

CEHANET DOCUMENT NO. 9  
CEHA DOCUMENT TLM-4

**TRAINING COURSE ON  
ENVIRONMENTAL HEALTH  
INFORMATION NETWORKING  
AND SERVICES**



**WORLD HEALTH ORGANIZATION  
EASTERN MEDITERRANEAN REGIONAL OFFICