development life cycle process."

Why documentation?

NOTES

Documentation is needed because it is

- A means for transfer of knowledge and details about description of the system
- To communicate among different teams of the software project;
- To help corporate audits and other requirements of the organization;
- To meet regulatory demand;
- Needed for IT infrastructure management and maintenance; and
- Needed for migration to a new software platform.

Document communicates the details about the system targeted at different audience. It explains the system. The ever-increasing complexity of information system requires emphasis on well-established system of documentation. Every information system should be delivered along with an accurate and understandable document to those who will use the software.

Traditionally, documentation was done after the development of the software is completed. However, as the software development process is becoming complex and involved, documentation has become an integral part of each system development process. Documentation is now carried out at every stage as a part of development process. We will also discuss how documentation affects quality of the software later in this section.

When the process of documentation is undertaken as a separate process, it requires planning in its own right. The figure below shows, how at the development process, documentation is done alongside each step. Design and development activities of software depend on a certain base document. Documentation is to be carried out before actually implementing the design. In such a case, any flaw in design identified can be changed in the document thereby saving cost and time during implementation. If documentation is being developed for an existing software, then documentation is done along side the software development process.

### **The Process of Documentation**

The following are various steps involved in the process of documentation:

**Collection of Source Material.** The very first step of any documentation process is to acquire the required source material for preparation of document. The material is collected including specifications, formats,

screen layouts and report layouts. A copy of the operational software is helpful for preparing the documentation for user.

**Documentation Plan.** The documenter is responsible for preparation of a documentation plan, which specifies the details of the work to be carried out to prepare the document. It also defines and the target audience.

**Review of Plan.** The plan as set out in the process above is reviewed to see that material acquired is correct and complete.

**Creation of Document.** The document is prepared with the help of document generator.

**Testing of Document.** The document created is tested for usability as required by the target audience.

**Maintain Document:** Once the document is created and distributed, it must be kept up to date with new version of the software product. It must be ensured that the latest document is available to the user of the software.

### Types of Documentation

Any software project is associated with a large number of documents depending on the complexity of the project. Documentation that are associated with system development has a number of requirements. They are used by different types of audience in different ways as follows:

- They act as a means of communication between the members of development team
- Documents are used by maintenance engineer
- Documents are used by the user for operation of the software
- Documents are used by system administrator to administer the system.

### System Requirements Specification

System requirement specification is a set of complete and precisely stated properties along with the constraints of the system that the software must satisfy. A well designed software requirements specification establishes boundaries and solutions of system to develop useful software. All tasks, however minute, should not be underestimated and must form part of the documentation.

**Requirements of SRS.** The SRS should specify only the external system behaviour and not the internal details. It also specifies any constraints imposed on implementation. A good SRS is flexible to change and acts as a reference tool for system developer, administrator and maintainer.

### NOTES

## Characteristics of a System Requirements Specification (SRS)

### NOTES

1. All the requirements must be stated unambiguously. Every requirement stated has only one interpretation. Every characteristic of the final product must be described using a single and unique term.
2. It should be complete. The definition should include all functions and constraints intended by the system user. In addition to requirements of the system as specified by the user, it must conform to any standard that applies to it.
3. The requirements should be realistic and achievable with current technology. There is no point in specifying requirements which are unrealisable using existing hardware and software technology. It may be acceptable to anticipate some hardware developments, but developments in software technology are much less predictable.
4. It must be verifiable and consistent. The requirements should be shown to be consistent and verifiable. The requirements are verified by system tester during system testing. So, all the requirements stated must be verifiable to know conformity to the requirements. No requirement should conflict with any other requirement.
5. It should be modifiable. The structure and style of the SRS are such that any necessary changes to the requirements can be made easily, completely and consistently.
6. It should be traceable to other requirements and related documents. The origin of each requirement must be clear. The SRS should facilitate the referencing of each requirement for future development or enhancement of documentation. Each requirement must refer to its source in previous documents.
7. SRS should not only addresses the explicit requirement but also implicit requirements that may come up during the maintenance phase of the software. It must be usable during operation and maintenance phase. The SRS must address the needs of the operation and maintenance phase, including the eventual replacement of the software.

### *Rules for Specifying Software Requirements*

The following are the rules for specifying software requirements:

- Apply and use an industry standard to ensure that standard formats are used to describe the requirements. Completeness and consistency between various documents must be ensured.
- Use standard models to specify functional relationships, data flow between the systems and subsystems and data structure to express complete requirements.

- Limit the structure of paragraphs to a list of individual sentences to increase the tractability and modifiability of each requirement and to increase the ability to check for completeness. It helps in modifying the document when required.
- Phrase each sentence to a simple sentence. This is to increase the verifiability of each requirement stated in the document.

**NOTES**

**Structure of a Typical SRS Document:**

1. Introduction
  - System reference and business objectives of the document.
  - Goals and objectives of the software, describing it in the context of the computer-based system.
  - The scope of the document.
2. Informative description about the system
  - Information flow representation.
  - Information content and structure representation.
  - Description of subsystems and System interface.
  - A detailed description of the problems that the software must solve.
  - Details of Information flow, content, and structure are documented.
  - Hardware, software, and user interfaces are described for external system.
3. Functional description of the system
  - Functional description.
  - Restrictions/limitations.
  - Performance requirements.
  - Design constraints.
  - Diagrams to represent the overall structure of the software graphically.
4. Test and validation criteria
  - Performance limitation, if any.
  - Expected software response.
  - It is essential that time and attention be given to this section.
5. Glossary
  - Definitions of all technical or software-specific terms used in the document.
6. Bibliography
  - List and reference of all documents that relate to the software.

## 7. Appendix

- Supplementary information to the specification.

### NOTES

### **System Design Specification**

The system design specification or software design specification as referred to has a primary audience, the system implementer or coder. It is also an important source of information for the system verification and testing. The system design specification gives a complete understanding of the details of each component of the system, and its associated algorithms, etc.,

The system design specification documents all as to how the requirements of the system are to be implemented. It consists of the final steps of describing the system in detail before the coding starts.

The system design specification is developed in a two stage process: In the first step, design specification generally describes the overall architecture of the system at a higher level. The second step provides the technical details of low-level design, which will guide the implementer. It describes exactly what the software must perform to meet the requirements of the system.

### **Tools for Describing Design**

Various tools are used to describe the higher level and lower level aspects of system design. The following are some of the tools that can be used in the System Design Specification to describe various aspects of the design.

#### **Data dictionary**

Definition of all of the data and control elements used in the software product or sub system. Complete definition of each data item and its synonyms are included in the data dictionary. A data dictionary may consist of description of data elements and definitions of tables.

#### **Description of Data Element.**

- Name and aliases of data item (its formal name).
- Uses (which processes or modules use the data item; how and when the data item is used).
- Format (standard format for representing the data item).
- Additional information such as default values, initial value(s), limitations and constraints that are associated with the data elements.

#### **Table definitions**

- Table name and Aliases.
- Table owner or database name.

- Key order for all the tables, possible keys including primary key and foreign key.
- Information about indexes that exist on the table.

**Database schema.** Database schema is a graphical presentation of the whole database. Data retrieval is made possible by connecting various tables through keys. Schema can be viewed as a logical unit from programmer's point of view.

**E-R model.** Entity-relationship model is database analysis and design tool. It lists real-life application entities and defines the relationship between real life entities that are to be mapped to database. E-R model forms basis for database design.

**Security model.** The database security model associates users, groups of users or applications with database access rights.

**Trade-off matrix.** A matrix that is used to describe decision criteria and relative importance of each decision criterion. This allows comparison of each alternative in a quantifiable term.

**Decision table.** A decision table shows the way the system handles input conditions and subsequent actions on the event. A decision table is composed of rows and columns, separated into four separate quadrants.

Input Conditions

Condition Alternatives

Actions

Subsequent action Entries

### **Timing diagram**

Describes the timing relationships among various functions and behaviours of each component. They are used to explore the behaviours of one or more objects throughout a given period of time. This diagram is specifically useful to describe logic circuits.

### **State machine diagram**

State machine diagrams are good at exploring the detailed transitions between states as the result of events.

*Que-5*

---

## **2.9 DIFFERENT STANDARDS FOR DOCUMENTATION**

This software documentation standard is used in the organization for uniform practices for documentation preparation, interpretation, change, and revision, to ensure the inclusion of essential requirements of different standards. Sometimes, documentation as per various standards is stated in the contractual agreement between the software vendor and the customer.

This standard will also aid in the use and analysis of the system/sub-system and its software documentation during the system/software life cycle of a software project. Documentation comes in many forms,

NOTES

e.g., specifications, reports, files, descriptions, plans, source code listings, change requests, etc., and can be in electronic or paper form.

The Documentation Standard defines various aspects of documentation such as style, format, and the document revision/change process of these documents.

## NOTES

The International Standards, ISO/IEC 12207—Software life cycle process, describes documentation as one of the supporting parallel process of software development process. It may be noted that this standard is not documentation standard but describes the process of documentation during the software development process. The following are other documentation standards:

1. **ISO/IEC 18019.** Guidelines for the design and preparation of user documentation for application software.

This standard describes how to establish what information users need, how to determine the way in which that information should be presented to the users, and then how to prepare the information and make it available. It covers both online and printed documentation. It describes standard format and style to be adopted for documentation. It gives principles and recommended practices for documentation.

2. **ISO/IEC 15910.** Software user documentation process

This standard specifies the minimum process for creating user documentation for software that has a user interface, including printed documentation (e.g., user manuals), online documentation, help text and online documentation systems.

3. **IEEE 1063.** Software user Documentation

It provides minimum requirement for structure, information content and format for user documentation. It does not describe the process to be adopted for documentation. It is applicable for both printed and online documentation.

### **Components of software user documentation as described in IEEE 1063: Software user documentation:**

Components of software user documentation:

1. Identification data (e.g., Title Page)
2. Table of contents
3. List of illustrations
4. Introduction
5. Information for use of the documentation such as description of software etc.,
6. Concept of operations
7. Procedures

8. Information on software commands
9. Error messages and problem resolution
10. Glossary (to make the reader acquainted with unfamiliar terms)
11. Related information sources
12. Navigational features
13. Index
14. Search capability (for electronic document).

NOTES

Documentation involves recording of information generated during the process of software development life cycle. Documentation process involves planning, designing, developing, distributing and maintaining documents.

During planning phase, documents to be produced during the process of software development are identified. For each document, following items are addressed:

- Name of the document
- Purpose
- Target audience
- Process to develop, review, produce, design and maintain.

The following form part of activities related to documentation of development phase:

- All documents to be designed in accordance with applicable documentation standards for proper formats, content description, page number, figure/table.
- Source and accuracy of input data for document should be confirmed.
- Use of tools for automated document generation.
- The document prepared should be of proper format. Technical content and style should be in accordance to documentation standards.

Production of the document should be carried out as per the drawn plan. Production may be in either printed form or electronic form. Master copy of the document is to be retained for future reference.

### **Maintenance**

As the software changes, the relevant documents are required to be modified.

Documents must reflect all such changes accordingly.

---

## **2.10 DOCUMENTATION AND QUALITY OF SOFTWARE**

---

Inaccurate, incomplete, out of date, or missing documentation is a major contributor to poor software quality. That is why documentation and document control has been given due importance in ISO 9000

NOTES

standards, SEI CMM software Maturity model. In SEI CMM Process Model and assessment procedure, the goal is to improve the documentation process that has been designed. A maturity level and documentation process profile is generated from the responses to an assessment instrument.

One basic goal of software engineering is to produce the best possible working software along with the best possible supporting documentation. Empirical data show that software documentation products and processes are key components of software quality. Studies show that poor quality, out of date, or missing documentation are a major cause of errors in software development and maintenance. Although everyone agrees that documentation is important, not everyone fully realizes that documentation is a critical contributor to software quality.

Documentation developed during higher maturity levels produces higher quality software.

### Good Practices for Documentation

1. Documentation is the design document. The time to document is before actually implementing any design. A lot of effort can be saved in such cases.
2. Good documentation projects the quality of software. Many people take poor, scanty, or illiterate documentation for a program as a sign that the programmer is sloppy or careless of potential users' needs. Good documentation, on the other hand, conveys a message of intelligence and professionalism. If your program has to compete with other programs, better make sure that your documentation is at least as good as your competitors.

---

### SUMMARY

---

- This Unit has dealt with four responsive information services viz. literature search service, technical enquiry service, document delivery service and translation service. It has been observed that advances in computers and telecommunication technologies are exerting great impact on these services. For instance, in literature searches, the availability of electronic databases offers speed, currency and wide range of search options. The compilation of comprehensive subject bibliography manually, was a time consuming and laborious process. Computer-based searching has made the process less time consuming. Moreover, it has offered other benefits such as in depth searching and free text searching. Similarly, the availability of electronic trade and business databases, company's websites, government's websites, etc., has greatly enhanced the technical enquiry service. The Electronic Document Delivery Systems (EDDS) involving libraries and commercial document suppliers are emerging.

There is a global trend toward linking of electronic retrieval of bibliographic references with electronic full-text retrieval of documents. New generation of e-journal service providers have emerged. These include publishers as well as aggregators. The problems associated with document delivery service are attracting worldwide attention and many international organisations are playing active role in solving these problems. Reduction in funding for information services has resulted in significant decline in translations made on ad hoc bases. This has led to the closure of International Translation Centre as well as its prestigious publication World Translation Index. Research in machine translation has resulted in a number of MT systems for mainframe, personal computers and for Internet. The availability of computer based translation tools such as computer based multilingual dictionaries, terminological databanks, multilingual word processing, and translation memories are greatly facilitating the translation process by professional translators.

## NOTES

---

### REVIEW QUESTIONS

---

1. What do you understand by different generations of online searching? Discuss briefly.
2. Discuss about technical enquiry? How it differs from general inquiry?
3. What is query analysis?
4. Describe the importance of e-mail reference service?
5. What are the major digital reference service projects in operation? Explain their functions.
6. Define types of document delivery systems and models?
7. What do you understand by e-journals consortium? Discuss with examples.
8. Discuss the role of International organization's in DDS.
9. Define concepts and process of documentation.

---

### FURTHER READINGS

---

1. Manual of Reference and Information Sources, Sewa Singh, B R Pub, 2004.
2. Information System Management, M.Y. Kamat, Pointer Pub, 2002.
3. Introduction of Computers and information System, Sushila Madan, Taxmann, 2007.
4. Web based Information System, S K Dass, Shree Pub, 2007.

## UNIT III GLOBAL INFORMATION SYSTEMS AND PROGRAMMES

### NOTES

#### ★ STRUCTURE ★

- 3.1 Introduction
- 3.2 Un-based Information Systems and Programmes
- 3.3 UNESCO'S Current Activities
- 3.4 UNISIST (World Science Information System)
- 3.5 PGI (General Information Programme)
- 3.6 Regional Information Systems and Networks
  - *Summary*
  - *Review Questions*
  - *Further Readings*

#### LEARNING OBJECTIVES

After going through this unit, you will be able to:

- know about un-based information systems and programmes
- describe UNESCO'S current activities
- explain UNISIST and PGI
- describe regional information systems and networks

### 3.1 INTRODUCTION

In the library and information field, international organisations help in maintaining cooperation and good relations among countries for exchanging and sharing information, ideas, experiences. United Nations is an organisation that provides an appropriate framework which acts as a forum where several problems can be discussed and solved. The role played by professional bodies especially international ones, is manifold as they have facilitated distribution of technological information and promoted technical cooperation among developing countries. The social problems faced by developing countries are priority issues with these organisations and many efforts to find solutions to these problems have been made.

Let us now study some of representative international organisations.

---

## 3.2 UN-BASED INFORMATION SYSTEMS AND PROGRAMMES

---

### **United Nations Educational Scientific and Cultural Organisation (UNESCO)**

#### NOTES

UNESCO was established in 1946. It is a specialised agency of the United Nations Systems concerned with information matters. The objectives of UNESCO at the time of its inception were: encouraging international intellectual cooperation, speeding up development through operational assistance to Member States, and promoting peace, human rights and international understanding. Article I of its constitution stipulated that the organisation shall:

“maintain, increase and diffuse knowledge by encouraging cooperation among the nations in all branches of intellectual activity, the exchange of publications and other materials of information, and by initiating methods of international cooperation calculated to give the people of all countries access to the printed and published materials by any of them.”

UNESCO's earliest activities include mainly to help Member States rebuild their libraries destroyed during World War II. A careful analysis of UNESCO's efforts to assist its Member States in the development of their documentation, library and archival services initially indicated five trends:

- (a) **Principles and Structure of Documentation, Library and Archives Services.** UNESCO through its various principles has contributed a lot on documentation, library and archives services. The UNESCO Public Library Manifesto gave a new image and wide scope to public libraries. UNESCO influenced the development of public libraries in many Member States and underdeveloped countries and recognised the role of libraries in educating the communities.

UNESCO also concerned itself with school libraries and educational documentation services both as an essential aid to education and an ideal means of establishing the reading habit among different groups of people.

Concerning the university and special libraries, UNESCO initiated several activities like seminars, technical assistance missions, grants, publications, etc. to improve the services of libraries in Member States. UNESCO's contribution to the development of scientific and technical documentation centres helped Member Countries to overcome problems of information explosion and paved the way for the increase of S&T research. UNESCO also recommended Member Countries the setting up of a National

NOTES

System (NATIS) which helped to lay the foundation of national, regional and international cooperation in information services.

- (b) **Internationalisation of Documentation, Library and Archives Services.** UNESCO has contributed to a great extent in the internationalisation of documentation, library and archives services at national, regional and international levels. It helped in the free flow of information and documentation embodying the product of human intellect. Its periodic associations with international non-governmental organisations like FID, IFLA and ICA have enabled it to extend its programme of activities. Many international seminars, workshops, conferences, courses, have been organised throughout the world. UNESCO sponsored and funded many publication programmes.
- (c) **Professional Training.** Lack of qualified professional staff has been a serious problem in developing and underdeveloped countries. UNESCO gave high priority to this problem and as a result several specialised courses, meeting of experts, courses for teachers in schools of librarianship were organised, scholarships were arranged and regional training centres were set up.
- (d) **Book Promotion.** A familiar problem in most of the developing countries is lack of books in vernacular languages. UNESCO organised a number of regional meetings to study this problem and as a result regional book promotion centres have come up with the help of Member States.
- (e) **The Future.** UNESCO efforts have increased international cooperation and on these lines all the future activities have been organised. A lot of stress is being given to communications and computer technologies and their application in development of information systems. Some other steps taken include introduction of UNESCO Book Coupons, securing postal concession for books and development of bibliographic services and tools.

The activities aim at improving national and regional programmes. This includes sending consultants to advise on development of training programmes and to participate in launching seminars and refresher courses, in-service training to managers and training programmes for users.

Numerous publications have been published and widely distributed and utilised on a variety of subjects like policy on education, curriculum development, use of AV materials and education of users.

---

### 3.3 UNESCO'S CURRENT LIBRARY ACTIVITIES

---

The changing role of libraries and information centres and the development of modern information technologies, especially the Internet, has created

a new environment which has stressed the need to provide new dimensions to the role of traditional libraries. With this in view, UNESCO established the Communication and Information Sector (CI) in 1990.

The chief objectives of the CI Sector's programme are:

"Promoting the free flow of ideas and universal access to information.

Promoting the expression of pluralism and cultural diversity in the media and world information networks.

Promoting access for all to ICTs."

In addition to the Regular Programme, the CI Sector implements various inter-regional, regional and national projects with extra-budgetary funding mainly in Africa, the Arab States, Asia, the Pacific, Latin America and the Caribbean. The Sector collaborates with UN agencies.

### ***UNESCO's Activities by Theme***

The various themes under which UNESCO carries out its various activities include:

Archives

Community Media

Community Multimedia Centres

Creative Content (Radio, TV, etc.)

Education and Information Communication Technologies

e-governance

Ethical Issues Related to Information Society

Freedom of Expression

Independent Press

Information Society

Information for Community Development

Information Literacy

Information Processing Tools

Legislation in Information Society

Media Education

Libraries

Media Development

Preservation of Documentary Heritage

People with Disabilities and ICT

Public Domain Information

Public Service Broadcasting

Recycling IT Equipment

NOTES

***UNESCO's Activities by Region/Country***

**NOTES**

Africa

Asia and the Pacific

Arab States

Europe and North America

Latin America/Caribbean

Other World

***Networks of UNESCO***

- MEDLIB—Internet-based Virtual Library Network
- APIN—Asia and Pacific Information Network
- RINAF—Regional Information Society Network for Africa
- JOURNET—Global Network for Education in Journalism
- UNAL—UNESCO Network of Associated Libraries
- INFOYOUTH—International Information and Data Exchange Network on Youth
- ACCESS-net—Association of Computer Centres for Exploiting Sustainable Synergy
- HeritageNet—The Electronic Network of Cultural Institutions in Central Asia
- INFORLAC—Information Society Programme for Latin America and the Caribbean
- ORBICOM—International Network that Links Communications Leaders
- UNESCO Chairs/UNITWIN—The International Network of UNESCO Chairs in Communications

Details of some of the networks of UNESCO are given below:

ORBICOM is an international network that links communications leaders from academic, media, corporate and government circles for providing for exchange of information and the development of shared projects.

UNAL, established in 1990 to promote co-operation among public libraries to build international understanding and to establish contacts between libraries of the North and of the South. UNAL's principal objective is to encourage libraries that are open to the public to undertake activities in UNESCO's fields viz., the promotion of human rights and peace, cultural dialogue, protection of the environment, fight against illiteracy, etc. Over 500 libraries around the world are members of this Network.

APIN (Asia and Pacific Information Network) merges the Regional Network for the Exchange of Information and Experiences in Science and Technology in Asia and the Pacific (ASTINFO), the Regional Informatics Network for Southeast Asia and the Pacific (RINSEAP) and the Regional Informatics Network for South and Central Asia (RINSCA). APIN also covers all the activities carried out by the UNESCO umbrella project General Information Programme (PGI) in the Asia and Pacific Region.

## NOTES

### ***Intergovernmental Programmes***

UNESCO presently has two Intergovernmental Programmes in the field of Communication and Information which replace all the previous programmes carried out by UNESCO till the year 2000. These programmes are:

- Information for All Programme (IFAP)
- International Programme for the Development of Communication (IPDC)

### ***Information for All Programme (IFAP)***

UNESCO's Information for All Programme provides a platform for international policy discussions and guidelines for action on:

- preservation of information and universal access to information,
- participation of all in the emerging global information society, and
- ethical, legal and societal consequences of ICT developments.

The Information for All Programme promotes a framework for international co-operation and international and regional partnerships. It supports the development of common strategies, methods and tools for building a just and free information society. This programme is for narrowing the gap between the information rich and the information poor.

The IFAP is a the most important element in the fulfillment of UNESCO's goal, *i.e.*, "education for all", "free exchange of ideas and knowledge" and "increase the means of communication between peoples".

### ***International Programme for the Development of Communication (IPDC)***

The International Programme for the Development of Communication (IPDC) "promotes free and pluralistic media in developing countries and the countries in transition". With the help of media development IPDC strengthen communicative and analytical skills of the people and increase their participation in democratic governance. IPDC gives priority to the projects promoting press freedom and media pluralism, development of community media, enhancing professional capacity and building partnerships for media improvements.

NOTES

We all know that the media, newspapers, radio or television, are ways of informing people and prompting them to interact. "Free and pluralistic media results in good and honest governments and make development investments fruitful." All types of media are essential for the construction of democratic societies as they are crucial for economic growth and nurturing the democratic process. "Media pluralism alone can guarantee every community the opportunity to express its concerns without exclusion or discrimination".

Some inadequacies of media in many countries put barriers for people to voice their democratic aspirations, from sharing and accessing information, and from making life-saving decisions. "UNESCO created the International Programme for the Development of Communication (IPDC) in 1980 to address these needs and to accelerate media development".

---

### **3.4 UNISIST (WORLD SCIENCE INFORMATION SYSTEM)**

---

In 1973 with the launching of UNISIST programme a new phase in UNESCO's work in library, documentation and information field was marked. UNISIST was a conceptual framework with emphasis on scientific and technological information. "UNISIST was planned as a continuing, flexible programme to coordinate existing trends towards cooperation and to act as a catalyst for the necessary development in scientific information". The main goal was the establishment of a flexible and loosely connected network of information systems and services based on voluntary cooperation.

The working document of the UNISIST Intergovernmental Conference known as the UNISIST Study Report (1971) stated the broad principles on which this World Science Information System was to be based. According to this Report, "UNISIST stands for the unimpeded exchange of published scientific information and data among scientists of the world, promotion of compatibility, cooperative agreements, cooperative development and maintenance of technical standards to facilitate the interchange development of trained manpower, reduction of administrative and legal barriers to the flow of scientific information and assistance to countries that seek access to present and future information services."

- Three major inter-governmental conferences, namely, UNISIST I, NATIS and UNISIST II (1971, 1974, 1979) recognised a number of programmes and made several recommendations for their implementation.



### 3.5 PGI—GENERAL INFORMATION PROGRAMME

#### NOTES

The General Information Programme (PGI) was created in 1976 by merging UNISIST with a programme concerned with the development of documentation, libraries and archives. An Intergovernmental Council having 30 Member States replaced the former UNISIST Steering Committee and guided the planning and implementation of PGI. During UNISIST II Conference (1979), it was felt that the creation of PGI had brought a number of benefits, for example, it reduced the number of inconsistencies in UNESCO's dealings with Member States on matters relating to information transfer, infrastructure development, education and training and provided an integrated approach to information systems planning and development. The following are the types of activities undertaken under each of the five sub-programmes that made up PGI:

- (i) *Tool for Processing and Transfer of Information.* ISO Standards Handbook I : Information Transfer, 2<sup>nd</sup> ed. 1982.

Reference Manual for Machine-Readable Bibliographic Descriptions, 2<sup>nd</sup> ed. 1981.

Reference Manual for Machine-Readable Descriptions of Research Projects and Institutions, 1982.

Common Communication Format, CCF, 3rd ed. 1993.

- (ii) *Development of Databases.* Useful inventories and studies like the International Inventory of Software Packages in the Information Field and the Application of Microcomputers to Information Handling have been published.

A mini/micro version of Computerised Documentation System/ Integrated Set of Information Systems (CDS/ISIS) Software has been developed by UNESCO and is provided free of charge to non-profit organisations of developing countries.

Within the PGI framework about 50 projects on creation of databases have also been taken up for which assistance regarding software, consultation, equipment and training has been provided.

- (iii) *Regional and International Cooperative Schemes.* In the area of cooperation and resource sharing PGI aims at strengthening the national capitals for information exchange and creating necessary mechanisms for sharing experience and resources and for viewing coordinating regional activities. Examples of such regional schemes are ASTINFO—Regional Network for the Exchange of Information and Experience in S&T in Asia and the Pacific and APINESS—Asia-Pacific Information Network in Social Sciences.

- (iv) *National Information Policies and Infrastructure.* UNESCO has advocated that information infrastructure should be developed

in each country within the framework of a National Information Policy. One attempt in this regard was in 1974, when the document "Information Policy Objectives: UNISIST Proposals" was brought out. This publication provided 113 possible policy objectives in the field of S&T. Revised guidelines were also provided in "Guidelines on National Information Policy: Scope, Formulation and Implementation".

- (v) *Developing an Information Workforce.* Under the PGI Programme priority has been given for training of both information specialist and information users. The objective is to improve national and regional training programmes, preparing teaching materials and providing training for teachers and refresher courses for specialist.

---

### **3.6 REGIONAL INFORMATION SYSTEMS AND NETWORKS**

---

#### **DELNET: Developing Library Network**

DELNET has been in operation since January 1988 and was registered as a society in 1992. It was initially sponsored by the National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Government of India and is currently being promoted by the National Informatics Centre, Ministry of Information Technology, Government of India, and India International Centre, New Delhi.

DELNET has been established with the prime objective of promoting *resource sharing* among libraries through the development of a network of libraries. It aims to collect, store, and disseminate information besides offering computerised services to users, to coordinate efforts for suitable collection development and also to reduce unnecessary duplication wherever possible.

DELNET has been actively engaged in the compilation of various Union Catalogues of the resources available in member-libraries. It has created a number of databases listed in the services. All the DELNET databases have been resident on DELSIS, an in-house software developed on BASIS Plus, an RDBMS, the product of Information Dimensions Inc. of USA which has been provided to DELNET courtesy National Informatics Centre, New Delhi.

DELNET provides an array of facilities including e-mail to its 243 member-libraries including both institutional and associate institutional members. DELNET'S relentless efforts in resource sharing have proved extremely effective. It has indeed been a big leap towards the modernisation of libraries in India.

**NOTES**

**Delnet-Service**

**Electronic Mail.** DELNET provides RENNIC E-mail facility to its member-libraries which was introduced by the National Informatics Centre. This gives the members access to both national and international E-mail users and also to INTERNET users.

**Online Access to Different Databases:**

- Union Catalogue of Books of 8,77,772 bibliographic records.
- Union Catalogue of Books : MARC Format has presently 27,231 records.
- Union List of Current Periodicals with 16,497 periodicals and is regularly updated. Union Catalogue of Periodicals contains 10,623 records.
- Database of Periodical Articles has around 2,00,410 records.
- Indian Specialist's Database has 2,000 records of eminent scientists, educationists and writers from all over the country.
- CD-ROM Database has 1,214 Records.
- Union List of Video Recordings has about 2,278 listings.
- Union List of Sound Recordings consists of 708 audio cassette records.
- Union Catalogue of Hindi has Books nearly 3,000 records in Hindi and can be retrieved through the GIST compatible system.
- Urdu Manuscripts' Database contains 210 manuscripts.
- Database of Theses and Dissertations has 16,587 records.
- Retro-Conversion facilities provided to the libraries through specialised agencies and also facilitates the use of modern tools such as CD-ROMs and online facilities for retro-conversion.
- Referral services to participating libraries.
- Document Transfer/Copy Facilities for transferring or copying of the documents to its users.
- DELNET conducts training programmes in the use of DELNET services, software, E-mail, AACR2 and LC Subject Headings, Internet, etc., from time to time.

**CALIBNET: Kolkata Library Network**

CALIBNET, a Government of India project, has been launched by the National Information Systems for Science and Technology (NISSAT), Department of Scientific and Industrial Research (DSIR); and managed by the CALIBNET Society established under the West Bengal Government's Societies Registration Act 1961. CALIBNET aims to provide individual libraries and their reading members with cost-effective solutions to their information problems.

**NOTES**

CALIBNET was planned to link 38 science and technology libraries of various sizes located in the Kolkata Metropolitan Area in two phases (eight in the first and thirty in the second phase). All these libraries as a pre-requisite, are first to be computerised and then linked to the network. The main features of the network include online/offline output, editing and retrieval of records. Eventually CALIBNET will be connected to other metropolitan networks, viz., DELNET, BONET, MALIBNET, ADINET, etc., through packet-switched data network.

**Services**

The network is intended to provide current awareness services, SDI, union catalogue, partial databases and access to national and international networks. Services also include:

- Access to CD-ROM databases
- LCMARC
- Biblio file
- Inside information
- Email service

**ADINET: Ahmedabad Library Network**

ADINET is a network of libraries in and around Ahmedabad. ADINET was registered as a society in October 1994. It is sponsored by the National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Government of India.

ADINET aims to bring about a cooperative mode of working amongst the libraries and information centers in and around Ahmedabad. The main objective of ADINET is to promote sharing of resources and disseminate in of information among member libraries by networking them and creating a centralized Union catalogue of their holdings. It plans to coordinate efforts for suitable collection development and reduce unnecessary duplication wherever possible.

A centralized database of periodicals, books and non-book materials available in the libraries of Ahmedabad is being created by ADINET. Records collected from participating libraries are being suitably formatted and merged to generate a Union Catalogue of Ahmedabad libraries. With the cooperation of participating libraries, this database is being regularly updated.

**Services:**

- Online information-accessing the Union Catalogue.
- Inter-Library Loan-enables a user to find the location of periodical/book/report of his/her interest Books, reports, theses and borrowed on an inter-library loan basis. Inter-library document delivery service is available.

NOTES

- Photocopying services
- Current Awareness Services
- Information Service
- Internet Services

### **MYLIBNET: Mysore Library Network**

The National Information System for Science and Technology (NISSAT), Dept. of Scientific and Industrial Research (*DSIR*), took the initiatives design and develop library networks in India in 1985 in order to share the resources available in the libraries located in various parts of the country. The Mysore Library Network was set up during May 1995 in the city of Mysore with financial assistance from NISSAT. The Mysore Library Network is housed inside the Central Food Technological Research Institute (CFTRI) campus.

#### ***Objectives of MYLIBNET***

- To share the resources available with all the libraries.
- To provide faster communication to all the libraries through electronic mail facility.
- To develop software tools for better library management.
- To create awareness in the field of latest information technology by conducting seminars/workshops/training programmes.
- To set up an information base in collaboration with industries.
- To conduct surveys.

---

### **SUMMARY**

---

- The role played by professional bodies especially international ones, is manifold as they have facilitated distribution of technological information and promoted technical cooperation among developing countries.
- UNESCO's earliest activities include mainly to help Member States rebuild their libraries destroyed during World War II.
- UNESCO influenced the development of public libraries in many Member States and underdeveloped countries and recognised the role of libraries in educating the communities.
- UNESCO's contribution to the development of scientific and technical documentation centres helped Member Countries to overcome problems of information explosion.
- UNESCO organised a number of regional meetings to study this problem and as a result regional book promotion centres have come up with the help of Member States.
- Numerous publications have been published and widely distributed and utilised on a variety of subjects like policy on education.

- The changing role of libraries and information centres and the development of modern information technologies, especially the Internet.
- Promoting the expression of pluralism and cultural diversity in the media and world information networks.
- ORBICOM is an international network that links communications leaders from academic, media, corporate and government circles for providing for exchange of information.
- UNAL's principal objective is to encourage libraries that are open to the public to undertake activities in UNESCO's fields.
- UNESCO presently has two Intergovernmental Programmes in the field of Communication and Information which replace all the previous programmes carried out by UNESCO.
- The Information for All Programme promotes a framework for international co-operation and international and regional partnerships.
- The International Programme for the Development of Communication (IPDC) "promotes free and pluralistic media in developing countries and the countries in transition".
- The main goal was the establishment of a flexible.
- An Intergovernmental Council having 30 Member States replaced the former UNISIST Steering Committee and guided the planning and implementation of PGI.
- UNESCO has advocated that information infrastructure should be developed in each country within the framework of a National Information Policy.
- The objective is to improve national and regional training programmes, preparing teaching materials and providing training for teachers and refresher courses for specialist.
- DELNET has been established with the prime objective of promoting *resource sharing* among libraries through the development of a network of libraries.
- DELNET databases have been resident on DELSIS, an in-house software developed on BASIS Plus, an RDBMS, the product of Information Dimensions Inc. of USA.
- DELNET'S relentless efforts in resource sharing have proved extremely effective.
- CALIBNET aims to provide individual libraries and their reading members with cost-effective solutions to their information problems.
- The main features of the network include online/offline output, editing and retrieval of records.
- It is sponsored by the National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research, Government of India.
- ADINET aims to bring about a cooperative mode of working amongst the libraries and information centers in and around Ahmedabad.

NOTES

**NOTES**

---

**REVIEW QUESTIONS**

---

1. Give the function of UNESCO.
2. Write the UNESCO'S Activities by Theme.
3. IPDC gives priority to which project?
4. Give full form of UNISIST.
5. Explain the need of Development of Database.
6. Describe the importance of Electronic Mail.

---

**FURTHER READINGS**

---

1. Manual of Reference and Information Sources, Sewa Singh, B R Pub, 2004.
2. Information System Management, M.Y. Kamat, Pointer Pub, 2002.
3. Introduction of Computers and information System, Sushila Madan, Taxmann, 2007.
4. Web based Information System, S K Dass, Shree Pub, 2007.

---

# UNIT IV NATIONAL INFORMATION SYSTEMS AND PROGRAMMES

---

NOTES

## ★ STRUCTURE ★

- 4.1 Introduction
- 4.2 National Institute of Science Communication and Information
- 4.3 Defence Scientific Information and Documentation Centre (DESIDOC)
- 4.4 National Information System and Programmes
- 4.5 Information Systems and Programmes in India
- 4.6 Library and Information Networks in India
  - *Summary*
  - *Review Questions*
  - *Further Readings*

---

### LEARNING OBJECTIVES

---

After going through this unit, you will be able to:

- know about national institute of science communication.
- describe about defence scientific information and documentation.
- know what is national information system.
- discuss about the information networks in India.

---

### 4.1 INTRODUCTION

---

The increasing role of science and technology in the economic and social development of the country generated a pressing demand for faster technology transfer to the industries. In fact information centres serving the needs of different industries and R & D units, were therefore required to be coordinated and organized into an integrated system to avoid a haphazard growth and duplication of activities and to conform to national and international standards. In order to meet this requirement the National Information System for Science and Technology (NISSAT) was launched in 1977. In tune with the changing global scenario and in pursuance of the national efforts in liberalization and globalization of the economy, NISSAT reoriented its programme activities continually in order to be useful to a wider base of clientele in diverse subjects. Besides establishing the internal linkages between the information

industry, its promoters and users, NISSAT also made efforts to establish a bridge between information resource developers and users in India and other countries.

## NOTES

---

### 4.2 NATIONAL INSTITUTE OF SCIENCE COMMUNICATION AND INFORMATION

---

#### *Resources (NISCAIR)*

Indian National Scientific Documentation Centre (INSDOC), a constituent laboratory of CSIR, was established in 1952, as a national centre for supplying information in all fields of science and technology to any user in India or abroad. It was established with the support of UNESCO and had the following objectives:

“To receive and retain all the scientific periodicals which may be of use to the country.

To answer specific queries of users from the information available in the country and elsewhere.

To inform scientists, technologist and engineers of articles which may be of value to them by issuing a monthly bulletin of abstracts.

To supply photocopies of scientific articles required by scientists.

To supply translations of scientific material available in various foreign languages to individual scientists.

To act as a repository for, both published and unpublished, reports of the scientific work of the nation.

To be a channel through which the scientific work of the nation is made known and available to the rest of the world.”

Over the past five decades, the activities of the centre have been reoriented and updated to meet the information requirements of the user community. The availability of modern technologies especially the computer technology and telecommunication technology have also enabled the centre to make available required information to the users in a timely and efficient manner.

INSDOC has, since September 2002, been merged with National Institute of Science Communication (NISCOM), another CSIR Laboratory and is presently named as National Institute of Science Communication and Information Resources (NISCAIR).

The main objective of the NISCAIR, formed by merger of INSDOC and NISCOM, is dissemination of scientific and technical information through various information products and services made available by the institution. The NISCAIR Citizen Charter incorporates citizen's entitlement to public services, wide publicity of standards of performance, quality of services, access to information, simplified procedures of

complaints, time-bound redressal of grievances and provision for independent scrutiny of performance.

### ***Activities of NISCAIR***

To meet the above mentioned objectives, the following services/activities are organised by the Institute:

1. Publication of 17 primary and 2 secondary scientific/research journals
2. Publication of CSIR News and CSIR Samachar
3. Raw Material Herbarium and Museum
4. Popular Science Magazines
5. Popular Science Books
6. Information Services
7. Developing and Maintaining Specialised Databases
8. Electronic Publishing
9. Human Resource Development
10. Information Resources
11. Sales and Marketing
12. Consultancy Services

*Let us now know about details of some important activities of NISCAIR.*

### ***Journals Published by NISCAIR***

NISCAIR is bringing out 17 primary journals in various subject fields related to science and technology. These are:

1. Journal of Scientific and Industrial Research (monthly)
2. Indian Journal of Chemistry A (monthly)
3. Indian Journal of Chemistry B (monthly)
4. Indian Journal of Experimental Biology (monthly)
5. Indian Journal of Pure and Applied Physics (monthly)
6. Indian Journal of Biochemistry and Biophysics ( bi-monthly)
7. Indian Journal of Engineering and Material Sciences ( bi-monthly)
8. Indian Journal of Chemical Technology (bi-monthly)
9. Indian Journal of Radio and Space Physics ( bi-monthly)
10. Journal of Intellectual Property Rights (bi-monthly)
11. Indian Journal of Marine Sciences (quarterly)
12. Indian Journal of Fibre and Textile Research (quarterly)
13. National Product Radiance (bi-monthly)
14. Indian Journal of Biotechnology (quarterly)
15. Indian Journal of Traditional Knowledge (quarterly)
16. Annals of Library and Information Studies (quarterly)
17. Bhartiya Vaigyanik evam Audyogik Anusandhan Patrika (Hindi) (half-yearly)

NOTES

Besides the primary journals, NISCAIR also publishes two abstracting journals, they are:

1. Medicinal and Aromatic Plants Abstracts (bi-monthly)
2. Indian Science Abstracts (fortnightly)

## NOTES

### ***CSIR News and CSIR Samachar***

NISCAIR publishes CSIR News (in English) fortnightly and CSIR Samachar (in Hindi) monthly, both of which serve as an effective link between various CSIR Laboratories. Information is also provided to users on various R & D programmes and activities of CSIR, R & D organisations, university departments and industry.

### ***Wealth Of India (WOI)***

WOI is an encyclopaedia of Indian natural raw materials. A continuous activity of NISCAIR is to publish the supplements of WOI, publish books on the natural raw material resources of the country and provide enquiry services to information seekers on natural raw material resources. Bharat ki Sampada, the Hindi version of Wealth of India is also available.

### ***Raw Material Herbarium and Museum***

Raw Material Herbarium and Museum provides consultancy services on identification of plants and crude drugs of plant origin. Photo Library Service is also provided to users where photographs/illustrations are reproduced from a collection of over 3000 photographs/illustrations.

### ***Popular Science Publications***

NISCAIR publishes popular science magazines in three languages covering the latest scientific developments for all kind of users especially for users requiring popular kind of scientific information. These are Science Reporter (English) and Vigyan

- Pragati (Hindi) published monthly and Science Ki Duniya (Urdu), a quarterly publication.
- NISCAIR publishes a large number of popular science books in various areas that include fundamental science, contemporary areas of science and science entertainment.

### ***Information Services***

NISCAIR offers a number of information services, some of these have been continuing since the inception of the erstwhile INSDOC.

- Medicinal and Aromatic Plants Information Services (MAPIS) based on the Wealth of India and MAPA databases.
- Content Abstract and Photocopy Service, is a highly personalised service. This service provides contents information from journals on a regular basis.

- Literature Search Service is offered by providing access to over 6000 international databases.
- NISCAIR is the National Centre for ISSN International Centre for assigning ISSN number to serials published in India.
- NISCAIR provides S&T translation services from major foreign languages such as Japanese, German, French, Spanish, Chinese and Russian into English.
- Bibliometrics Services: NISCAIR renders bibliometrics services on specialised subjects for studying the growth, development and spread of any area of research.

NOTES

### ***Electronic Publishing***

NISCAIR publishes digitised versions of some of its major publications that include Indian Science Abstracts, Medicinal and Aromatic Plants Abstracts, the Wealth of India, Raw Materials Series.

### ***Human Resource Development***

Development of human resources in library, documentation and information science has been a major activity of erstwhile INSDOC since 1964. Over the years, the changing dimensions in the areas of information science, technology and computer applications to library activities have been included in the various courses offered by NISCAIR. Besides Associateship in Information Science, the two year full-time academic course in information science, NISCAIR offers several short term training courses in computer application to library and information activities, attachment training programmes and even on-site training on request.

NISCAIR also offers short term training programmes in science communication and herbarium techniques.

### **National Science Library (NSL)**

NSL was established in 1964. It aims to acquire all important S&T publications published in the country and strengthening its resource base for foreign periodicals by acquiring the journals on CD-ROM or other electronic form. NSL has a rich collection of over 1,90,000 books including reference books, reports and standards. The library has one of the finest collections in the field of information science and technology, reference material/secondary sources, conference/seminar/symposia proceedings in S&T, foreign language dictionaries and medicinal and aromatic plants. It also subscribes to almost all worthwhile Indian S&T periodical publications and receives over 5,100 Indian and foreign periodicals. Of these nearly 3500 periodicals are in electronic form including 1,133 full-text journals.

**NOTES**

Membership of NSL is open to individuals, institutions and it offers various services that include Reader's Services, Technical Query Service, Copying Service and Inter-Library Loan Service.

***Consultancy Services***

NISCAIR offers consultancy services in several areas:

- Modernisation, reorganisation and automation of library and information organisations including turnkey projects.
- Design and development of specialised databases for various organisations.
- Editing, designing, production and printing of publications.

**National Social Science Documentation Centre (NASSDOC)**

National Social Science Documentation Centre (NASSDOC), New Delhi was established in 1969 by the Indian Council of Social Science Research (ICSSR). The centre was setup to meet the following objectives in the field of social sciences:

- "To provide library and information support services to the researcher in the field of social sciences".
- To provide support to those working in academic institutions, autonomous research organisations, policy making, planning and research units of government departments, business and industry.
- To disseminate information about developments in social science research.
- To provide guidance to libraries of ICSSR Regional Centres and ICSSR maintained Research Institutions.
- To provide financial assistance for documentation and bibliographic projects.
- To conduct short-term training courses for social scientists, research scholars, librarians and IT professionals.
- To make available study grants to doctoral students for collection of research material from libraries located in various parts of the country.

***NASSDOC Services***

NASSDOC has a vast collection of unpublished doctoral dissertations, reports of research projects. The centre acquires a wide range of Indian and foreign social science journals including back volumes of all the journals and prepares printed and digital databases. Based on the rich resources and available collection, NASSDOC offers the following library and information services to researchers in social sciences:

- (a) Library and reference services.

- (b) Literature search service from available databases both printed and digital including online databases.
- (c) Bibliography compilation on request.
- (d) Document delivery service by procuring books and journals on inter-library loan or by photocopying the documents.
- (e) Acquisition of published bibliographies, directories and reference sources in social sciences and distribution to institutions and libraries.

NOTES

***NASSDOC Databases/Publications***

One of the major activities of NASSDOC is the creation of databases and locating tools. The products of NASSDOC include Library Databases, Directories, Indian Social Science Periodicals Literature (INSSPEL), Union Catalogues, Bibliographies and Journals. Some of these are:

***Database of Research Project Reports***

This database covers bibliographic details like author, title, subject, etc. of over 3000 Research Project Reports funded by ICSSR as well as by other organisations. It is available both in print and digital form.

***Database of Ph.D. Dissertations***

The database covers bibliographic details like name of the researcher, topic of dissertation, year of award of Ph.D. degree, etc., of about 5000 dissertations acquired by NASSDOC. The database is available both in print and digital form.

***Directory of Social Science Libraries and Information Centres in India***

The Directory gives information of 447 social science and allied disciplines, libraries and information centres attached to government agencies, research and training institutes under various ministries, universities and autonomous bodies, banks, industry and trade, etc. Information about libraries having independent name, is given by references provided by their parent institutions. Each entry contains address of the library, e-mail, strength of the staff, type of collection, budget, subject coverage, computerisation details, facilities and services provided like photocopying, bibliography services, inter-library loan, online databases, literature search, translation, etc. The data given in the directory may enhance cooperation and resource sharing among Indian libraries and information centres.

***Directory of Social Science Research and Training Institutions in India***

This directory given comprehensive list of about 450 social science institutions engaged in research and training in India. It provides

NOTES

details on areas of research, major achievements, special facilities, current research projects, publications, type of staff, library collection and services, relations with national and international organisations, and complete postal address with telephone, telex, fax and e-mail. The Subject Index and Location Indexes are appended in the directory to provide multiple access points. The directory was last updated in 1996.

***Directory of Asian Social Science Research and Training Institutes/Organisations in India***

This directory provides information of about 42 teaching and research institutes on Asian Studies in India. Each entry contains information about the name, address of the institution, type of organisation, type of staff, aims and objectives, activities, parent organisation, publications, name and level of training courses, library collection and services and facilities provided by the institution.

***Union Catalogue of Social Science Periodicals and Serials in India***

Since 1970, the compilation of the Union Catalogue of Social Science Periodicals and Serials is being undertaken by NASSDOC. The complete database was published in 32 volumes, having details of 31,125 journals in 550 libraries, in 17 states and two union territories, having a separate volume of the National Library, Kolkata.

Union Catalogue of Periodicals in Chennai, Mumbai and Hyderabad libraries have been updated till the year 2000. The periodical details in Chennai cover location of 867 journals in 12 libraries, Union Catalogue of Periodicals in Hyderabad provides location of 4,455 titles in 25 libraries, whereas, Union Catalogue of Periodicals in Mumbai covers 2,928 journals available in 16 libraries. All the three Union Catalogues are available in machine-readable format also.

***Union Catalogue of CD-ROM Databases in Social Science Libraries in India***

This catalogue covers information about 132 CD-ROM databases available in 40 major social science libraries and information centres in India. It provides information about the title of CD-ROM database, frequency, brief annotation, information about the producer/vendor and library symbols along with holdings of the respective CD-ROM databases.

***Bibliography on India in 2000 A.D.***

This bibliography has a record of 647 select books and articles appearing in journals, published and unpublished research reports and seminar papers, etc. on India in English language covering the period up to the first half of 1987. It also includes articles on Asia and the world with some bearing on India.

### 4.3 DEFENCE SCIENTIFIC INFORMATION AND DOCUMENTATION CENTRE (DESIDOC)

DESIDOC was functional in 1958 as Scientific Information Bureau (SIB), a division of the Defence Science Laboratory (DSL) presently the Defence Science Centre. The Defence Research and Development Organisation (DRDO) library, established in 1948, became a division of SIB in 1959. In the year 1967 SIB was reorganised and renamed Defence Scientific Information and Documentation Centre (DESIDOC). It is still functioning under the administrative control of DSL. During in 1970, DESIDOC became an independent unit and one of the laboratories of DRDO. The Centre initially functioned in the main building of Metcalfe House, a national monument and in 1988 moved to a new building in the same complex. After it became an independent and self-accounting unit, DESIDOC has been functioning as a central information resource for DRDO. It provides S&T information, based on its library and other information resources, to the DRDO headquarters and its various laboratories located all over India.

#### NOTES

The objectives of DESIDOC are:

- "To function as a central source for providing scientific information, documentation, library, reprographic, translation services to DRDO headquarters, laboratories, establishments and to coordinate their scientific information programmes,
- To develop an information system for Defence Science and Technology,
- To provide training and user education programmes in the field of scientific information,
- To provide consultancy and referral services, and
- To publish scientific and technical journal, books and monographs of DRDO".

The various activities of the Centre include the following:

- (a) *Library Services.* DESIDOC maintains the Defence Science Library which is the central library of DRDO. It gives access to Online Public Access Catalogue, CD-Rom Search Service, Document Supply Service and Resource Sharing Service.
- (b) *Information Processing and Dissemination.* The Library collects scientific and technical information of interest to DRDO and provides current awareness services and selective dissemination of information to users of DRDO.
- (c) *Database Development.* It develops and maintains bibliographic databases which includes OPAC, bibliographic database of books, reports, conference proceedings in DSL. The full-text databases, include newspaper clippings, Defence Science Journal, IEE/IEEE contents.

NOTES

- (d) *DRDO Publications.* DESIDOC functions as the publication wing of DRDO and brings out a number of journals, monographs, newsletters, etc.
- (e) *Training.* It provides training in information collection, processing and dissemination, library automation, database development, online searching, Internet use, and many areas concerned with it.
- (f) *Technical Services.* It provides reprography (photography, audio, video presentation materials), translation, communication (e-mail, Internet) and printing services.

**Functional Areas and Activities**

In order to meet various objectives and provide the services, the activities of the centre are organised covering the following functional areas:

- (a) *Internet and e-mail Access.* DESIDOC provides e-mail and Internet access to the DRDO Laboratories in the country, through ERNET and NICNET. Communication links have also been established between the Internet gateway of VSNL and DESIDOC and also between VSNL gateway and DRDO Headquarters to provide scientists/managers high speed easy access to Internet and its resources. DESIDOC has established an Internet Lab to cater to the needs of the Internet users.
- (b) *Multimedia Laboratory.* This facility has been provided to facilitate multimedia authoring, designing and presentation facilities to the top management and the Scientific Adviser to the Defence Minister. Expertise in the areas of image processing, CD-writing, audio-video designing, desktop CD publishing and multimedia CD-ROM production has been established. In order to establish multimedia laboratories both within and outside DRDO a few multimedia products were published and consultancy was provided.
- (c) *Reprographic Facilities.* Reprographic facilities has been set up to help DRDO top management and scientists in their technical presentations. This facility has a computer-based multicolour slide making system, a digital colour copier, high quality colour printers and video recorders, which helps in providing high quality presentation materials.
- (d) *Printing Facility.* A full-fledged high quality printing facility has been established which includes designing, layout, typesetting, DTP, processing and printing units for in-house production of DRDO publications. Commercial printing agencies have been given the responsibility for high quality multicolour printing.

**Publications**

DESIDOC undertakes the following DRDO publications:

- (a) Defence Science Journal

- (b) Popular Science and Technology
- (c) DRDO Newsletter
- (d) DRDO Samachar
- (e) R&D Digest
- (f) Technology Focus
- (g) DESIDOC Bulletin of Information Technology

NOTES

**Defence Science Library**

The Defence Science Library is the largest Defence Library in the country with a unique collection of publications in various fields of science and technology. The library has, currently, over 3 lakh documents that include books, periodicals, technical reports, patents and standard specifications. This was one of the first libraries in the country to be computerised.

---

**4.4 NATIONAL INFORMATION SYSTEM  
AND PROGRAMMES**

---

Information is a vital resource for cultural, socio-economic and scientific and technological development of a nation. Information plays a key role in education, training, research and knowledge development. Recognising the importance of information in education and research, Government of India has been making consistent efforts in setting up libraries and documentation centres along with the growth of academic and research institutions in the country since independence. In academic sector, efforts have been made to set up libraries at school, college and university level. Government has been strengthening Public Library System to cater to the information requirements of general public. In R&D sector, libraries and information centres have come up in the field of science and technology, social sciences and humanities. You have already been acquainted with activities of some of the information centres, that are operating at national level such as National Institute of Science Communication and Information Resources (NISCAIR, (formerly INSDOC)), Defence Scientific Documentation Centre (DESIDOC), National Social Science Documentation Centre (NASSDOC), Small Enterprises National Documentation Centre (SENDOC), etc.

Advances in computer and communication technologies paved the way for computerisation of information resources and networking of different organisations for sharing and exchange of information. To reap the benefits of emerging technologies, India recognised the need for strengthening the information base in the country by integrating different information agencies into a well-knit information system. Consequently, Government of India took several initiatives, particularly from 1975 onwards, by launching new programmes and setting up new institutions/

**NOTES**

departments to fulfil the above mentioned need. For example, setting up of NIC (National Informatics Centre) in 1975 and implementation of NISSAT (National Information System for Science and Technology) programme in 1977. Among other initiatives are, promotion and establishment of library networks (INFLIBNET, CALIBNET, DELNET, etc.); setting up of specialised information systems such as Biotechnology Information System (BTIS) and Environmental Information System (ENVIS), etc. It is expected that, Information Technology Act 2000 and more recently Right to Information Act 2005 will provide further impetus to Information Communication Technologies (ICTs) related activities in the country.

Before proceeding to gain knowledge about these various information systems and programmes, let us try to understand the meaning of the terms "Information Systems" and "Information Programmes" and the difference between them. Information Programmes are launched by an authority like planners and policymakers in an organisation or by a government body. The Information Programmes specify the objectives to be achieved, infrastructure required and sources of funds for setting up an Information System. Whereas Information Systems are type of communication systems, which select, organise, store and disseminate public knowledge to the users as per the objectives laid down by the Information Programmes. An Information System is composed of all the components that collect, manipulate and disseminate data or information. It usually includes hardware, software, people, communication systems such as telephone lines and data itself. Activities involved include inputting of data, processing of data into information, storage of data and information and production of services

---

#### **4.5 INFORMATION SYSTEMS AND PROGRAMMES IN INDIA**

---

##### **Information Systems and Programmes in Science and Technology**

If we consider the amount of money spent on education, research and development activities in various disciplines or subject fields in the country, we can easily find that major portion of such expenditure goes every year to science and technology, rather than the subject fields of arts, social sciences, humanities, etc. It has been observed that major portion of this investment in science and technology is spent in building up and maintaining good libraries and information centres. India, therefore, has well developed library and information systems in the country in most of the disciplines covered by science and technology, like agricultural sciences, medical sciences, atomic energy, space sciences, engineering and technology, etc

## **National Information System for Science and Technology (NISSAT)**

*National Information Systems and Programmes*

NISSAT programme was launched by Department of Scientific and Industrial Research (DSIR), with the broad objective of interlinking and coordinating a large number of information sources, systems and services into an effective network under an overall coordinating agency. The NISSAT programme was formally implemented in September 1977 with the following objectives:

### **NOTES**

- Development of national information services;
- Promotion of existing information systems and services;
- Introduction of modern information handling tools and techniques;
- Promotion of international cooperation in information;
- Development of indigenous products and services;
- Organisation of skill development programmes; and
- Promotion of R&D in information science and technology.

The National Focal Point (NFP) of NISSAT was located in DSIR, New Delhi. Thrust areas of NISSAT were continuously modified, keeping in tune with the global information scenario during its operations from 1977-2002. During its 25 years of operation, NISSAT programme achieved the following:

- 1. Setting up of Information Centres:** NISSAT supported 13 national information and data centres in different areas (discipline, product or mission), which provided bibliographic as well as factual information services, to the users in academic, R&D sector and industry. These information centres (previously called Sectoral Information Centres) were built around existing information resources and facilities.
- 2. Setting up of Value Added Patent Information Systems (VAPIS):** To strengthen patents information activities in India, NISSAT established VAPIS in two areas viz. chemistry and chemical technology (at National Chemical Laboratory, Pune) and in engineering (at Central Manufacturing Technology Institute, Bangalore). Value addition to patent information included, preparation of trend reports, forecasting, identifying technological alternatives, research areas and business opportunities.
- 3. National Access Centres to International Data Services (NACIDS):** During 1980s and mid 1990s, NISSAT established several NACIDS, to provide online access to remotely held international databases through online search service providers such as DIALOG, STN, SDC, etc. These centres were established in R&D institutions in metro cities like Delhi, Mumbai, Bangalore, Kolkata, Pune, etc.

NOTES

4. **CD-ROM National Collection Centre:** NISSAT supported national collection of CD-ROM databases on India and CD-ROM products produced in India. The centre was set up at Foundation for Innovations and Technology Transfer in Indian Institute of Technology, Delhi in 1996. The Centre rendered services from CD-ROM collection. This centre has stopped functioning since 2003.
5. **Computers and Information Communication Technologies (ICTs) Based Activities:** Under these activities NISSAT supported development of indigenous databases in S&T areas; databases of union catalogues for resource sharing; establishment of library networks like DELNET, CALIBNET, BONET, PUNENET, ADINET, MYLIBNET in Delhi, Kolkata, Mumbai, Pune, Ahmedabad, Mysore respectively; establishment of websites/servers such as Indian Ocean Server at NIO, Goa, Indian Consultancy website at CDC, New Delhi, 'Vigyan', an Indian S&T website, and a discussion forum called 'LISFORUM' with NSCI at Indian Institute of Science, Bangalore.
6. **Promotion of use of Standards:** NISSAT took active interest in the diffusion of standards for library and information activities. Its campaign supported with training, helped CCF (Common Communication Format) to earn the status of a de facto national standard for exchange of information, creation of databases, etc.
7. **Information Technology Applications:** NISSAT acquired two software packages namely CDS/ISIS (for bibliographical processing and retrieval) and IDAMS (for statistical data processing), from UNESCO for distribution to Indian institutions. At present, there are about 1940 CDS/ISIS installations and 100 IDAMS installations in India. NISSAT regularly monitored the implementation of these software packages through periodic surveys and user group meetings. NISSAT in collaboration with DESIDOC, developed a software package SANJAY, for automation of house-keeping and service functions of libraries.
8. **Manpower Development in Information Science and Technology:** To upgrade the skill of library and information professionals, NISSAT encouraged and supported several training programmes in library and information fields such as application of computers in library and information centres; use of personal computers and CDS/ISIS; TQM in library services; technical communication, scientometrics; CD-ROM/online searching, etc.
9. **International Activities:** NISSAT Advisory Committee functioned as National Advisory Committee of UNISIST and the National Advisory Group for ASTINFO/UNESCO (Regional Network for the Exchange of Information and Experience in Asia and the

Pacific). UNESCO/ASTINFO often utilised NISSAT services for implementation of various programmes, such as preparation of teaching aids for CDS/ISIS, CCF and MIS for libraries, course material for marketing of information products and services, etc. NISSAT contributed a section on South Asia in the World Information Report 1997. NISSAT also conducted a cross country analysis of information scenario in Asia and Pacific Countries for the study on 'Information Infrastructure for Planning Information Systems and Networks in Asia and Pacific Countries' undertaken by UNESCO and the University of Library and Information Science, Tsukuba.

NOTES

10. **R & D in Information Science and Technology:** NISSAT promoted and supported R & D activities and survey studies in information science and technology particularly in areas scientometric and infometric studies, such as *National Mapping of Science*, *Indian Science through Bibliometric Indicators*, *Industrial Innovation Indicators*, etc.

NISSAT published a quarterly newsletter, NISSAT Newsletter (the title changed to *Information Today & Tomorrow*), to provide information on information systems development in India and abroad, current events, new tools and techniques, interesting Internet sites, new database products and services, etc. It also published review articles on selected subjects.

NISSAT Programme closed its operations in March, 2002. Most of the National Information Centres, earlier supported by NISSAT in different R&D institutions, are still functioning with the support from their respective parent institution and providing the services.

Recognising the importance of digital information resources, DSIR launched a new programme namely, "Technology Information Facilitation Programme" (TIFP), as one of the components of its 'Technology Promotion, Development and Utilisation' (TPDU) Programme. Broad objective of TIF Programme is to generate endogenous capacities for development and utilisation of digital information resources and provide input to S&T research and development. The TIF Programme intends to strengthen the resource base of available information and provide a mechanism for optimal utilisation of the resources in the country. TIF would also facilitate collaborative research among industries and institutions.

### ***National Informatics Centre (NIC)***

NIC was set up in 1975 by Government of India, for developing computerised Management Information Systems (MIS) for Ministries and Departments of Central and State governments to facilitate planning and decision making process in the country. The Centre commissioned nation-wide online network system called NICNET in 1977 to enable efficient exchange of information between the Central and State

Government Departments and between the States and their Districts. NICNET is one of the largest VSAT based network connecting the national capital, the state capitals and district headquarters to one another.

NOTES

Presently NIC, under the Department of Information Technology, Ministry of Communication and Information Technology, New Delhi, is recognised as a premier information technology organisation providing network backbone and e-governance support to the Government of India at all levels. NIC has its Head Quarters(HQ) at New Delhi, 28 State Units at State Capitals, 7 Union Territories Units at UT Headquarters and 571 District Centres in almost all the Districts of India. In addition to these units, NIC has two other units namely NIC Training Unit at Mussoorie and Software Development Unit at Pune. At the NIC HQs, a large number of application divisions exist which provide total information support to the Ministries and Departments of the Central Government. NIC computer cells are located in all the Ministry Bhawans and the Central Government Apex Offices including Prime Minister's Office, Rashtrapati Bhawan and the Parliament House. In addition, NIC has various Resource Divisions at the HQs which specialise into different areas of Information Technology (IT) and facilitate Application Division as well as other NIC Centres in providing ICT services to the Government.

At the state level NIC's STATE/UT units provide informatics support to their respective State Government. At the district level NIC's District Centres provide effective informatics support to the Development, Revenue and Judiciary administration of the respective district.

NIC has developed a large number of information technology projects/products for various central, state government ministries, departments and organisations. Many of these projects are continuing projects being carried out by various divisions of NIC at New Delhi HQs., State and District Centres throughout the country. NIC offers following IT services:

- (i) Computer Aided Design (CAD);
- (ii) Computer Aided Paperless Examination System (CAPES);
- (iii) Computer Telephony Interface (CTI);
- (iv) Consultancy;
- (v) E-Commerce;
- (vi) Geographic Information System;
- (vii) Informatics;
- (viii) Internet Services;
- (ix) Mathematical Modeling and Simulation;
- (x) Networking;
- (xi) Office Automation;

- (xii) Software Design and Development;
- (xiii) Training;
- (xiv) Video Conferencing; and
- (xv) Website Development and Hosting.

*Consultancy:* NIC provides extensive consultancy services in areas of information technology. The services covered are, right from identification of IT needs of an institution to setting up IT infrastructure on turnkey project bases. In addition it provides extensive training as well as maintenance support.

*E-Commerce:* NIC has set up a state-of-the-art E-Commerce server on NICNET. This server is based on Trading Post and incorporates Internet, WWW, EDI, mailing systems and directory services to provide integrated E-Commerce solutions to trading partners and subscribers of the service.

*Informatics:* Three types of information services viz. Biomedical Information Service, Patent Information Service and Rural Information Service, are provided.

*Biomedical Information Service:* NIC and ICMR (Indian Council of Medical Research) have jointly set up Indian Medlars Centre (IMC) to cater to the information needs of medical community of India. IMC has designed and developed 3 databases viz., IndMED, medIND and Union Catalogue of Biomedical Periodicals, to provide quick and easy access to Indian biomedical literature. IndMED database indexes 75 Indian biomedical periodicals from 1985 onwards. medIND provides full-text of 37 journals indexed in IndMED. Union Catalogue of Biomedical Periodicals is a database of serial holdings of 180 medical libraries in India. (<http://www.indmed.nic.in>)

*Patent Information Service:* NIC provides online and offline patents information services. Services offered are bibliographic search, abstracts and full-text patent document services. Databases used for online searching are EPIDOS-INPADOC databases from European Patents Office. EPIDOS-INPADOC databases are the largest patents databases in the World covering bibliography of patents applied and granted in 65 countries and patenting organisations since 1968, consisting of over 33 million references. The databases on CD-ROM are USPAT CD-ROM, CASSIS-BIB, CASSIS-ASSIGN, CASSIS CLASS and CASSIS-ASSIST. USPAT CD-ROM, published by Derwent Inc., USA, contains the bibliographic textual data of U.S. patents from 1975-1994. All CASSIS databases on CD-ROM are from United States Patents and Trademark office. (<http://www.patinfo.nic.in>)

*Rural Information Service:* In 1986, NIC introduced IT in villages to facilitate planning, monitoring and exchange of information between various agencies in Rural Development Administration. (<http://www.ruralinformatics.nic.in>)

## NOTES

NOTES

**Internet Services:** Internet services are provided through NICNET, a satellite based computer communication network. Range of Internet services offered are: E-Mail; WWW Browsing; File Transfer Facility; Directory Services; and Gateway to SMTP/UUCP.

**Networking:** The network services offered are setting up of LAN, Virtual Private Network or setting up of Intranet at the user premises. Other specialised services offered on the network are Video-conferencing, Electronic Data Interchange, etc.

**Training:** Training Centres of NIC are located at the HQs in New Delhi, at the Regional Centres and at all the State Centres. Regular training programmes to upgrade the skills of in-house staff are held throughout the year. In addition, customised training programmes for specialised groups such as civil servants, international teams visiting India, armed forces personnel, etc., are organised.

**Video-conferencing:** NIC is currently providing video-conferencing services from 206 cities in India through NICNET. NIC is also providing video-conferencing services from many central and state government ministries using ISDN lines.

Temporary video-conferencing service for conferences, exhibitions, seminars and other important events are provided by NIC using portable VSAT.

**Website Development and Hosting:** Web services provided by NIC are Website Design and Development; Web Page Hosting and Maintenance; Review of Websites; and Enhancement of Existing Website. NIC maintains state-of-the-art web server at its HQs which currently hosts around 2000 websites.

NIC has also set up Storage Area Network (SAN) at its data center in Delhi. This high capacity SAN is used as storage infrastructure for websites, portals, citizen services, databases, e-mail services and other international services.

***Biotechnology Information System (BTIS)***

To promote R&D efforts in different areas of biotechnology viz. agricultural, animal, environmental, medical and plant biotechnology in India, Ministry of Science and Technology, set up a Department of Biotechnology (DBT) in 1986, at New Delhi. The department through its several programmes, accelerated the pace of development of biotechnology in the country. Since its establishment, DBT has made significant contributions in the growth and application of biotechnology in the broad areas of agriculture, health care, animal sciences, environment and industry through its various R&D projects and programmes. The research in biotechnology generates huge amount of biological data and analysis of such large data requires computer intensive techniques to solve complex biological problems such as genome sequencing,

protein modeling and protein analysis, structural genomics, etc. This requirement led to the development of new multidisciplinary area called Bioinformatics. Recognising the importance of Bioinformatics in biotechnology research, India was the first country in the world to establish a Biotechnology Information System (BITS) network to create an infrastructure to harness, biotechnology through the application of Bioinformatics.

Established in 1987, by DBT, Biotechnology Information System (BTIS)-A National Bioinformatics Network is a distributed network system, to disseminate latest information resources to the research scientists and develop various bioinformatics tools for biotechnology and molecular biology applications.

National Bioinformatics Programme of DBT has following thrust areas:

- To undertake advanced research in frontier areas of bioinformatics and computational biology;
- To establish human resources in bioinformatics;
- To establish effective academia-industry interface;
- To pursue and promote international co-operation with leading institutions, organisations and countries in the world; and
- To create suitable platform for technology development, transfer and commercialisation.

At present, BTIS is one of the major scientific networks in the world dedicated to provide state-of-the-art infrastructure, education, manpower and tools in bioinformatics. The network consists of 10 Distributed Information Centres (DICs), 50 Distributed Information Sub-Centres (DISCs), and one Apex Biotechnology Information Centre (BTIC). Six interactive computer graphic facilities, to provide interactive molecular graphic support to researchers and five long-term educational programmes in bioinformatics are additional components of BTIS.

Apex Biotechnology Information Centre (BTIC) located at DBT, New Delhi performs the following functions:

- It coordinates the activities of BTISnet and provides nation-wide communication network between the Bioinformatics Centres.
- It also coordinates linkages and cooperation with external sources in bioinformatics including documentation and information centres located abroad.
- It initiates major research projects in bioinformatics and encourages bilateral and international collaboration in bioinformatics.
- It promotes standards for databases, data exchange and nomenclature for molecular biology data to facilitate sharing of such data amongst laboratories on a national and international scale.

## NOTES

NOTES

A Patent Facilitating Cell is part of the Apex Centre which undertakes searching of patent information and patent filing.

The Apex Centre has developed a directory on the "Research Profiles of Biotechnology Activities in India". The directory lists more than 200 institutions and is available on the Internet. (<http://www.bioinfo.ernet.in>) The Apex Centre maintains a database of R&D projects sponsored by DBT.

BTIS has 10 specialised Distributed Information Centres (DIC) providing discipline oriented information to various institutions and individuals. These centres act as repository of information on their specialised discipline; develop specialised databases using bioinformatics tools; carry out R&D activities in bioinformatics to develop new software tools for application in biotechnology and conduct training programmes in bioinformatics.

There are 45 Distributed Information Sub-Centres (DISC) established at various universities and R&D institutions in the country. These Centres are engaged in research in specific areas of biotechnology and provide access mechanism for the information to be available at the Universities, R&D and Manufacturing Institutions.

DBT has established a high speed and high bandwidth network in the form of Virtual Public Network (VPN) named as BIOGRID INDIA. The network has been established through HCL Info system and is being coordinated by National Brain Research Centre. Eleven DICs, which are actively engaged in bioinformatics activities such as human resource development and R&D in bioinformatics, apart from disseminating biotechnology information to the researchers in the country, have already been networked in the first phase. In the second and third phase, remaining BTIS centres and DBT institutions will be networked under the faster track.

The BIOGRID allows exchange of databases and softwares which have been created or acquired by the DICs. The mirror sites of internationally recognised genomic databases such as Genome Databanks, Protein Data Bank, Plant Genome Databanks, Databases of European Bioinformatics Institute, and public domain bioinformatics software packages are also available on the BIOGRID.

Major activities of BTISnet are as follows:

- (i) *Development of Databases:* BTIS centres are responsible for developing databases in the identified thrust areas. More than 100 subject specific databases have been developed by the centres and are available on the BTISnet. Some of these databases have received international recognition. For instance, a major database on animal viruses, developed by the centre at University of Pune has been recognised by the Microbial Strain Data Network, CODATA and other international bodies.

- (ii) *R&D in Bioinformatics*: BTIS centres carry out research in gene analysis, protein structure prediction and engineering, molecular modeling, macromolecular assembly, evolutionary biology, development tools for peptide vaccine; metabolic pathways engineering, new tools for data mining, etc.
- (iii) *Training in Bioinformatics*: To meet the requirement of trained bioinformatics professionals in the country, BTISnet has introduced several training programmes in bioinformatics such as: (i) one year Advanced Postgraduate Diploma Course; (ii) M.Sc. and M.Tech. Courses; (iii) Ph.D. Programme and (iv) Short-term Training Courses. Five universities viz. Madurai Kamaraj Univ., Pune Univ., Kolkata Univ., Jawaharlal Nehru Univ. and Pondicherry Univ. are conducting Advanced Postgraduate Diploma Course in bioinformatics. M.Sc. and M.Tech. Courses are conducted by Pune Univ. and SASTRA, Thanjavur. IIT, Allahabad is also conducting M.Tech course. About 50-60 Short-Term training courses are held every year by BITS's DICs and DISCs to train researchers and scholars in bioinformatics.
- (iv) *Dissemination of Information*: BTIS resources are used by over 12,000 scientists in the country. Mirror sites established by BTISnet are also being accessed by scientists of other countries over the Internet. The services offered are analysis of biological data, bibliographic references to published literature on biotechnology (including patent data), software development for computationally intensive problems in molecular biology such as molecular modeling, genome analysis, protein engineering for rational drug design, etc. A printed directory of resources available at each centre is produced every year.
- (v) *International Co-operation*: Under UNDP/FAO/UNIDO sponsored scheme, a Referral Centre has been set up as a part of Apex Bioinformatics Centre in DBT to maintain regional information on various aspects of the FARM Programme, viz. Farming Systems, Watershed Management, Agro Forestry, Integrated Pest Management, Safe Pesticides, Biotechnology and Biodiversity and People's Participation. Network connectivity has been established at national focal points in China, Indonesia, Philippines, Thailand and Vietnam. Another international cooperation with Weizmann Institute of Science (WIS), Israel has been initiated as a part of international cooperation in Bioinformatics sponsored by UNESCO. Under this programme, India will host a Regional Node in bioinformatics along with other regional nodes proposed in China, Poland and Turkey. The Central Node has been set up at WIS. India's Regional Node in bioinformatics will extend the regional cooperation to the SAARC countries also.

NOTES

### **Environmental Information System (ENVIS)**

#### NOTES

Recognising the importance of environmental information for sustainable development and formulation of environmental management policies, Government of India set up ENVIS in 1982 under the Ministry of Environment and Forests (MOEF) erstwhile Department of Environment, as a decentralised system with a network of distributed subject specific centres to collect, collate, store, retrieve and disseminate relevant and timely environmental information to help in decision making in environmental planning and management. To begin with, ENVIS started with ten ENVIS centres located at different places in the country with Focal Point in the headquarters of Ministry of Environment and Forests, New Delhi, to coordinate the activities of ENVIS network. ENVIS centres were located mostly in R&D institutions dealing with different subject areas of environment such as pollution control, toxic chemicals, environmentally sound and appropriate technology, media and environment, coastal and offshore ecology, renewable energy and environment, eco toxicology, biodegradation of wastes, environment impact assessment, environmental management and occupational health. ENVIS, since its inception has been providing timely and relevant environmental information to all concerned.

In expanding the ENVIS network, to cover a wider range of disciplines as per the requirement of environmental information, the cooperation and active participation of State governments/Union Territories was felt necessary. Keeping this in view, the network was expanded gradually with the involvement of more environmental related areas and state government departments to make it more comprehensive.

ENVIS network, at present consists of 72 subject specific and state related centres, called ENVIS Centres. ENVIS Focal Point is located at the Ministry of Environment and Forests. Thirty Centres are set up in the state departments dealing with environment, 26 Centres are in R&D institutions/organisations covering various aspects of environment and 16 are NGOs (Non Government Organisations) who hold expertise in specific subject area of environment. Long-term and short-term objectives of ENVIS Programme are as follows.

#### Long-term objectives:

- To build up a repository and dissemination centre in Environmental Science and Engineering;
- To gear up the modern technologies of acquisition, processing, storage, retrieval and dissemination of information of environmental nature; and
- To support and promote research, development and innovation in environmental information technology.

#### Short-term objectives:

- To provide national environmental information service relevant to present needs and capable of development to meet the future

needs of the users, originators, processors and disseminators of information;

- To build up storage, retrieval and dissemination capabilities with the ultimate objective of dissemination of information speedily to the users;
- To promote national and international cooperation and liaison for exchange of environment related information;
- To promote, support and assist education and personnel training programmes designed to enhance environmental information processing and utilisation capabilities; and
- To promote exchange of information amongst developing countries.

ENVIS Focal Point, under World Bank assisted Environment Management Capacity Building Technical Assistance Project (EMCBTAP), enlarged the ENVIS network and launched portal of ENVIS (<http://www.envis.nic.in>) connecting various ENVIS centres. The portal acts as a catalyst for inter-centre interaction and for different subject related environmental information. The websites of all the ENVIS network partners can be accessed through this portal. The portal provides information on major events, activities and current updates of entire network. The portal also links to other ENVIS related sites like DELNET, BTISNET, etc. ENVIS functions as a National Focal Point of the Global Information Network, INFOTERRA of UNEP, and provides the necessary inputs from the Ministry as and when required.

The ENVIS Focal Point at MOEF HQs performs following functions:

- Coordination of ENVIS network;
- Identification of ENVIS Centres in specialised areas, their location in selected institutes and their linkages with the Focal Point;
- Framing guidelines and designing procedures for ENVIS Centres;
- Monitoring and Reviewing of ENVIS;
- Organising training, seminars and workshops;
- Regularly updating Ministry's website (<http://www.envfor.nic.in>) and ENVIS portal;
- Responding through users queries directly or through ENVIS Centres;
- Liaison with national as well as international information systems;
- Publishing quarterly abstracting periodical 'Paryavaran Abstracts'. The publication provides information on environmental research in India. About 350 national and international journals are referred to for compilation of abstracts. The abstract are arranged under major categories like air pollution, water pollution, noise pollution, environmental management, ecology, health and toxicology, forestry, wildlife, etc.;

## NOTES

- Publishing a quarterly newsletter 'ENVIRONEWS' providing information on current activities, programmes, policies, legislations, new sanctioned projects and other important decisions taken by the Ministry.

## NOTES

ENVIS Centres, set up in state departments cater to the status of environment of the state such as status of air, water and land pollution, biodiversity, etc.

ENVIS Centres set up in various R&D organisations deal with wide range of subjects such as chemical waste and toxicology; flora, fauna and conservation; ecology and ecosystems; environment and energy management; environmental education and sustainable development; environmental law and trade, etc.

ENVIS Centres of NGOs provide information in the areas of Media, environment and sustainable development; eco-labelling and promotion of eco-friendly products; conservation of medicinal plants; conservation of ecological heritage and sacred sites in India; wetland ecosystem; women and environment; sewage treatment systems and technology; urban municipal waste management; environment audit and accounting, etc.

ENVIS Centres perform the following functions:

- Build extensive collection in their subject area for collation, storage, retrieval and dissemination of information to all concerned;
- Co-ordinate with the Focal Point for supplying relevant, adequate and timely information;
- Develop databanks/databases relating to the subject area;
- Respond to users queries;
- Bring out newsletters/publications in their subject area for wider dissemination; and
- Develop their websites to enable the users to access the information electronically.

## **INFLIBNET: Information and Library Network**

INFLIBNET Centre is an autonomous Inter University Centre (IUC) of University Grant Commission (UGC) of India with its headquarters in Gujarat university campus, Ahmedabad. INFLIBNET is a major National Programme initiated by UGC in 1991. Initially started as a project under IUCAA (Inter University Centre for Astronomy and Astrophysics), INFLIBNET became an independent Inter University Centre in 1996. INFLIBNET Centre is involved in modernising university libraries, connecting them as well as information centres, through nation-wide high-speed data network for optimum utilisation of information. It serves as an information centre for transfer and access

of information, supporting scholarship, learning and academic pursuits in universities, colleges and R&D institutions in the country. Primary objectives of INFLIBNET as laid down in Memorandum of Association are as follows:

- To promote and establish communication facilities to improve capabilities in information transfer and access, that provide support to scholarship, learning, research and academic pursuits through cooperation and involvement of agencies concerned; and
- To establish INFLIBNET, Information and Library Network for linking libraries and information centres in universities, deemed to be universities, colleges, UGC information centres, institutes of national importance, R&D institutions etc. avoiding duplication of efforts.

To fulfil the above objectives INFLIBNET Centre carries out well defined activities and provide nation wide services. The Centre performs following activities:

- (i) Software Development;
- (ii) Networking;
- (iii) Database Development;
- (iv) Library Automation; and
- (v) Human Resource Development.

*Software Development:* One of the major activities of the Centre is to develop soft wares for library automation and other supporting tools for library automation. The Centre has developed Windows based library management software named 'SOUL'. The software comprises 6 modules viz. Acquisition, Catalogue, Circulation, OPAC, Serial Control and Administration. The software is based on client/server architecture and uses MS-SQL server as back end tool. It works on Windows and Windows NT environment. Some utility softwares have also been developed by the Centre to carry out data transfer and Union database activities, for example 'UCMS' (Union Catalogue Management System), a Windows based software developed for duplicate check, error correction and uploading of data.

*Networking:* UGC is modernising universities campuses with the state-of-the art campus wide network and setting up its own nation wide communication network named UGC-INFONET. INFLIBNET Centre is the nodal agency for co-ordination and management of UGC-INFONET, and facilitates linkages between ERNET and universities. Presently UGC-INFONET is linking more than 172 universities across the country.

## NOTES

NOTES

*Database Development:* Development, management, and updating of union databases of books, serials, theses, etc. have been some of the major activities of the Centre. The Centre also assists participating libraries in database development, develop utility tools for retrospective conversion of union catalogues, develop software tools for multilingual database of union catalogue, etc. Following 8 databases have been developed and are continuously growing: (i) Books: Union catalogue of books of participating libraries. (ii) Serials Holdings: Holding information of serials of more than 200 university and institute's libraries in the country; (iii) Current Serials: Currently subscribed journals by university libraries; (iv) Secondary Serials/CD-ROM: Holding information of secondary serials in print as well as on CD-ROM in various university libraries; (v) Theses Database: Doctoral theses submitted to various Indian universities till date; (vi) DDC Serials: Database of currently subscribed serials by 6 universities identified as Document Delivery Centres; (vii) Research Projects Database: Provides information about on-going research projects in Indian universities; (viii) Experts Database: A database of profiles of scientists/researchers and faculty members working in leading R&D and other institutions involved in teaching and research. The database was developed under the project funded by NISSAT. (ix) Online Profile of Academic Community of Indian Universities: Database provides the academic and research profile of senior level faculty members working in Indian universities, colleges and R&D organisation in the country.

*Library Automation:* Since library automation is a pre-requisite for networking and resource sharing, INFLIBNET Centre through UGC has been providing required support to university libraries in a phased manner. The universities are given initial grant of Rs. 6.5 lakhs each by UGC, to develop infrastructure for library automation. After installation of computer systems, further financial support is provided for 5 years to take care of the recurring expenditure. These libraries on receipt of initial grant, sign a Memorandum of Understanding with INFLIBNET. The library automation package 'SOUL' is installed and required training is provided. 'SOUL' has been well received by the university libraries. 'SOUL' has been installed at 600+ libraries including over 160 university libraries.

*Human Resource Development (HRD):* To enhance the skills of university library staff for implementation of INFLIBNET Programme, Centre conducts several training programmes and workshops on 'the application of computers in libraries and information services'. Workshops are conducted for senior level staff like university librarians and deputy librarians. One month training programme is conducted for operational staff of the library providing exhaustive training on the application

of computers to library and information activities. On-site training programmes are also conducted, where staff of INFLIBNET Centre visit the library, and conduct one-week training course on CDS/ISIS and Integrated Library Management Software (ILMS) or provide 'SOUL' training.

INFLIBNET Centre provides following services:

- (i) Bibliographic Information Service;
- (ii) Information Service from CD-ROM Collection; and
- (iii) Document Delivery Service.

*Bibliographic Information Service:* INFLIBNET provides online access to all union databases developed by the Centre, over the Internet. Librarians and scholars can access these databases, there is no restriction.

*Bibliographic Service from CD-ROM Collection:* INFLIBNET Centre is subscribing to over 12 indexing/abstracting periodicals on CD-ROM such as LISA, Dissertation Abstracts International, Current Contents, ERIC, Sociological Abstracts, etc., for providing bibliography service to faculty members and researchers in the universities and colleges. On receipt of request, search output is provided via mail, in a floppy or through e-mail.

*Document Delivery Service (DDS):* The service is provided through six university libraries identified as Document Delivery Centres, at no profit no loss basis. These centres are located at Banaras Hindu University, Varanasi; University of Hyderabad, Hyderabad; Indian Institute of Science, Bangalore; Jawaharlal Nehru University, New Delhi; Punjab University, Chandigarh; and Tata Institute of Social Sciences, Mumbai. The libraries of these universities have requisite infrastructure and strong collection base to provide DDS in their respective region. The role of INFLIBNET Centre is to promote this service to the academic and research community in the country.

*UGC-INFONET E-journals Consortium:* Under the consortium 100 Indian universities are able to access 4000+ full text scholarly electronic journals in different disciplines, from 25 publishers, across the globe. The consortium provides current as well as archival access to these journals. The programme is fully funded by UGC and monitored by INFLIBNET Centre.

INFLIBNET Centre in collaboration with different universities organises a national convention, 'CALIBER' (Convention on Automation of Libraries in Education and Research) every year. The convention provides a forum for librarian and information professionals involved in library automation and networking, to come together and interact on subject of mutual interest.

## NOTES

## National Institute of Science Communication and Information Resources (NISCAIR)

### NOTES

NISCAIR came into existence on October 1, 2002, following the merger of two CSIR institutions viz. Indian National Scientific Documentation Centre (INSDOC) and National Institute of Science Communication (NISCOM).

*Traditional Knowledge Digital Library (TKDL):* India has rich collection of genetic resources and traditional knowledge, which is either undocumented or is available in ancient classical and other literature, often inaccessible to information managers and patent examiners due to language barrier. Escalating misappropriation of the traditional knowledge (TK) in recent times has necessitated the protection of TK and genetic resources in the country. To prevent the grant of patents on non-patentable traditional knowledge, it is essential that TK is made accessible to the patent examiners in a language and a format that is easily understood by them.

Recognising the need for and importance of documenting the existing knowledge, available in public domain on various traditional systems of medicines, NISCAIR (Under CSIR), AYUSH (Department of Ayurveda, Yoga, and Naturopathy, Unani, Siddha and Homoeopathy) and DIPP (Department of Industrial Policy and Promotion) collaborated to establish Traditional Knowledge Digital Library (TKDL) on Ayurveda. NISCAIR, being the implementing agency for the project, is responsible for developing user friendly software, setting up TKDL hardware and software platform for data entry operations, digitising images of 'slokas', making directory on Traditional Knowledge Resource Classification (TKRC), populating the database and hosting the database on web/portal. The TKDL software with its associated classification system, TKRC, translates Sanskrit 'slokas' into English, Spanish, German, French and Japanese languages. TKDL database at present consists of 36,000 formulations of Ayurveda from 14 authentic Ayurveda texts in a digitised patent application format, in five international languages mentioned above. TKDL includes search interface providing full-text search and retrieval of TK information on International Patent Classification (IPC) and keywords in multiple languages. Activities under the phase II of Ayurveda have also been initiated. This will cover 65,000 formulations from 45 Ayurveda texts. These formulations will be checked for the duplicates and new formulations will be transcribed. The activities of TKDL project have been diversified to cover Unani and Siddha systems of medicine also. Thus, TKDL has given legitimacy to existing traditional knowledge and has protected such information from getting patented and misused. TKDL has gained recognition at national as well as at international level and several countries have expressed their desire to adopt TKDL as a model for developing TKDLs for protecting their traditional knowledge.

*TKDL Network Project:* Nine CSIR laboratories viz., NBRI, Lucknow; CIMAP, Lucknow; ITRC, Lucknow; Institute of Himalayan Bioresource Technology, Palampur; CFTRI, Mysore; Unit for Research and Development of Information Product, Pune, RRL, Jammu; RRL, Bhubaneswar and CBRI, Roorkee have joined TKDL as networking partners in Feb. 2004, and would be contributing to the TKDL database based on their core competencies.

*National Science Digital Library (NSDL):* Under NSDL Project, electronic access to digital resources of curriculum related material in science and technology will be provided to students in remote areas. NSDL will be implemented by NISCAIR with the active participation of UGC and Ministry of Human Resource Development. In the first phase, NSDL will cover the students of undergraduate level in Indian universities and colleges. It is proposed to create original and targeted contents by identified panel of experts/authors for about 1000 e-books for undergraduate students by the end of 2006-07. The contents of the e-books will be subject specific, location specific and university specific.

*CSIR e-Journal Consortium:* The Consortium provides access to about 3300 full-text S&T scholarly e-Journals from 11 publishers of international repute, to the scientific community in 38 CSIR laboratories. The project aims to cover 4500 world-class e-journals.

### **INDEST Consortium**

Ministry of Human Resource Development (MHRD) has set up INDEST (Indian National Digital Library in Engineering, Science and Technology) Consortium, providing access to full-text e-journals. Ministry provides funds required for subscription to electronic resources to 38 institutions including IITs, IISc, NITs, IIMs and few other centrally funded government institutions through Consortium headquarters set up at the IIT, New Delhi. Besides, government and government aided engineering colleges and technical departments in some universities have also joined the Consortium with financial support from the AICTE (All India Council for Technical Education). Eighty four engineering colleges and institutions have already joined the Consortium on their own. INDEST Consortium provides access to 4252+ full-text e-journals from 1028 publishers.

---

## **4.6 LIBRARY AND INFORMATION NETWORKS IN INDIA**

---

Data communication is an integral part of the modern information storage and retrieval systems in terms of their capabilities for online access. In the initial stage, the information networks operated in an off-line mode, wherein a query was loaded into a computer which was later matched with the database for relevant bibliographic records.

NOTES

## NOTES

The search results consisting of such records on the subject of query were generated as output. This process was not satisfactory for effective and efficient retrieval of relevant records. Further progress in computer and communication technology has made it possible to carry out this process in an online interactive mode wherein a user can access an online host via a microcomputer from a remote location and can define and redefine his query based on the search results obtained till he is fully satisfied with the final outcome.

The use of communication technology for information retrieval activities gained momentum with the creation of several large databases made available online for shared use through vendors like DIALOG, STN, Datastar, etc. By the mid-1970s, several organizations had started offering online searches from remote terminals on a variety of online databases. The article, before describing data communication and networks and their use in the libraries and information centres, touches upon their basic concepts, and the types of hardware involved which are considered necessary for users to know.

### **Brief History-International Scenario**

- Has its roots in Library co-operation, ILL and shared cataloguing
- Began in true sense with MARC - 1968
- Library of Congress played a vital role
- Ultimately led to large networks such as OCLC, WLN, RLIN, BCLMP, UTLAS, ABN, JANET and many others.

### **Brief History Library Networking Scene in India**

- 1958 - Scientific Policy Resolutions
- 1959 - Sinha Committee's Report
- 1965 - Ranganathan Report to UGC
- 1972 - Peter Lazar Committee Report
- 1972 - V A Kamath Report
- 1983 - Technology Policy statements
- 1984 - Planning Commissions Working group headed by Dr. N. Seshagiri (Seventh Five Year plan)
- 1985 - NISSAT efforts (city networks)
- 1988 - UGC effort (Academic Library) DESINET, BTIS, CSIRNET, INFLIBNET, etc.

### **INDONET**

The INDONET, a computer-based network commissioned by Computer Maintenance Corporation (CMC), was the first Indian commercial computer communication network. It came into operation in 1986. It

is an integrated information management and distributed data processing facility spanning the entire country. The INDONET aims to provide facility for distributed data processing on an all-India basis to large organizations in the network using the CMC computers for their data processing operations. It also plans for provision of data communications between its users in their respective locations in the network, even if the users are not accessing CMC's nodal computers. Distributed databases in various subjects and access to specialized applications software locally, or in remote locations obviate the need for duplication of software and hardware facilities at each location.

INDONET-CMC's Value Added Services network is a data network, which supports both TCP/IP and X.25 Network Protocols. It is approved by the Department of Telecommunications having:

High speed leased links of 64 kbps connecting 9 locations in India

- Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Vizag.
- Has alternate Data-links at each location, for better reliability and uptime.
- 2 RISC based servers at each location

Present services of INDONET include:

— E-mail/E-mail-fax services

- File Transfer, Credit card Authorization, Database Services

— Hosting User Applications in the Net

- Providing Network-based connectivity solutions, Corporate Intranet
- Network Management, Managed Data Network Services, Help Desk
- EDI Services, Web-based applications
- Students registration in the Net for admission
- Students assignment submission grading over the Net.
- Electronic Reference Library access in the Net
- Data Management and data processing services
- Recruitment Services using Newer Technologies (OMR, OCR) etc.
- ISP Services

Future services planned are:

- Full fledged E-commerce services, ERP/Application Integration Services
- Voice/Video Conferencing facilities,
- Payment transaction to *Utilities* (Electricity, Water, Telephone etc.)

## NOTES

- Fax-Store and Forward
- Call Centre Services
- VSAT Services

## NOTES

### **ERNET (Education and Research Network)**

In this era of globalization and hyper-competition, the concept of teaching has under-gone a sea change. Learning and dissemination of information is becoming more important. Internet-based education and e-learning are the trends of the day. The Department of Electronics had initiated a project "ERNET" with funding from UNDP. The objective was to create expertise, R&D and education in the country in the area of networking and the Internet in the country.

Today ERNET is the largest nationwide terrestrial and satellite network with a presence in the premier educational and research institutions in major cities in the country. The focus of ERNET is providing network connectivity and meeting the entire needs of educational and research institutions by hosting and providing relevant information to their users. Research and Development and training are integral parts of ERNET activities.

ERNET (Education and Research Network) has made a significant contribution to the emergence of networking in the country. It has built up national capabilities in the area of networking, especially in protocol software engineering. It has not only succeeded in building a large network that provides various facilities to the intellectual segment of Indian society, that is the research and education community, it has over the years become a trendsetter in the field of networking. The Govt. of India has committed itself to further strengthen the project by including it in the 9th Plan with the allocation of funds and by creating of a new organisational set-up in the form of a Society.

ERNET was initiated in 1986 by the Department of Electronics (DoE), with funding support from the Government of India and the United Nations Development Programme (UNDP), involving eight premier institutions as participating agencies—NCST (National Centre for Software Technology) Bombay, IISc (Indian Institute of Science) Bangalore, the five IITs (Indian Institutes of Technology) at Delhi, Bombay, Kanpur, Kharagpur and Madras, and the DoE, New Delhi. ERNET began as a multiprotocol network with both the TCP/IP and the OSI-IP protocol stacks running over the leased-line portion of the backbone. Since 1995, however, almost all traffic is carried over TCP/IP.

#### **The Objectives of ERNET include:**

- ERNET operations, *i.e.*, providing state-of-the-art communication infrastructure and services to academic and research institutions,

Government organisations, NGOs, private sector R&D organisations, and various other non-commercial organisations;

- Research and development;
- Training and consultancy;
- Content development.

### **Achievements**

- Foundation of a national capability building in the area of computer networking laid through:
- Setting up of a chain of core groups as the participating agencies with a minimal set of lab facilities and creation of skilled manpower to carry out R&D
- Generating manpower at different levels
- Making the world of standards (TCP/IP, OSI etc.) well understood
- Providing an insight into emerging issues such as ATM networks, networked multimedia, and information infrastructure
- Network infrastructure and services set up, including
- Installation, maintenance and operation of large campus LANs
- Design, commissioning and testing of SATWAN hub and the installation of VSATs
- Seamless interconnection of LAN-WAN segments and multiprotocol capability provided
- Provision of the whole range of Internet services
- Deployment of TDM/TDMA based VSAT network for Internet access
- Research and Development
- Research and development in the area of computer networking has been the forte of ERNET.

### **NICNET: National Informatics Centre Network**

The satellite based National Informatics Centre Network (NICNET) (Seshagiri *et al.*, 1987) was set up to provide informatics services to the Central and State Government Departments and then organizations. NICNET provides state of the art solutions and decision support for information management and decision support requirements of the Government of India and the corporate sector. The information technology services provided by NIC range from conducting feasibility studies for developing and implementing computer-based information systems, undertaking large turnkey networks and imparting training. It has developed extensive expertise in integrating IT-based systems with the working of user organizations. NIC continue to provide value added network services, viz., E-mail, database access, Internet etc.

NOTES

**NOTES**

The network consists of Master Earth Station, Remote Micro Earth Stations and a Geosynchronous Satellite. The master earth station is located at CGO Complex, New Delhi. It comprises a 13-metre antenna, a network control centre and a packet switch. The micro earth station connects remotely located district computers with the State computer, which, in turn, are connected to the regional headquarters. Specialized services such as computer-aided design and computer-aided management are also offered over NICNET. The network supports X.25 switch and operates at 1200 bps transmission speed and 19.2 Kbps receive speed. The present configuration handles 300 packets (128 bytes each) per second. The host computers are connected to this packet switch. NICNET is currently using the INTELSAT-V satellite which mainly functions as a relay station between the master earth station and the micro earth station. NICNET has used terrestrial communication for distribution of terminals (Local and Remote from NEC-S1000, CEBER-730, CYBER-830, ND-550 or Super AT386 systems) and for development of Local Area Network. Terminals in a building are distributed over RS-232C cable or dedicated lines using line drivers, depending upon the distance involved. The terminals outside the building are connected over data circuits leased from the local telephone authorities. Dial up access using Public Switched Telephone Network (PSTN) is also provided to many users.

The Local Area Network with a gateway to the NICNET has been developed at the NIC Headquarters. A large number of terminals have been distributed from super ATs installed in various buildings. These super ATs are connected to the host machine/packet switch in NIC Headquarters. Initially, it connected 40 interactive local terminals and 11 minicomputer systems to the in-house mainframe CYBER 170/730 system. These are spread out over a radius of 25 km at Delhi. The remote terminals and the minicomputers are connected by point-to-point data circuits in star configuration; 2 concentrators have also been used to support remote terminals. The network facilitates flow of information among 4 national/regional nodes (NEC at Pune, Bhubaneswar and Hyderabad, ND 550's at State capitals), 32 state/union territory nodes and 439 district nodes.

NICNET has expanded as a dedicated network having more than 500 nodes geographically distributed over the country to address the rapidly growing awareness to of computerization in different sectors of the Government. Each district information centre consolidates information for monitoring the socio-economic development of the district. Each district is connected to its State's information centre for flow of information from district level to State level. The State centre in turn sends processed information to the regional and the national centres and is also connected to other States. Hence, any

user connected to a remote or master earth station can link to any other remote micro earth station. The national centre at New Delhi is the repository of all information systems and conducts research and development of relevant software and hardware tools.

The various facilities and services of NICNET include:

- Gateway to Internet by providing Internet connectivity
- Electronic mail service
- USENET bulletin board service
- Telnet facility to login to remote host
- File transfer protocol facility
- Research and Education Network of NIC (RENNIC) service to research, education and medical institutions
- Electronic Data Interchange service
- Bibliographic information service
- Geographical Information Systems
- General information Services terminal(GISTNIC) for common public
- Training facilities.

NOTES

### **Vikram**

Vikram is the packet switched public data network under development by the Department of Telecommunications. This network will initially have 8 switching nodes in Delhi, Bombay, Kolkata, Madras, Bangalore, Hyderabad, Ahmedabad and Pune and 12 remote access nodes with its network management centre located at Delhi. It will support packet switching interface to CCITTs X.25, X.28, X.29 and X.75 recommendations.

#### **Bibliographic Applications:**

Like NICNET and INDONET, **Vikram** also has bibliographical applications. It has offered its infrastructure to NISSAT for pilot experimentation on library networking in the country.

### **BITSNET**

Recognizing the importance of information technology for pursuing advanced research in modern biology and biotechnology, a bio-informatics programme, envisaged as a distributed database and network organisation, was launched during 1986-87. The programme has become a very successful vehicle for transfer and exchange of information, scientific knowledge, technology packages, and references in the country involving 10-12 thousand scientific personnel. Ten Distributed Information Centres and an Apex Centre at the Department of Biotechnology, and 44 Sub-Distributed Information Centres, located

**NOTES**

in universities and research institutes of national importance, are fully engaged in this task. Six national facilities have been set up for interactive graphics-based molecular modeling and other bio-computational needs. Four long-term courses at the level of post MSc Diploma in Bio-informatics, at Poona University, Jawaharlal Nehru University, Kolkata University and Madurai Kamaraj University, are fulfilling the long outstanding need for trained human resources in this inter-disciplinary area.

**INET**

INET is India's X.25-based packet switched public data network; it was commissioned by DOT and paved the way for highly reliable, cost-effective and flexible ways of national data transfer and information access. Packet switching enables error-free transmission with dynamic rerouting of calls and provides interconnection between computers/terminals at different speeds and protocols. In its first phase, INET had nodes at New Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Pune, Kanpur and Ahmedabad; and connected through 9.6 kbps and 64 kbps links. In subsequent phases, this facility was extended to 88 other cities throughout the country. It supports CCITT interfaces/ protocols X.25, X.28, X.29, X.3 and X.75. Access is through dedicated leased lines for asynchronous (X.28) or synchronous (X.25) and dial-up mode (X.28).

The facilities offered by INET include: reverse charging, closed user groups, fast selects, charge information indication, call redirection, call deflection, abbreviated address calling, hunt groups, multiple packet sizes and network user identification. The typical applications are e-mail services, corporate communications, information retrieval, database services, remote job applications, credit card verifications, travel reservations and electronic fund transfers (DOT, 1999b).

**SIRNET**

The SIRNET (Scientific and Industrial Network) (SIRNET NETletter., 1990-), a project of INSDOC aims at networking all 40 CSIR laboratories under SIRNET. It was made operational in December 1989. At present, SIRNET provides electronic mail facility as its first application service from the SIRNET servers with a number of user nodes. For transmitting a message, a user has to deposit the message to one of the SIRNET mail service nodes situated at INSDOC, Delhi and at its regional centre at Bangalore from where it can be transmitted to its destination which may be any of the CSIR laboratories at present linked to the mail node. The SIRNET, in turn, is connected to a large network-ERNET (Educational and Research Network) which is connected to the international network UUNET (Unix

User Network) through which other international networks like BITNET, CSNET and JANET are accessible. The SIRNET's mail node at the INSDOC also acts as a gateway to ERNET and through ERNET to other networks. Connections between various laboratories of CSIR are established using dial-up telephone lines, while SIRNET is directly connected to DoE mail server VIKRAM which acts as the clearing node in Delhi ERNET.

**NOTES**

---

**SUMMARY**

---

- Information is a vital resource for users and for information specialists. The national organisations, international organisations and professional bodies are engaged in providing services and products which help in closing the information gap. Another problem is that the Western nations have always been information rich and the developing countries are information poor. The modern technologies, especially the computer and the telecommunication technologies have bridges to a great extent the information gap within the framework of international organisations that have come forward to help close this wide gap by their programmes and activities.
- United Nations agencies, professional organisations like FID, IFLA, ICSU, etc., have helped a lot in this regard. They are professional bodies that provide a forum for exchange of ideas and experiences. Specialised global information systems provide computerised products, services and activities that ensure taking care of the information needs of the user community.
- The growing demand for information and increasing use of present facilities and services indicates the need and importance of such national, international and special information organisations within our information infrastructure.

---

**REVIEW QUESTIONS**

---

1. Explain in your own words Regional Information System.
2. What do you understand by NIC?
3. List the information services of NISCAIR.
4. Name some databases of NASSDOC.
5. Which are the areas of activity of DESIDOC?
6. When and why was NIC set up? Enumerate the services provided by NIC.
7. What are the Long-term and Short-term objectives of ENVIS?

---

## **FURTHER READINGS**

---

**NOTES**

1. Manual of Reference and Information Sources, Sewa Singh, B R Pub, 2004.
2. Information System Management, M.Y. Kamat, Pointer Pub, 2002.
3. Introduction of Computers and Information System, Sushila Madan, Taxmann, 2007.
4. Web based Information System, S K Dass, Shree Pub, 2007.

---

# UNIT V ORGANISATIONS PROMOTING INFORMATION SYSTEMS AND PROGRAMMES

---

*Organisations Promoting  
Information Systems and  
Programmes*

NOTES

## ★ STRUCTURE ★

- 5.1 Introduction
- 5.2 International Organisations
- 5.3 Organisations Promoting Information Systems and Programmes in India
- 5.4 Role of Professional Associations in Promoting Information Systems and Services
  - *Summary*
  - *Review Questions*
  - *Further Readings*

---

### LEARNING OBJECTIVES

---

After going through this unit, you will be able to:

- explain international organisations.
- know about OCLC database service.
- define joint academic network.
- describe organisations promoting information systems and programmes in India.
- explain role of professional associations in promoting information systems and services.

---

## 5.1 INTRODUCTION

---

Libraries are committed to providing and making accessible the best possible informational, educational, cultural, and recreational materials and services to the citizens of the service area. The library's most important technology goal is to give all citizens access to information regardless of format, and regardless of where the information is stored. The secondary goal is to make that access available from anywhere in the community as far as possible.

A network is an essential partner in this exercise because it facilitates access to vast information services. Networks have a potential to improve library services in several ways. Libraries and their users

NOTES

get benefit from accessing databases, discussion groups, full-text access, document delivery through resource sharing. The continuous improvement in networking technologies reduces the cost of information provision, thus creating new opportunities for the library networks to play their role in information provision to end users.

A large number of international organisations are engaged in the development of library and information services, these also include global information systems devoted to collection, processing and dissemination of information in various countries. We will discuss in this unit about different organisations promoting information systems and programmes dedicated to the purposes of furthering access to the world's information.

---

## 5.2 INTERNATIONAL ORGANISATIONS

---

### **Online Computer Literary Centre (OCLC) (<http://www.oclc.org/>)**

The Online Computer Library Center, Inc. (OCLC), a non-profit corporation, is a membership-based, service and research organization dedicated to the purposes of furthering access to the world's information at reduced cost. The OCLC members are institutions, primarily libraries, which use OCLC products and services to locate, acquire, catalogue, lend and preserve books and other library materials. Researchers, students, faculty, scholars, professional librarians, and other information seekers use OCLC systems through libraries to obtain bibliographic, abstract, citation, and full-text information. The OCLC cataloguing and resource sharing system is the largest and most heavily used computer library system in the world. The OCLC FirstSearch service ranks among the leaders in the online information industry in terms of connect hours. The OCLC bibliographic database, WorldCat (the OCLC Online Union Catalogue), is one of the most consulted electronic databases in higher education.

The OCLC and its member libraries cooperatively produce and maintain WorldCat, the Online Union Catalogue of Books available in the libraries of member institutions. Members of the OCLC can also get access to a wide range of services and databases, including WorldCat. The OCLC is the world's largest library network.

### **History of OCLC**

In 1967, the presidents of the colleges and universities in the state of Ohio founded the Ohio College Library Center (OCLC) to develop a computerized system in which the libraries of Ohio academic institutions could share resources and reduce costs. Its first offices were in the Main Library on the campus of the Ohio State University. Mr. Frederick G. Kilgour, was the first President of OCLC, responsible for the

**NOTES**

growth of OCLC from a regional library computer system for 54 Ohio colleges into an international network. The objective of the OCLC as stated in its Articles of Incorporation is to "establish, maintain and operate a computerized library network and to promote the evolution of library use, of libraries themselves, and of librarianship, and to provide processes and products for the benefit of library users and libraries...."

In 1977, the OCLC changed its policy that enabled libraries outside Ohio to become members and participate in its governance. The Ohio College Library Center became OCLC, Inc. in 1981, the legal name of the corporation became Online Computer Library Center, Inc.

***Membership***

More than 50,540 libraries in 84 countries and territories around the world are members of OCLC.

***Governance***

The OCLC's governance structure consists of Members and Governing Members, Members Council and the Board of Trustees. Governing Members of OCLC have the privilege of electing representatives to the Members Council. Any OCLC Member or Governing Member may serve on Members Council, but only Governing Members nominate and determine (by vote) who serves. The Members Council is comprised of 60 delegates plus six international transitional delegates who reflect and articulate the interests of member institutions that participate in OCLC through qualifying regional service providers. Delegates come from many types and sizes of libraries, bringing different perspectives to the Members Council. The 15-member Board of Trustees consists of the President of OCLC and eight trustees elected by the Board itself.

***Services***

The OCLC offers several products and services, a few of them are described below:

***WorldCat***

WorldCat is a worldwide union catalogue created and maintained collectively by more than 9,000 member institutions in 84 countries representing hundreds of languages and cultures. With millions of online records built from the bibliographic and ownership information of contributing libraries, it is the largest and most comprehensive database of its kind. WorldCat is the foundation of many OCLC services that facilitates libraries to process, manage and share information resources.

The WorldCat includes catalogue records dating back to thousands of years nearly in every format. Records exist for everything from stone

NOTES

tablets to electronic books, wax recordings to MP3s, DVDs and Web sites. Whether an item is physical or digitally preserved, popular or one-of-a-kind, the integrity of its record is maintained by the input of catalogueing members, OCLC's standards and quality control.

The OCLC offers a number of catalogueing tools such as Connexion, PromptCat and CatExpress to interface with the WorldCat enabling librarians to perform copy or original catalogueing. Built around WorldCat, the OCLC offers a complete range of catalogueing and metadata service including online catalogueing, copy catalogueing, MARC record collections, (online and offline), offline catalogueing and customized OCLC catalogueing.

### ***NetLibrary***

The OCLC's NetLibrary platform provides access to electronic books from a wide range of publishers. More than 12,000 libraries worldwide subscribe to NetLibrary. NetLibrary's growing collection of monographs and reference resources spans hundreds of subject areas and can be accessed through an intuitive, easy-to-use interface that offers a single point of access. Users can find the latest titles, reference sources, business and economics resources, best-selling fiction, and more. NetLibrary also works with the world's leading publishers to provide even more resources, including foreign language collections, databases, journals and audio-books.

The NetLibrary offers detailed usage reports for books subscribed by a library. It is fully integrated into leading library systems allowing libraries to provide direct links to electronic books in NetLibrary.

### ***OCLC's Electronic Collections Online***

OCLC's Electronic Collections Online is a powerful electronic journals service that offers web-based access to a growing collection of more than 5,000 titles in a wide range of subject areas from over 70 publishers. It also provides a robust archiving solution and searching across journals. OCLC has secured archival rights to journal content, subscription to e-journals through the OCLC thus it ensures perpetual access to the journals subscribed through OCLC for the paid period of subscription.

### ***OCLC Database Service: FirstSearch***

The FirstSearch (FS) is an online service that provides web access to research databases consisting primarily of journal. The service provides seamless electronic access to more than eighty databases containing 10 million full-text and full-image articles in most subject fields. Libraries have an option to select databases based on their needs. Some of the more important databases included in FirstSearch are:

ABI/INFORM

Applied Science & Technology Abstracts

ArticleFirst: index to articles in 12,500 journals

BasicBIOSIS

Geobase

ContentsFirst: Tables of contents of 12,500 journals

Disclosure: Financial reports of publicly owned companies

Education Abstracts: database of articles in education

Eventline: Schedule of conventions, exhibits, etc., worldwide

Microcomputer Abstracts: Articles in computer applications

Periodical Abstracts: Index to articles in 1500 multidisciplinary journals

Proceedings: Index to conference proceedings

WorldCat: Catalogue of over 32 million book and other library resources

WorldScope: Financial reports on companies world wide.

The size and period covered in FirstSearch varies between the individual databases but many include data going back as far 1980. The FirstSearch facilitates search across multiple databases through its simple menu-driven search interface. Full-image articles from Electronic Collections Online journals are linked to corresponding citations in databases throughout the FirstSearch service. Subscribers to FirstSearch may also place their orders online for articles that are not accessible to them.

### ***Question Point: Cooperative Virtual Reference Service***

A collaborative project of the Library of Congress and OCLC, QuestionPoint offers more than 7,000 question-and-answer sets from a database built from reference transactions. Its interface is available in 10 languages, and is used by more than 1,000 libraries in 20 countries. QuestionPoint helps libraries to manage their reference transactions, both online and in-person. Robust administrative tools available through Question Point allow libraries to route questions and manage other reference transactions locally, regionally and nationally. It provides statistical reports to make management decisions, demonstrate trends for funding proposals and measure user satisfaction levels. OCLC's Question Point interface can be added to the library's Web site so as to provide access to quality online reference assistance at any time of day. Users get online help through familiar online channels such as e-mail or a chat window. Question Point assistants can even "share" their solution with a technology that safely and securely gives them remote access to a user's desktop.

### ***CONTENTDM: Digital Content Management Software***

CONTENTdm is comprehensive digital management software. It provides tools to organize, manage, publish and search digital collections on the Web. It is a flexible, multifunction software package that handles

## NOTES

NOTES

all document formats including PDFs, images, video and audio files. CONTENTdm offers a scalable solution that can be upgraded based on user's needs. Its functionality allows a user to create collections quickly and easily using a simple point and click interface.

***Inter-Library Loan Management Software: ILLaid***

The ILLaid from OCLC is a resource sharing management software that helps libraries to automate routine interlibrary loan functions. The software helps to reduce paperwork dramatically and increases productivity. The software serves as an integrated interface for the library to handle borrowing, lending and document delivery through a single Windows-based interface that includes access to WorldCat and OCLC ILL. The ILLaid automates the processing of interlibrary loan requests, compiles lending and borrowing statistics, provides financial tracking for lending and borrowing and delivers articles and other documents electronically. It even notifies users when requests are fulfilled. Moreover, users can submit and track their own requests via the Web.

***Other Services***

The OCLC's digitisation, microfilm and archival services are designed to protect and share collections for their members. The OCLC has infrastructure and skilled staff at their preservation centres. The OCLC's collection development services can assess the strengths and gaps of collection available in the libraries if a member institution using their analysis tools.

***Research Libraries Group (RLG)-RLIN ([www.rlg.org](http://www.rlg.org))***

The Research Libraries Group (RLG) is a not-for-profit organization consisting of over 150 research libraries, archives, museums, and other cultural memory institutions. The RLG's global membership has remarkable collections for research and learning. Founded in 1974 by the New York Public Library, Columbia University, Harvard University and Yale University, the RLG provides solutions to the challenges presented by information access and management in the digital era.

The RLG supports researchers and learners worldwide by expanding access to research materials held in libraries, archives, and museums. It works with and for its member organizations enhancing their ability to provide research resources. The RLG designs and delivers innovative information discovery services, organizes collaborative programs, and takes an active role in creating and promoting relevant standards and practices. It offers a variety of information resources useful to institutions and individuals.

The RLG is governed and run by its members, staff and board of directors. Its headquarter is in Mountain View, California, USA.

### ***History***

In the early 1970s, three US universities and the New York Public Library created a new kind of practical resource-sharing consortium, which was incorporated in 1975 as the Research Libraries Group, Inc. (RLG). Since then, RLG has grown to include virtually every type of cultural memory institutions, *i.e.*, universities, national libraries, archives, historical societies and museums.

### ***Governance***

The RLG consists of 150 members which include universities, national libraries, archives, museums, and historical societies, with remarkable collections for research and learning. The RLG provides a framework for collaboration, problem solving and the development of new standards, products and services. The RLG's Board of Directors, elected by the RLG members' designated representatives, is responsible for the strategic management of the activities, property, and affairs of the corporation. The president is the CEO and a voting member of the RLG board. RLG staff, numbering approximately 90, are organized into six departments, namely: General Administration, Member Programs and Initiatives, Integrated Information Services, Technology Development, Customer and Operations Support and Finance and Administration.

### ***Services***

Some of the important products and services by the RLG are:

#### ***RLG Union Catalogue***

This RLG union catalogue is a source of bibliographic information for over 130 million records. It provides unparalleled coverage across subjects and material types in almost 400 languages.

#### ***The AMICO Library***

The AMICO Library from RLG offers high-quality art images for class projects, art history and studio art programs, course Web sites, lectures, presentations, and research resources. These images are copyright cleared. The database is the Art Museum Image Consortium's multimedia resource of works of art with descriptive material from leading museums.

#### ***RLG's Online Databases***

RLG's web-accessible databases contain a wealth of information and resources, *i.e.*, traditional library materials, including books, journals, music, and maps, indexes to archival collections, art and rare book auction catalogues, digital images of works of art and cultural artefacts. Some of the online databases offered by RLG are:

NOTES

NOTES

RLG Union Catalogue  
The AMICO Library from RLG  
Anthropological Index and Literature  
RLG Archival Resources  
Avery Index to Architectural Periodicals  
Bibliography of the History of Art  
RLG Cultural Materials  
FRANCIS  
Hand Press Book Database  
Handbook of Latin American Studies  
History of Science, Technology, and Medicine  
Index to Foreign Legal Periodicals  
Index to 19th-Century American Art Periodicals  
Russian Academy of Sciences Bibliographies  
SCIPIO: Art and Rare Book Sales Catalogues

Effective, global resource sharing is central to mission of the RLG. Inter-library loan is made effective under RLG's SHARES Partnership Program using ILL management software.

**Technical Services**

The RLG offers technical services like:

Copying existing records in local systems at the user workplace. Also, it allows a user to have access to Marcadia Cataloguing. It lets a subscriber put a brief record on an FTP server that need cataloguing along with specific cataloguing requirements.

The RLG have produced a number of guides and tools useful both to members and to the larger community. Most of the tools and guidelines are for metadata creation, digitisation, mark-up languages for archival preservation, microfilming and digital imaging.

**Joint Academic Network (JANET) (<http://www.ja.net/>)**

JANET is dedicated to the needs of the UK education and research community. It connects education and research organizations in UK to each other, as well as to the rest of the world through the Internet. In addition, JANET includes a separate network that is available to the community for experimental activities in network development. The JANET connects all universities in UK, FE Colleges, Research Councils, Specialist Colleges and Adult and Community Learning providers. It also provides connections between the Regional Broadband Consortia. The JANET network currently serves over 16 million end-users.

JANET allows videoconferencing and video streaming capabilities to be used to deliver lectures to remote groups of students. For researchers, the high capacity of the JANET backbone allows the linking of large data storage and high performance computing facilities at a national and international level.

### ***Role of UKERNA***

UKERNA (United Kingdom Education and Research Networking Association) manages the operation and development of JANET on behalf of JISC (Joint Information Systems Committee) for the UK Further and Higher Education Funding Councils. JISC also works in partnership with the Research Councils. UKERNA is funded by the UK government, with the primary aim of providing and developing a network infrastructure that meets the needs of the education and research communities. The JANET consists of a backbone, known as SuperJANET which, in turn, is linked to Regional Networks. Education and research institutions are connected to the JANET backbone through Regional Networks.

### ***JANET Services***

The JANET offers a wide range of network, support and information services to help educational institutions to maximize their benefits from JANET. Major services offered by the JANET includes:

*JANET Customer Service (JCS):* JCS (JANET Customer Service) is the primary point of contact for enquiries concerning JANET. The JCS is in contact with technical experts and service managers both within UKERNA and throughout the education community, and is, therefore, able to provide relevant assistance at any level. The JCS responds to a large volume of customer queries and facilitates provision of new and upgraded connections to JANET. It also assists in the registration of domain names and applications for IP addresses.

*Mail Services:* A range of mail services is available, including an electronic mailing list service, a Mailer Shield service, a SPAM-relay Tester System and the Mail Abuse Prevention System. A Web Mail Service is also offered to a limited number of organizations, which do not have the resources to support an e-mail service themselves.

*Networking Support Services:* Networking Support Services include a co-location service for hosting equipment within the JANET backbone, a Network Time Service offering organizations a stable time reference and a Managed Router Service for those needing expertise in managing their network router.

*Usenet News Services:* Subscribing organizations with their own news servers can accept a news feed sent from central JANET servers. Organizations without their own news server can let their users read news directly from a JANET server.

### **NOTES**

NOTES

*Videoconferencing Services:* Videoconferencing over IP networks and ISDN (Integrated Services Digital Network) are provided. A Booking Service lets registered users book a videoconference online. The Video Technology Advisory Service evaluates products, develops documentation and offers an on-site consultancy service.

*Web Services:* A pilot Web Filtering Service is available to provide protection against access to inappropriate content on the Internet and to allow the maintenance of lists of blocked or permitted URLs. Two other pilot services—Web Hosting and Web Mail—are available to small organizations only, such as specialist colleges or adult and community learning centres.

*Training:* The Training Section was set up initially to provide for the needs of technical staff at sites new to JANET. It has been extended to include education and training for staff charged with the management of networking and networking services at JANET sites with Primary Connections.

*Workshops and Conferences:* UKERNA ensures that the JANET community is kept up-to-date with networking developments by organizing workshops and conferences to cover either general networking issues or more specific topics. The annual events cover a number of different networking issues, from strategy to technical support. UKERNA also organizes events in conjunction with other organizations.

Other services include Advisory Services, Domain Name Services, Information

Dissemination services etc. JANET web site provides further details.

***Consortium of University Research Libraries (CURL) (<http://www.curl.ac.uk/>)***

The CURL is a Consortium of University Research Libraries in UK. Several activities of CURL are funded by the JISC. The CURL helps member institutions to build distributed and hybrid research library in their institutions with an aim to help researchers all over the world:

- (i) to search, locate and request resources of all kinds in different formats, easily and quickly from their desktops;
- (ii) have quick and easy access to an increasing amount of electronic resources, both born-digital and digitized;
- (iii) have physical access to manuscripts, archives or printed items that have not been digitized and cannot be moved, wherever these are held; and

- (iv) have other printed items from outside their own institutions delivered to them efficiently. The CURL's mission is to increase the ability of research libraries to share resources for the benefit of the local, national and international research community.

The total membership of CURL has grown to 28 libraries in UK including 22 university libraries, as well as the British Library, the National Library of Scotland and the National Library of Wales.

### ***Services and Projects***

CURL's services and related projects are as below:

*Online Databases:* The CURL database consists of bibliographic records of documents available in members libraries as well as data from other sources (like Library of Congress). Records are stored in UKMARC and can be accessed via telnet or Z39.50 client. The database is available to non-members of CURL on charged services. The database currently consists of more than 38 million records, which is growing constantly. As libraries progress their retrospective conversion programmes the number of records for older material and for non-book material is increasing. The records are of good quality and CURL has established bibliographic standards for contributors and records are flagged to indicate standard. The service is open to any non-profit organization.

*COPAC (<http://copac.ac.uk/>):* COPAC is a union catalogue that provides free access to the merged online catalogues of members of the CURL. There are some 30 million records on COPAC representing the merged holdings of 26 CURL member institutions, including the British Library and National Library of Scotland, plus special collections from a small number of non-CURL libraries. The remaining CURL libraries' catalogues are also being loaded. The COPAC web site contains service information and support materials. COPAC is funded by the JISC.

*Archives Hub (<http://www.archiveshub.ac.uk/>):* The Archives Hub is a collaborative service, which provides a single point of access to descriptions of archive collections held in universities and colleges throughout the United Kingdom. Over 60 institutions are contributing high-quality information to the Hub, which covers over 20,000 archives. The website is free to use and contains information relevant to a wide range of research areas. The service is funded by the Joint Information Systems Committee (JISC) and is overseen by CURL. MIMAS runs the service at the University of Manchester and development work on the Archives Hub software is undertaken by the Cheshire Development Team at the University of Liverpool.

*Britain in Print (<http://www.britaininprint.net/>):* The Britain in Print project, funded by the Heritage Lottery Fund, is a collaborative venture led by Edinburgh University Library involves participation of ten CURL libraries including the Edinburgh Royal College of Physicians and the Mitchell Library in Glasgow. All ten libraries have significant

### **NOTES**

NOTES

collections of pre-1700 British books which are not yet catalogued in electronic form. Launched in January 2003, the Britain in Print project will provide free access to information about the rich collections of early British books that are held in twenty-one of the nation's most important libraries.

*CURL-CoFoR* (<http://www.cocorees.ac.uk/>): CoFoR (Collaboration For Research) is a new CURL initiative, set up to provide its members and other research libraries with practical tools (templates, guidelines and recommendations) for collaborative acquisition and retention. It will also give special attention to techniques for serial de duplication and to the mapping of relationships between research activity and library provision.

### **China Academic Library and Information System (CALIS)**

The China Academic Library and Information System (CALIS), launched in 1998, is a nation-wide resource-sharing system among Chinese academic libraries. Its mission is to serve directly those universities, which are funded by the central government, by providing document and information services to the users through the China Education and Research Network. The CALIS also serves users in other universities and colleges so long as they have network connections to the China Education and Research Network (CERNET). The CALIS is just like a nation-wide academic library consortium in China, half supported by the government, half by the libraries themselves. It can be reached through the web site (<http://www.calis.edu.cn/>).

#### ***Aims and Objectives***

CALIS aims to build a national information infrastructure along with CERNET. The priority of CALIS is to reveal what already exists in academic libraries in China and to increase its utilization. Two main tasks of CALIS are to build an information service network that contains hardware and software; and (ii) to introduce and produce various databases.

#### ***Governance and Organisation***

A top-level committee that consists of officers from related departments of the Ministry of Education and two university presidents from Beida and Tsinghua governs CALIS. An expert team acts as consultants to the committee. CALIS Administrative Centre located at Beijing University coordinate and execute various activities of the network under the leadership of the committee.

CALIS is organized into four national information centres, *i.e.*, Science, Social Science and Humanities Information Centre, Engineering and Technology Information Centre, Medical Information Centre and Agricultural Information Centre. These Centres provides information

support to users. Seven regional information centres divided as East China South Regional Center, East China North Regional Center, South China Regional Center, Central China Regional Center, Southwest China Regional Center, Northwest China Regional Center, and Northeast China Regional Center, which provides secondary support for the information users.

### ***Current Status of CALIS***

CALIS has established a three-level resource and service infrastructure. Cooperative activities are undertaken in various cities and regions. Currently, CALIS has undertaken six major activities drafted in its plan. These activities include: Coordinative Acquisition, Online Catalogueing, OPAC, ILL, Document Delivery and Internet Navigating.

A number of bibliographic databases and full-text databases are being subscribed/acquired either as central-funded acquisition or consortium acquisition, covering almost all the disciplines and subjects. Some major bibliographic databases and full-text resources include:

- Science Citation Index (SCI)
- Social Science Citation Index (SSCI)
- Engineering Information (EI)
- Biological Abstracts (BA)
- Chemical Abstracts (CA)
- Cambridge Scientific Abstracts (CSA)
- ABI/Global
- ProQuest Academic Research Library
- Science Online
- Elsevier ScienceDirect Onsite
- Academic Press
- IEEE/IEE Electronic Library (IEL)
- Genome Database
- China InfoBank, etc.

Besides, a series of databases were produced in-house. These databases includes:

Union Catalogues of Books and Journals: 150 members have contributed 1.4 million titles and more than 3 million holdings;

Current Contents of Chinese Journals: 28 members have contributed more than 2 million abstracts of 5500 Chinese journals;

Chinese Dissertation and Proceedings Abstract Databases: 85 members have contributed more than 70,000 abstracts;

Chinese Databases with Unique Features: 23 members have contributed 25 databases which contain more than 450,000 records;

### **NOTES**

NOTES

Navigating Databases for Key Subjects: 45 members have contributed more than 290 disciplines;

An application platform operated on networks, which are Unicode, Z39.50, ISO10160, and 10161 compliant. The platform includes:

- online cataloguing server and client, through which librarians can download and upload MARC records and holdings;
- data-making tools and database servers for TOC and other self-made databases;
- web-based search engines for accessing self produced databases; software for ILL and desktop document delivery services.

**Australian Academic and Research Library Network (AARLN) (<http://www.aarlin.edu.au/>)**

The Australian Academic and Research Library Network (AARLN) is a strategic framework for cooperation and collaboration developed by CAUL (Council of Australian University Librarians). The AARLN aims to provide seamless access to Australian and international information resources for researchers via their personal computers through a personally customized portal. The project has funding from the Australian Government. AARLN commenced in the year 2000 with a pilot project and has developed into a fully operational service in Australian universities.

Twenty of the thirty eight Australian universities and the National Library of Australia are active participants in the project and have contributed funds. The AARLN project has established cooperative arrangements between the institutions involved for the direction and management of the project. The project is based at La Trobe University where project staff was employed. It is guided by a Steering Committee which includes representatives of CAUL and the Council of Australian University Information Technology Directors (CAUDIT).

**Aims**

The AARLN aims to develop a major network infrastructure to support research in Australian universities and other research organizations. Its vision is to develop a national virtual research library and information system that will provide unmediated, personalized and seamless access to the collections of Australian libraries, to research databases and to document delivery services from the work stations of research staff and students. To achieve this vision, the AARLN project is using portal technology. It is intended that the national portal will have context sensitive and open reference linking software (or openURL) which will permit researchers once authenticated to access a context-sensitive and "standardised" search interface and undertake concurrent

searches of electronic databases, web sites, online library catalogues and other electronic information resources.

### **AARLIN Services**

The AARLIN Service model is built around a national portal, which is linked to the local authentication systems of the participating universities. When a user logs on, the portal ensures that the user is an authorized user by communicating with that user's authentication system. At the same time, the authentication service passes to the portal the "user's profile" that includes information such as the subject interests of the user. On the basis of that profile, the portal "pushes" to the user a suite of relevant information resources. Individual users can further refine their access to the relevant resources by adding or deleting individual items from their list of favourite resources. The portal includes a search engine, which allows parallel searching of a diverse range of databases, information resources and websites using multiple protocols. These protocols include Z39.50, Http, SQL and XML gateways. Consequently, it would be possible for a user with a single search argument to search across citation and full text databases, online library catalogues, Internet search engines, websites and subject gateways, and to get a uniform search outcome from this parallel search.

### **NOTES**

---

## **5.3 ORGANISATIONS PROMOTING INFORMATION SYSTEMS AND PROGRAMMES IN INDIA**

---

A beginning has been made by the Ministry of Human Resources Development, through the University Grants Commission by establishing the Information and Library Network Centre to cater to the needs of academicians and research community by connecting the higher education institutions in the country at the national level. The base created by INFLIBNET in terms of infrastructure at different universities, awareness of the technologies available to them will play a major role in the success of any further programmes in this direction. The UGC-NET being established in collaboration with ERNET-India is to set up a state-of-the-art nationwide network for its universities to effect a virtual enhancement of academic infrastructure in the country. This network will connect more than 172 universities in the country with proper bandwidth to access its own resources as well as resources available elsewhere. Considerable progress has been made by other library networks in the country viz., DELNET, CALIBNET, ADINET etc. Though initially DELNET was established for libraries in Delhi, it has increased its scope with membership from other parts as well and also a few international memberships.

NOTES

## **INFLIBNET—National Network**

The Information and Library Network Centre (INFLIBNET) is an Autonomous Inter-University Centre, established by the University Grants Commission (UGC), with its Headquarters at Ahmedabad.

Information and Library Network (INFLIBNET) is a major programme of the University Grants Commission (UGC) initiated in 1991. The programme is directed towards modernization of libraries and information centres, and establishment of a mechanism for information transfer and access, to support scholarship, learning and academic pursuits. It is also aimed at establishing a national network of libraries and information centres in universities, institutions of higher learning and R and D institutions in India. It is basically a cooperative endeavour in resource development, sharing and its utilization at the national level.

Over the years, the programme has progressed steadily and since May 1996 it is an independent autonomous Inter-University Centre under the UGC to coordinate and implement nationwide high-speed data network using state-of-the-art technologies for connecting all the university libraries in the country. INFLIBNET is set out to be a major player in promoting scholarly communication among academicians and researchers in India.

The broad objectives of INFLIBNET are:

- (a) To promote and establish communication facilities to improve capability in information transfer and access, providing support to scholarship, learning, research and academic pursuits through the cooperation and involvement of the agencies concerned;
- (b) To establish **Information and Library Network "INFLIBNET"** – a computer communication network for linking libraries and information centres in universities, deemed universities, colleges, UGC information centres, institutions of national importance and R&D institutions, etc., avoiding duplication of efforts.

### **Main Activities Include**

- Provided financial support to the tune of Rs. 6.5 lakhs each to 142 university libraries for the purpose of automation and networking.
- More than 75% libraries have become operational and started availing the recurring grant.
- Provided core facility grant of Rs. 1 lakh each to 65 libraries to establish core facilities and get connected to the network for accessing the information.
- Provided training to the staff members working in these libraries, conducted 20 such courses to help the operational staff of these

libraries to implement the IT in their libraries. Similarly one-week workshops were also conducted for the executives working for the libraries at INFLIBNET.

- Onsite training has been provided at more than 35 places.
- INFLIBNET also has started providing regional level training to help the librarians from college libraries and provides necessary support.
- Software to run the library operation is developed and has been installed at more than 50 libraries.
- Union databases development is another activity to provide access to holdings of libraries of different materials, viz., serials, theses, books, experts, projects, etc., and are kept online for access at <http://www.inflibnet.ac.in>. User friendly search engines have been developed to provide access to these databases.
- Implementing the MARC-21 interface to SOUL software and vice versa.
- Providing various kinds of information services such as CD-ROM based services, access to OCLC first search, Contents page service.
- INFLIBNET Conducts annual convention to provide a platform for librarians and IT professionals in the form of CALIBER
- Brings out a series of publications to promote the cause of INFLIBNET.
- INFLIBNET has also initiated two major projects, viz., Retrospective Conversion of collection of five major libraries and Six Document Delivery Service Centres.

More importantly INFLIBNET has been able to create an IT-conscious environment in university libraries. Librarians have now accepted and are eagerly working to bring these changes to their libraries.

### **Future Programmes**

The INFLIBNET Centre, in its initial phase has focussed on the building up of the infrastructure at the participating libraries, and preparing them to accept the changes brought about by the information technology. INFLIBNET, as a major library network in the country, sees the future full of opportunities to enter the fast track of information superhighway of this millennium.

### **Major Priorities Listed**

- Providing network connectivity through UGC NET to more than 170 university libraries
- Financial support to remaining universities and recurring grants to funded universities
- Delivering the software (SOUL) to participating libraries

NOTES

NOTES

- Increase participation in the network by expanding the membership
- Collaboration with existing national information centres for enhancing the information base
- Develop manpower through continuous training activities to provide services in the networked environment.
- Development of union databases—updating
- Shared cataloguing
- Networked information services
- Access to full text of publications
- Organization and providing access to Internet resources
- Promoting Indian academic information
- Promotion of discussion forum in different areas

---

#### 5.4 ROLE OF PROFESSIONAL ASSOCIATIONS IN PROMOTING INFORMATION SYSTEMS AND SERVICES

---

A large number of international organisations are engaged in the development of library and information services, these also include global information systems devoted to collection, processing and dissemination of information in various countries.

Use of computers for location, collection, storage and processing of information has opened up the possibilities of creating machine-readable databases which have led to the development of international/global information systems. This new development has been harnessed further by the very concept of decentralised input of information from the member countries of a participating system, where centralised processing of information is possible through computers, while decentralised dissemination of information is again possible at the users' end. This principle is behind the success of the INIS, the International Nuclear Information System, which had paved the way for other similar systems like AGRIS, DEVSIS, INFOTERRA, SPINES, CAS, INSPEC, BIOSIS and APINESS. In all these systems, the input to the system is made available by the member country from where information originates, leading to reliability, timeliness and comprehensibility. The input thus collected nationally is entered in prescribed standardised format, usually a machine-readable format to ensure compatibility.

The inputs from all member countries thus are passed onto the centralised agency which processes the information and eventually distributes usable output in machine-readable form or in printed form back to the member states for use by end users. This approach commenced with INIS and has found to be working well with majority of global information systems.

Some of the global information systems being covered in this Unit include:

- (a) INIS
- (b) AGRIS
- (c) INFOTERRA
- (d) UNESCO's Science and Technology Policy Programme
- (e) ASTINFO
- (f) MEDLARS
- (g) CAS
- (h) INSPEC
- (i) BIOSIS

Let us study each one of the systems in detail.

## INIS

The acronym INIS stands for International Nuclear Information System. INIS sponsored by the International Atomic Energy Agency (IAEA), Vienna started functioning in 1970. It is a cooperative, decentralised computerised abstracting and indexing system providing worldwide coverage of the literature on the peaceful uses of nuclear energy. It processes and merges input provided by its members and redistributes the information in machine-readable form as well as in print form. INIS, the International Nuclear Information System is appropriate for those who need information on the peaceful applications of nuclear science and technology.

INIS is an international co-operative information system, operated by the International Atomic Energy Agency (IAEA) in collaboration with 132 members that include 114 Member States and 19 International Organisations, with over 30 years of experience.

INIS processes most of the world's scientific and technical literature that falls within its subject scope. INIS maintains a bibliographic database which presently covers over 2.5 million abstracted and indexed records and a comprehensive collection of over 600,000 of full-texts of INIS scope publications which are not easily available through the commercial channels, thus making it the world's most comprehensive and leading information source on the peaceful applications of nuclear science and technology.

### *Subject Scope*

INIS subject coverage has been developed keeping in view the information needs of the international user community for whom the interests and activities of International Atomic Energy Agency are relevant especially with regard to peaceful applications of nuclear science and technology.

## NOTES

## NOTES

The chief subject areas are: nuclear reactors, reactor safety, nuclear fusion, applications of radiation and radioisotopes in medicine, agriculture, industry and pest control. Besides the above some related fields are nuclear chemistry, nuclear physics and materials science.

### *Literature Coverage*

The literature coverage by the INIS Database includes bibliographic citations and abstracts from relevant scholarly journal articles, R & D reports, papers presented in seminars and conferences, books, patents, theses, laws, regulations and standards. Besides these, the INIS inputting centres located all over the world regularly scan over 2,400 periodicals for articles relevant to the nuclear science field. An important feature of the INIS is the very fact that most of the abstracts of INIS records are in English as a carrier language. This is what has made INIS so popular internationally.

Additionally, the INIS Database also contains bibliographic references to various literature types that include journal articles, books, reports, patents, etc. INIS Database can be accessed by individual users and institutions in the Member States of INIS and the other cooperating institutions of INIS.

### *Input Processing*

For processing the input to the INIS database, the procedure is as given below:

Literature in each INIS member state collected by a designated national inputting centre that submits input to the INIS Secretariat in pre-prepared machine-readable form usually through e-mail or on diskette or magnetic media. The standardised format in which inputs are to be submitted conforms to the guidelines as provided by the INIS Reference Series.

Almost all the inputting centres send data through the 'FIBRE' (Friendly Inputting of Bibliographic Records), which is a PC based input preparation package especially designed for the purpose by INIS. FIBRE is a tool that not only helps the INIS Centres to streamline their input preparation but also ensures data of higher quality and consistency thereby reducing the costs through lower correction efforts and results in improving processing time.

After the input reaches the INIS Secretariat, bibliographic description of records are processed thoroughly by checking programs in order to identify the errors and omissions which are corrected by specialists employed by the INIS Secretariat. The input is then converted with the help of computer programs into an internal working format and is made ready for final processing.

Prior to final processing, the inputs are checked for the indexing and abstracting of records which are subjected to a continuing quality

control based on an Expert System. For this, the system identifies records with a high probability of error for scrutiny by subject specialists of the INIS Secretariat.

Lastly, towards the end of each processing cycle, a final consolidated output file is created which becomes the input to further programs that firstly create the INIS output files in the INIS exchange format (ISO-2709) and eventually create the INIS Database for online and CD-ROM retrieval.

Besides the procedure discussed above, an important activity carried out at the INIS Secretariat is the processing of Non-Conventional Literature (NCL) submitted by the INIS members. Here, the full-text of such literature is received in electronic form or hard copy and is then processed for distribution in the form of microfiche, CD-ROMs or electronic mail.

### ***INIS Products and Services***

INIS makes available different products and services which are available to the end users in various INIS member countries. These vary from country to country and in each country, it is the responsibility of the designated National Liaison Officer to make available detailed information about available INIS products and services in that particular country. The various products and services of INIS include the INIS Database and INIS Non-Conventional Literature. Let us know some details of the available products and services of INIS.

**1. INIS Database.** The INIS database is one of the leading information sources for worldwide published scientific literature on the peaceful applications of nuclear science and technology and other related fields. It is available from the year 1970, to till date. In the database, over 2.5 million scientific and technical bibliographic references have been indexed and abstracted in English as the carrier language and all this is according to agreed rules and standards. The INIS Database also includes the economic and environmental aspects of all non-nuclear energy sources published since 1992. The database not only contains validated and high quality references but also has comprehensive international coverage.

**2. INIS Non-Conventional Literature (NCL).** Easy access to the full-text of the non-conventional literature has remained one of the key features of INIS all these years. It is a well known fact that the literature represented in the INIS Database belongs to two chief categories, that is, conventional and non-conventional. The conventional literature is commercially available through normal distribution channels, such as books and journals. On the other hand, the non-conventional literature includes the scientific and technical reports, patent documents, conference papers and theses, which are usually not readily available through commercial channels.

### **NOTES**

NOTES

**3. Reference Series.** INIS Reference Series tells us the rules, standards, formats, codes and authority lists on which the International Nuclear Information System is based. The various reference series are in the form of manuals which are being published since 1969 and are an essential tool for users of the system, which includes cataloguers, indexers, abstractors or searchers. These reference manuals are being revised all the time on continuing basis and are available for purchase worldwide.

A widely used manual of INIS is the IAEA-INIS-13 (Rev 38) 1999 - INIS: Thesaurus. Details of other INIS manuals are available from INIS website: [www.iaea.org/inis](http://www.iaea.org/inis)

**4. INIS Web Services.** The INIS web services includes maintaining of links to websites on the Internet in various fields of interest to nuclear science and technology subject and to any other work related to the IAEA. Besides these, INIS also offers subject access to the contents of the IAEA website and the sites of various related international and multinational organisations in the field of nuclear science and technology.

**5. Marketing and Promotion.** INIS is carrying out extensive marketing and promotion of its products and services, which is handled by the INIS Secretariat in Vienna and the individual member states in the respective countries. At the IAEA Secretariat, the INIS marketing and promotion activities are carried out with the help of online/CD-ROM demonstrations, by advertisements, by publishing articles in professional journals and by distribution of material, demo CDs, video films and other promotional tools. INIS member states, on the other hand, are assigned the responsibility for establishing and carrying out promotional activities in the area or regions under their domain in order to make aware the INIS potential to the users desiring information and information services in the field of nuclear science and technology. For this, they are assisted by the INIS Secretariat which assists by providing general promotional and informational materials about INIS and its databases.

**6. Training.** A range of training activities provided by INIS meet a number of objectives that include: establishment and improvement of a national information infrastructure, transfer of modern information technology, enabling exchange of scientific and technical information, ensure high quality and coverage of the INIS Database, facilitate maximum utilisation of INIS output products and are responsiveness to a country needs.

**Alert Services**

Based on the INIS products, alert services are provided usually in the form of SDI services to the users requiring current information

in field of nuclear science and technology. These services are mostly available through the National INIS Liaison-Officer of the individual INIS member states. Here the alert services are in the form of individual searches which are performed against individual subject interest profiles of the users.

### ***Document Delivery Service***

For providing the document delivery services, INIS has made arrangements with several INIS national centres which make available full-texts of INIS non-conventional literature to users in the individual INIS member state. This service, however, is limited only to the users of the particular INIS member state. For requests received from countries where no such facility is available, service is available by referring to the Knowledge Preservation Group of INIS.

### ***Services in India***

From the very beginning India has been actively associated with INIS. In India, Library and Information Services Division of BARC is the National Centre for INIS activities. This centre collects information on the subject and then sends it to the Centre Processing Unit and passes the output to the users. The INIS database can be accessed online through Internet and CDs which are distributed by IAEA. The non-conventional literature of INIS is available in the form of CDs, microforms.

Besides the above products, each member state offers a host of individualised services based on INIS products received from the INIS Secretariat. Details of the exact availability of INIS related services in the particular country are available from the National INIS Liaison Officer.

Contact details in India:

INIS Liaison Officer, Head, Scientific Information Resource Division, Bhabha Atomic Research Centre ((BARC), Trombay, Bombay 400085.

### **AGRIS**

AGRIS, the International Information System for the Agricultural Sciences and Technology, was started in 1974 by the Food and Agriculture Organisation (FAO) of the United Nations. AGRIS became fully operational in 1975 with the first issue of AGRINDEX and was modeled on the INIS pattern to facilitate information exchange and to bring together the world literature dealing with all aspects of agriculture. Presently, FAO's another programme, Current Agricultural Research Information System (CARIS) and AGRIS are functioning collectively.

AGRIS is a cooperative system in which participating member countries input references to the literature produced within their country irrespective of the language and, in return, draw on the information

### **NOTES**



provided by the other participants. To date, 242 national, international and intergovernmental centres are participating in the AGRIS/CARIS programme. AGRIS was established with the following objectives:

“Creation of a single, comprehensive, current inventory of world-wide agricultural literature reflecting agricultural research results, food production, rural development and to help users to identify problems concerning all aspects of world food supply,

Meeting the information requirements of users requiring agricultural information by offering specialised subject retrieval services, providing documents on request, current awareness and selective dissemination of information services, and Collaborating with new and existing specialised secondary information services so as to increase efficiency and eliminate unnecessary duplication.”

## NOTES

### **Background and Development of the AGRIS Network**

AGRIS has been operational since 1975. Its main aim is “to build an information system in the field of agriculture science and technology and related subjects”. It is a system of collaborative network of agricultural institutions of the world. The basic principles on which AGRIS was established as an agricultural network are given below:

AGRIS is an international/global system that is:

“entirely international in scope as all United Nations Member Countries are participating in the programme;

multilingual with English as a carrier language;

a centralised collection of bibliographic details of publications, outputs and activities of agricultural research programmes of various United Nations Member States;

special emphasis is on non - conventional (grey) literature in Member States;

a global system which is participatory as it is based on a designated national AGRIS Input Centre in each United Nations Member State and other related agricultural international organisations;

an information system supported by Food and Agricultural Organisation (FAO) which has complete coordination with regard to application of tools and methodologies, data processing, training, and other technical back-up activities; and

a system where all UN Member States have common ownership of agricultural data alongwith facility of easy access to the collective information base maintained at the AGRIS headquarters.”

The subject areas of the AGRIS include various aspects of agriculture, including forestry, food, environment, animal sciences, aquatic sciences and fisheries, human nutrition and all other aspects related to agricultural sciences from participating countries all over the world. AGRIS centres

**NOTES**

input information from periodical literature, monographs, reports, patents, standards, etc., on standardised data input formats. The covered literature also includes unique material such as unpublished scientific and technical reports, theses, conference papers, government publications, and more. Approximately 1,30,000, records are added each year with keywords in English, French, and Spanish. The centralised processing is then done at the AGRIS Coordinating Centre in Rome.

The AGRIS information system has till date a total of 242 participating centres located in various United Nations Member States. Each AGRIS National Centre acts as a focal point in the concerned country or region which makes available information to the user community thereby acting as a decentralised system. Some of the centres are carrying out not only the documentation of scientific and technical literature, but are also working for the development of agricultural information management.

In the last three decades, AGRIS has been quite successful in achieving its initially stated goals, but there have been some problems faced by the participating centres which at times hamper overall progress of the network. Some of these problems are:

1. **Access to the original documents.** All AGRIS records comprise bibliographic reference. The abstract is usually available for only about 30% of AGRIS records. The access to the full-text of the documents, however, is only possible through document delivery (for example, by post or fax). Therefore, most developing countries have not been able to offer this service properly and this leads to a lot of problems.
2. **Incomplete coverage.** In the last few years, a review of the input statistics of literature received from Asia/Pacific region, Africa and Latin American/Caribbean regions to the central AGRIS database shows slight decline in the number of records input to the database. This has been in contrast to the statistics gathered from other sources that show a fast upward trend of global production of documentation and other outputs related to agricultural development and food security which too is a cause for alarm.
3. **Agriculture related systems other than AGRIS.** As per a chief objective of AGRIS, its database receives all inputs from the United Nations Member States only. But many national bibliographic databases, and even collections of electronic full-text documents pertinent to the scope of AGRIS, exist outside the framework of AGRIS, and thus have no involvement with FAO.

**NOTES**

- 4. Lack of structural and institutional linkages.** The overall setup lacks network linkages due to structural and institutional barriers. Thus the existing AGRIS system lacks proper coverage due to its centres not being linked in any significant way to the wider community of organisations and programmes working in food security or rural development.

Since its inception, the chief objective of AGRIS has been capacity building, improving access and exchange of information in the area of agricultural science and technology. Besides this, the system also aims to review the present day available technologies and user requirements for the future of development of the AGRIS. Presently, the strengthening of the AGRIS initiative has gone far beyond the creation and development of bibliographical databases. The focus has always been to improve accessibility of science and technology information to facilitate agricultural development and food security. AGRIS plays vital role in highlighting the need and importance of agriculture and information related to agricultural activities in the developing and developed countries thereby indicating that agriculture can be a central part of the developments in these nations. Although this effort is entirely based on the awareness and goodwill of the international community, AGRIS can lead to improving electronic publishing of documentation in agricultural science and technology, linking information about institutions, scientists and researchers, and activities, without too much of efforts and thus leading to a collaborative framework.

With the above in view, the AGRIS has revised its principles in collaboration with the Member Countries for the AGRIS network to achieve its objective in the near future. The revised principles take into account the aspects related to adopting a decentralised approach, more emphasis on national partnerships, improved linkages, capacity building, making available full-text of documents in the field of agriculture science and technology, web-enabled methodologies and tools and need for establishment of standards.

### **AGRIS Network and AGRIS Resource Centres**

Efforts are on to improve the activities of AGRIS Resource Centres and thus improve the capabilities of the AGRIS Network. With this in view, a high level committee was set up in June 2000, which recommended that AGRIS Input Centres be renamed as AGRIS Resource Centres in order to reflect their revised role. These centres just like the input centres, are recommended to be located in various national, regional or international organisations. The Resource Centres are expected to play a key role in capacity building with focus on national and regional partnership. The international network on the other hand would lead to exchange of agricultural information and knowledge with help of the modern available tools and technologies.

NOTES

Some of the functions that are essential for the AGRIS Resource Centres are:

“adoption and implementation of standards for catalogueing and indexing agricultural information, especially the categorisations schemes, thesauri and the development of standard exchange formats;

collection, recording and organisation of non-conventional and conventional scientific and technical literature relevant to AGRIS which is produced in the region;

creation of digital repositories for literature and other types of related scientific and technical information produced in their area, in consultation with FAO; and maximum use of Internet-based tools for data processing and dissemination.”

Other areas where efforts have been made include:

- FAO and AGRIS Information Centre/Website
- Improving Access to Documentation on Science and Technology
- Strengthening and Establishment of Standards
- The Central AGRIS Website/Database
- Deployment of New Methods and WebAGRIIS Tools

### ***Information Activities***

The information collected from various input centres from all over the world is processed by AGRIS and is available to users in the form of various current and ongoing agricultural information projects in both AGRIS and CARIS. Some of these are:

### ***WebAGRIIS***

It covers the current and ongoing agricultural information projects in AGRIS and CARIS and is considered as networking for AGRIS in the future. The target users are those that require information related to all areas of agricultural and rural development.

### ***AGRIIS AP***

AGRIIS Application Profile (AP) gives the Guidelines for Description of Information Objects for the International Information System on Agricultural Sciences and Technology. This document contains specifications about the metadata that should be exchanged and disseminated through the AGRIS system.

### ***Electronic Discussion Forum***

This is the discussion group workspace for the exchange of ideas on using the AGRIS AP, WebAGRIIS. The ideal target audience consists of coordinators and facilitators of established or incipient communities, as well as groups of individuals with shared interests in agricultural and rural development.

## **AGROVOC**

AGROVOC is the multilingual international agricultural thesaurus. The terms are in English, French and Spanish. Each key term included in the AGROVOC is either a descriptor or a non-descriptor. AGROVOC is also available online referred to as AGROVOC Online.

### ***AGRIS Information Products***

Various products of AGRIS available from the AGRIS Secretariat are:

AGRIS and CARIS on CD – This includes the bibliographic references, CARIS Project Data, the AGROVOC Thesaurus and the FAO Catalogue.

AGRIS Manuals – Several manual of AGRIS are available for immediate downloading for use by the resource centres.

AGRIS and CARIS - FTP site - Makes available AGRIS and CARIS data.

FAO Documentation – Food and Agricultural Organisation documents starting from 1980 to 2000 are available with complete text from the document repository of AGRIS.

### ***AGRIS Categorisation Schemes***

These are categorisation schemes for information in the areas of agriculture, nutrition, forestry and fisheries. The categorisation schemes available from AGRIS are:

AGRIS/CARIS Subject Categories – A List of 17 AGRIS/CARIS Subject Categories

Countries Codes – A List of Member Country Codes

Language Codes – A List of Language Codes

AGRIS/CARIS Categorisation Scheme

### ***Services in India***

India has been actively participating in AGRIS from the very beginning. The participating AGRIS/CARIS institution from India is the Agricultural Research Information Centre, Indian Council of Agricultural Research, Krishi Anusandhan Bhavan, Pusa Road New Delhi 110 012. On an average, 3500 bibliographic entries are submitted to AGRIS database as Indian input every year.

The Agricultural Research Information Centre, every month, receives from FAO updated machine-readable AGRIS outputs. Retrieval is then provided to agricultural scientists requiring information in the country. A computerised SDI service is also made available to agricultural researchers of India.

### ***Contact details in India***

AGRIS Liaison Officer, National AGRIS Centre, Agricultural Research Information Centre, Indian Council of Agricultural Research, Krishi Anusandhan Bhavan, Pusa Road, New Delhi 110 012.

## **INFOTERRA**

### **NOTES**

INFOTERRA is an information network of the United Nations Environment Programme (UNEP) established for facilitating global environmental information exchange. The programme is functionally successful because of an efficient system that operates through national focal points designated by various governments that are members of the United Nations. At present, INFOTERRA has 178 members in various Member States of UN.

The INFOTERRA national focal point in each member state is mostly a national information centre dealing with environmental science and usually is located in the ministry or a government agency responsible for activities concerned with environmental protection. The primary function of each centre is to provide a national environmental information service.

INFOTERRA was conceived in the year 1972 at the Stockholm Conference on the Human Environment which stressed on the exiting gap and recommended the need and establishment of an effective mechanism for exchange of environmental information and experiences among the United Nations Member Countries. Subsequent to this recommendation, UNEP established the INFOTERRA network (then known as IRS - International Referral System) and the UN Member Governments were requested to designate a suitable national focal point in the respective member country to participate and coordinate INFOTERRA activities at the country level. Later in the year 1992, the Rio Conference on Environment and Development (UNCED) reiterated the need and importance of information for decision-making and requested the member countries for strengthening of the INFOTERRA network in order to improve information availability in the field of environmental sciences.

In each UN Member State, INFOTERRA national focal points provide a wide range of environmental information products and services including bibliographies in the topic related to environmental sciences; directories of sources of information; information services; leaflets for environmental awareness and also access to Internet services.

The INFOTERRA Secretariat is situated at the UNEP Headquarters in Nairobi. It supports the national focal points by providing technical services and publishing reference tools that include the International Directory of Sources, the EnVoc Multilingual Thesaurus of Environmental Terms, various training manuals; sourcebooks and other promotional materials. Besides these, the focal points in developing countries are also provided with the facility of a capacity building programme.

The users seeking information on the areas related to environment can contact the INFOTERRA network through the following:

UNEP World Wide Web (WWW) site (<http://www.unep.org>);

INFOTERRA List Server; and  
INFOTERRA Secretariat.

UNEP-INFOTERRA Products and Services

INFOTERRA offers a wide range of environment related information products and services. Some of the products and services include:

NOTES

1. INFOTERRA Technical Services
  - Query Response Service
  - Availability of Environmental Literature
  - Bibliographies on Environmental Topics
  - Directories of Environmental Information Sources
  - Access to INFOTERRA Internet Services
  - UNEP-INFOTERRA Publications
2. Training Manuals, Environmental Source Books and Promotional Material
3. ENVOC Multilingual Thesaurus of Environmental Terms
4. INFOTERRA-ISIS (International System of Information Sources)  
- It is a database management system which enables each INFOTERRA national focal point to maintain a national database (directory) of institutional sources on environmental information with the integration of these national databases into an international database of sources, INFOTERRA-ISIS provides the INFOTERRA International Directory of Sources.
5. SASIN Environmental Database - SASIN (Southern African Sub-regional INFOTERRA Network) Environmental Database website is a part of INFOTERRA's global environmental information exchange network. This website has a searchable database of over 29,000 bibliographic references that includes books and journal articles on the subject of environmental sciences acquired from SASIN member organisations.
6. Sources of Information on Environment and Development available on CD-ROM and the Internet
7. National Focal Point Fact Sheet Database
8. Query-Response Service
9. List Servers - INFOTERRA in the Electronic Universe - INFOTERRA has been in operation, since 1994, and is an Internet subscription list for promotion of exchange of environmental information amongst Internet users. This has led to effective dissemination of environmental information.
10. UNEP-INFOTERRA International Directory
  - Address of INFOTERRA Secretariat - Division of Environmental Information, Assessment and Early Warning, United Nations Environment Programme, P.O. Box 30552, Nairobi, Kenya.

NOTES

### Services in India

India, being a member of the United Nations has been actively participating in the INFOTERRA Programme. ENVIS, the Environmental Information System, due to its comprehensive network has been designed as the National Focal Point (NFP) for INFOTERRA from India. In order to strengthen the information activities of the NFP, ENVIS was designated as the Regional Service Centre (RSC) of INFOTERRA of UNEP in 1985 for the South Asia Sub-Region countries.

The ENVIS has built up a reasonably good information base in the form of publications, reports, reprints, bibliographies, abstracts, databases, etc., as well as numerical data *i.e.*, statistics relating to environment. The services of ENVIS include answering queries, referral services, abstracting services and documentation and information dissemination of environmental related information.

The contact point for India is UNEP INFOTERRA National Focal Point Manager, Senior Adviser and Director (ENVIS), Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, Lodi Road, New Delhi 110003, India. The URL is <http://envfor.nic.in/envis>

### UNESCO Science and Technology Policy Programme

The Division of Science and Technology Policies of UNESCO had established SPINES Pilot Programme which was superseded by the Science and Technology Policies Information Exchange Programme (PIPS) in 1984. It was established to facilitate exchange, at the national and international levels, the documents and factual data that have a direct bearing on the formulation and monitoring of national science and technology policies. The PIPS programme contributed to development of compatible information services dealing with science and technology in UNESCO Member Countries.

This programme is now referred to as UNESCO Science and Technology Policy Programme and is part of UNESCO's Thematic Area- Natural Sciences and under this is Science Policy.

As part of Science Policy Resolution, assistance is given to countries in formulating policies, strategies, plans and legislations for the development of their scientific and technological capabilities.

As per the requirement of UNESCO Member States, and the recommendations of the World Conference on Science held in Budapest in 1999, UNESCO's Division of Science Analysis and Policies (SC/AP) was assigned the responsibility to:

contribute to the advancement of science;

promote a new contract between science and society; and

provide assistance in the formulation and implementation of science and technology policies at the national, regional and worldwide levels.

This was with a view to increase and mobilise scientific and technological resources for the advancement of knowledge and in the support of sustainable development and peace.

UNESCO also provides guidance with regard to science policy in its member states. Guidance is available with regard to provide technical advise on formulation, implementation, monitoring, and review of policies and plans concerning national S&T activities and encouragement and effective utilisation of scientific and technological potential.

## NOTES

### **Role of UNESCO**

UNESCO plays a major role as a promoter of international cooperation by carrying out Science and Technology Policy activities in member states leading to reforms and innovations in scientific pursuits. For this, UNESCO carries out programmes at regional and international levels, develops analytical work in co-operation with other international organisations, supports regional S&T policy networks and also serves as a clearing house.

UNESCO's role thus covers the following domains:

- Governance of S&T and its implications in UNESCO Member States,
- Evolving Policy Guidance,
- Encouraging capacity building in its Member States, and
- Prospective thinking and developing scientific temper amongst individuals.

### **ASTINFO**

ASTINFO stands for Regional Network for Exchange of Information and Experience in Science and Technology in Asia and Pacific. It aims to promote the exchange of information and experience in science and technology among countries in the Asia/Pacific region. It was established in 1983 as an outcome of the Second Conference of the Science Ministers and Economic Planning Bodies in the Asia/Pacific region (CASTASIA II), held in March 1982, in Manilla (Philippines). ASTINFO has coordinating units in 18 Member States; and some 82 national/regional institutions now hold the status of ASTINFO Associated Centres and Networks. A quarterly Newsletter is also being published. The aims and benefits of ASTINFO include the following:

- “Computerisation of library and information management services;
- Pilot projects on Specialised information systems and services;
- Development of National Information Policies and Standards;

Innovative approaches to education and training of library and information personnel;

Establishment of document delivery systems and services; and

Serving as a forum for communication and information exchange.”

## NOTES

ASTINFO helps Member States in acquiring/developing the necessary policies, methodologies, guidance, and expert advice to generate, store, process, retrieve, exchange, use and share information in the area of Science and Technology.

In the year 1986 UNESCO launched another network, called Asia-Pacific Information Network in Social Science (APINESS) with the collaboration of Association of Asian Social Research Councils.

Since the year 2000, UNESCO had revised its various activities and programmes and included ASTINFO and APINESS Programmes in the APIN (Asia Pacific Information Network). APIN is a network formed by a merger of the Regional Network for the Exchange of Information and Experiences (ASTINFO), the Regional Informatics Network for Southeast Asia and the Pacific (RINSEAP) and the Regional Informatics Network for South and Central Asia (RINSCA).

APIN Programme of UNESCO is linked with UNESCO's Information for All Programme (IFAP) and promotes ICT literacy and application, information and knowledge networking, sharing of information resources, and use of international standards and best practices in communication, information and informatics.

## MEDLARS

The United States National Library of Medicine (NLM), a component of the National Institutes of Health (NIH) is located in the campus of NIH in Bethesda, Maryland. NLM is one of the largest medical libraries of the world. It collects materials in all major areas of the health sciences and related areas which include chemistry and physics. The goal of the library is to collect material and provide information and research services in all areas of biomedicine and healthcare.

The NLM is presently having more than 7 million items that include books, journals, technical reports, manuscripts, microfilms, photographs and images. This library is equipped with one of the world's finest medical history collections of old and rare medical works. The collections of the library can be consulted either in the reading room or through inter-library loan. NLM is a national resource for all U.S. health science libraries which is a national network of libraries of medicine.

Medical Literature Analysis and Retrieval System (MEDLARS) was established in 1964 as a computerised storage and retrieval system at the NLM. It provides bibliographic access to the NLM's large biomedical literature collection. It became functional with the first computer-produced issue of Index Medicus.

## NOTES

The NLM has been publishing the Index Medicus, a monthly subject/author index guide to articles in 4000 journals for over 125 years. All the information available in Index Medicus, is also available in the database MEDLINE, the major component of PubMed which is freely accessible via the World Wide Web. Other databases of MEDLARS provide information on monographs (books), audio-visual materials, and on various specialised subjects such as toxicology, environmental health, and molecular biology.

MEDLINE is the National Library of Medicine's bibliographic database, covers the fields of medicine, nursing, dentistry, veterinary medicine, the health care system, and the preclinical sciences. MEDLINE can be accessed through PubMed and the NLM Gateway.

PubMed, a service of the National Library of Medicine, contains over 15 million citations for biomedical articles back to the 1950's. These citations are from MEDLINE and additional life science journals. PubMed has links to many sites providing full-text articles and other related resources.

NLM also has a large number of databases and other electronic resources which can be accessed online. These include TOXLINE, NLM Catalog, MedlinePlus, ClinicalTrials.gov, DIRLINE, Genetics Home Reference, Meeting Abstracts, HSRProj, OMIM, HSDB and NCBI Bookshelf.

### **Indian MEDLARS Centre (IMC)**

NIC and ICMR have jointly set up Indian MEDLARS Centre to cater to the information needs of medical community of India. We all know that Indian contribution in the areas of biomedical research and health care has been significant and conforming to international standards. Unfortunately only a small fraction of it is available for reference through international bibliographic databases. The ICMR-NIC Centre for Biomedical Information (Indian MEDLARS Centre or IMC) has developed a bibliographic database of peer reviewed Indian biomedical literature. This database covers prominent Indian journals. Which have been selected from more than 200 journals. More journals would be added to the list as their quality improves in coming years. It is proposed to cover the journals from 1985 onwards in this database.

### **IndMED**

This database is covering prominent peer reviewed Indian biomedical journals. It is basically designed to provide medical professionals/researchers/students and the medical library professionals a quick and an easy access to Indian literature covering biomedical field.

### **CAS**

In the year 1907, the Chemical Abstracts Service (CAS) was started. It is a non-profit organisation of the American Chemical Society (ACS),

NOTES

located in Columbus, Ohio. It disseminates chemistry related information derived from the scientific and technical literature and patents world wide. CAS covers publications in 50 languages from about 150 countries of the world and uses advanced computer based systems for processing, storing, searching and disseminating relevant scientific, technical and industry information. The most important feature of CAS is the computerised Chemical Registry that identifies chemical substances by structure and assigns each one a unique number. This is used in CAS products to link the structure with related names, bibliographic references and other information on the substances.

Presently, CAS being the world's leader in providing scientists online and web access to chemistry related research data, is also the largest and most comprehensive producer of databases of chemical information. Besides this, CAS has a team of scientists who create and deliver the most complete and effective digital information environment for scientific research and discovery by providing access to published research from journals world over along with patent literature that includes virtually everything relevant to chemistry plus a wealth of information in the life sciences and a wide range of other scientific disciplines from the very beginning of the 20th century.

Every year, CAS indexes and abstracts articles and patents from approximately 9,000 scientific journals, conference proceedings, and other documents relevant to chemistry, life sciences and many other related subject areas. Thus, every year, on an average, CAS scientists provide abstracts and indexing for over 800,000 journal articles, patents, and other research materials and also assign CAS Registry Numbers and substance records for more than 15 million substances. CAS has, therefore, since 1907, indexed and summarised chemistry-related articles from more than 40,000 scientific journals, in addition to patents, conference proceedings and other documents pertinent to chemistry, life sciences and many other fields. As per a latest count, abstracts for more than 24 million documents belonging to chemistry-related literature and patents and more than 25 million organic and inorganic substances and over 56 million sequences are accessible online through CAS.

CAS provides a number of print and computer-based information products and services, including Chemical Abstracts, its principal publication, computer readable bibliographic and registry databases, and the CAS Online Service. To facilitate access to its products and services, Chemical Abstracts Service licenses information centres to provide current awareness and other information services to the scientific community in their region. Through the printed CA, CA on CD, STN, the CAS files distributed through licensed vendors, the SciFinder and SciFinder Scholar, desktop research tools, and the STN Easy or STN on the Web services, data produced by CAS is

accessible to virtually any scientific researcher worldwide in industry, governmental research institutions, and academia.

Chemical Abstracts Service has a vast range of products and services, some of which are:

### **Chemical Abstracts (CA)**

Chemical Abstracts (CA) is a weekly abstracting journal covering abstracts from both journal articles and patents. It is available in print, microform, and CD-ROM. CA has been alerting its subscribers about the most recent published breakthroughs in science since the beginning of the 20th century. The unique abstracting journal is highly popular with scientific community due to its indexes. The indexes of CA are: Author Index, Keyword Index, Patent Index, General Subject Index, Chemical Substance Index and Formula Index. Chemical Abstracts is distributed as Printed CA and CA on CD.

### **STN**

STN International meets the information needs of knowledge managers, information professionals and research scientists. STN connects scientists, engineers and others requiring technical information to the world's most complete and authoritative 200 databases covering chemistry, life sciences, engineering, patents, business, etc. STN provides in-depth databases in science and technology to give the users quick, direct links to the literature, patents, and chemical catalogues.

### **STN on the Web**

STN on the Web is a full-featured service developed for searchers/users who are familiar with using a command language to search online databases. CAS offers a variety of ways to help users for searching information from STN which ranges from hands-on training to self learning training materials and documentation. STN on the Web thus offers web-browser access to the complete content and functionality of STN for information professionals and advanced end users.

### **STN Easy**

STN Easy is web access to 100 of the most essential STN databases with the users having no need to learn command language. Here easy and advanced Patent Lookup and CAS Registry Number searches are available. In addition, facility to save predefined searches or search terms for later use are also available.

### **SciFinder**

SciFinder is a desktop tool that allows users to explore research topics, browse scientific journals and stay current with the scientific

### **NOTES**

literature. CAS databases can be searched by author, keyword, (sub)structure, sequence, etc.

### **SciFinder Scholar**

#### NOTES

SciFinder Scholar is one of the leading services of CAS which provides the most accurate and comprehensive chemical and related scientific information to the users. This desktop research tool for students, researchers and faculty provides easy access to scientific information offered by the CAS databases such as patent and journal references, substance information, regulated chemicals, chemical reactions and chemical supplier information. SciFinder Scholar offers a variety of pathways and powerful tools to explore CAS databases and MEDLINE.

### **CAS Registry**

The main feature of CAS is substance identification. As you know, presently CAS is the largest substance identification system. When a chemical substance, newly encountered in the literature, is processed by CAS, its molecular structure diagram, systematic chemical name, molecular formula, and other identifying information are added to the Registry and it is assigned a unique CAS Registry Number. Registry now contains records of more than 25 million organic and inorganic substances, and 56 million sequences.

### **CAS Product Finder**

CAS products have developed to match scientific information needs of the users. The user may be an experienced information professional or an infrequent searcher who still needs current and accurate information. This service, offered online on the CAS website, allows a user to select the option that most closely describes a situation and finds out which CAS/STN electronic product is best for the particular user category.

### **INSPEC**

INSPEC, started in the year 1967, by the Institution of Electrical Engineers (IEE), United Kingdom. Presently it is one of the leading bibliographic information services available in English-language. It provides access to the world's scientific and technical literature in physics, electrical engineering, electronics, communications, control engineering, computers and computing, and information technology. INSPEC is based on the Science Abstracts service which has been available from the IEE since 1898. The major effort in this respect is preparation of the INSPEC database, since 1969, which provides all the services from INSPEC. The back files of Science Abstracts are also available from 1898 to 1968 to which electronic access is facilitated from the INSPEC Archive.

**NOTES**

INSPEC is useful to engineers, scientists and others in their research for locating relevant journal articles, conference papers and other documents. In addition, the database is also used for providing current awareness services, information about the new products from IEE, technological forecasting, competitive intelligence and patent-related searching.

The database is updated every year after scanning over 3400, scientific and technical journals, about 2000 conference proceedings, books, reports and dissertations. INSPEC has skilled staff for scanning relevant articles which are abstracted and indexed for inclusion in the database. Currently the database contains over 8 million bibliographic records and is growing at the rate of 400,000 records each year.

INSPEC has comprehensive subject coverage. It is a comprehensive index to the literature in physics, electrical/electronic engineering, computing, control engineering and information technology. Besides this, it also covers areas like materials science, oceanography, nuclear engineering, geophysics, biomedical engineering and biophysics. The full scope of subject coverage by INSPEC is given in INSPEC Classification.

***Products and Services***

The IEE is internationally well-known for its wide range of print and electronic publications that include books, journals, magazines, conference proceedings concerning various areas of electrical and electronic engineering, including telecommunications, computing, power, control, radar, circuits, materials and more. The IEE also publishes the Wiring Regulations and a range of associated publications.

Apart from this, the IEE also produces the INSPEC bibliographic database, which covers literature in the fields of physics, electronics, electrical engineering, computing, control and information technology. IEE Publishing is a member of the CrossRef initiative.

INSPEC is available in a wide range of products:

**1. Electronic Format.**

This includes:

Online database for remote access to information from INSPEC  
Inspec Ondisc (CD-ROM)

Inspec Archive - Electronic Access to Science Abstracts 1898 to 1968

Inspec Web

Site licences and direct data services for in-house and remote access information systems

INSPEC Specialised Databases - These are three subject oriented databases in the areas of photonics, biomedical technology, and information and communication technology.

NOTES

2. Abstracting Journals

Physics Abstracts, Electrical and Electronics Abstracts and Computer and Control Abstracts together form the Science Abstracts series of journals from IEE. These journals together contain almost all of the 350,000 or more short summaries of published articles which also appear annually in the INSPEC database.

3. Current Awareness

INSPEC offers a range of current awareness services including some online products, which offer specialised areas to meet the needs of specific individuals and research groups.

4. User Aids

The following user aids offered by INSPEC are available in print and CD format as INSPEC Search Aids CD-ROM on a single CD.

INSPEC Thesaurus

INSPEC Classification

INSPEC List of Journals

5. INSPEC Services

Document Delivery Service-Publications indexed by INSPEC are warehoused for this service.

IEL - IEEE/IEE Electronic Library full-text of IEEE and IEE publications with INSPEC index.

Electronic Materials Information Service (EMIS) giving data and background text on the properties and technology of semiconductors.

**BIOSIS**

BIOSIS, provided by Thompson Scientific. It is serving the life science community by providing researchers, students, and librarians with references to research published and found in journal articles, conference proceedings, meetings, patents, book units and other sources of information. For this, BIOSIS selects more than 600,000 new entries each year. Based on the collected information, BIOSIS provides flexible information services which include databases and customised information products to the life sciences community globally.

This benefits the user community who require life sciences information quickly and efficiently. It reduces the search time of users by using authoritative BIOSIS databases which aggregate information from more sources than any user could otherwise read or have access to.

BIOSIS databases are, the most complete resource for finding life sciences information. The databases are interdisciplinary as most

**NOTES**

important subjects from different fields all over biology are covered. The coverage of these databases includes international publications with a unique indexing system that allows flexible, efficient searching. These databases are prepared by gathering information from diverse sources as citations for articles, meetings, patents, book units, etc.

The BIOSIS databases are used by librarians, information specialists, researchers, students, academicians, legal experts, product development experts, government officials and product development experts requiring information related to the life sciences.

***BIOSIS Products and Databases***

Following are the BIOSIS products and databases available in print and electronic form.

***Biological Abstracts (BA)***

Usually referred to as an index to the world's life sciences journal literature, BA is an abstracting journal that covers articles from over 3,700 journals from all over the world and from subjects like botany, pharmacology, biochemistry, ecology and other biological areas. The publication includes over 350,000 citations each year with author abstracts. There are over 8 million archival records available from 1969. A unique feature of BA is its comprehensive coverage and context-sensitive indexing which makes available information useful for all researchers requiring life science information.

BA can be accessed on CD, through the web, or in print. Electronic versions of BA are updated quarterly. Print versions are issued twice each month.

***Biological Abstracts/RRM***

Biological Abstracts/RRM (Reports, Reviews, Meetings) is a complementary product to the BA. Every year, BA/RRM adds 215,000 references to non-journal documents. This information is collected from Meetings and Conferences, Literature Reviews, US patents, Books, CD-ROMs and other life science media. Updated quarterly, the non-journal information in BA/RRM usually precedes and complements the journal data thus offering a total solution to information requirements of any life sciences information user.

***BIOSIS Previews***

This is a comprehensive index to life sciences and biomedical research. BIOSIS Previews contains citations from Biological Abstracts (BA), and Biological Abstracts/Reports, Reviews, and Meetings (BA/RRM) (formerly BioResearch Index). Together, these publications constitute the major English language service providing comprehensive worldwide coverage of research in the biological and biomedical sciences.

## **BIOSIS Search Guide**

An essential tool for all users of the BIOSIS databases  
An essential tool for all users of the BIOSIS databases.

### **NOTES**

#### **BasicBIOSIS**

Life science database for students new to research.

##### *Abstracts of Entomology*

Provides insects related research from all over the world covering over 20,000 new references each year. Abstracts of Entomology is a monthly current awareness publication providing the most extensive reference to entomological studies published in world's life science literature. All references are derived from the BIOSIS Previews database. Coverage is from 5,500 international serial publications, books, conference proceedings and other related materials.

##### *Abstracts of Mycology*

A specialised resource that indexes mycology resources. Abstracts of Mycology is a monthly current awareness publication providing the most extensive references to mycological studies reported in worldwide life science literature. All references in this publication are derived from the BIOSIS Previews database. Abstracts of Mycology contains 17,000 new references each year from about 5,000 international serial publications, books, conference proceedings and other related materials.

#### **Zoological Record (ZR)**

This indispensable reference database covers topics covering the field of animal biology, including animal behaviour, conservation, ecology, marine biology, ornithology, parasitology, toxicology, zoology, veterinary sciences and other related areas. ZR's coverage dates back to 1864 and it has been known to the world's unofficial register of animal names. The ZR database indexes over 4,500 serials from all over the world besides books, reports, conferences, etc. Every year about 72,000 indexed records are added with about 1.5 million record archives is electronic format. ZR is available in print, CD and online formats depending on the users' requirements covering information from every field in animal biology.

##### **Zoological Record Search Guide**

An essential tool for all users of the Zoological Record databases.

##### **Zoological Record Serial Sources**

An essential tool for all users of the Zoological Record databases.

---

## SUMMARY

---

## NOTES

- Information is a vital resource for users requiring timely information. There are many international organisations, systems and centres contributing towards promotion, coordination and development of library and information services for assisting the users. In this Unit, we have covered global information systems like INIS, AGRIS and INFOTERRA that provide cooperative systems and services and work on the principle of decentralised input, centralised processing and decentralised output.
- The growing demand for information and increasing use of present facilities and services indicates the need and importance of information systems and centres as components of our information infrastructure. The advent of computers, as a major tool in information processing, has enhanced the possibility of creating machine-readable database which has enhanced the use and capabilities of the present day global information systems.

---

## REVIEW QUESTIONS

---

1. Give details of the participating institution from India in the INIS programme.
2. List the principles of the AGRIS Network.
3. What is INFOTERRA?
4. Write down the objectives of the science policy programme of UNESCO.
5. What are the aims and benefits of ASTINFO programme?
6. Write a brief note on MEDLINE.
7. What is PubMed?
8. List some computer-based products and services of CAS.
9. List the abstracting journals brought out by INSPEC.
10. Which are the user aids offered by INSPEC in CD-ROM?
11. Give a brief account of Biological Abstracts.
12. Elaborate the uses of BIOSIS databases.

---

## FURTHER READINGS

---

1. Manual of Reference and Information Sources, Sewa Singh, B R Pub, 2004.
2. Information System Management, M.Y. Kamat, Pointer Pub, 2002.
3. Introduction of Computers and information System, Sushila Madan, Taxmann, 2007.
4. Web based Information System, S K Dass, Shree Pub, 2007.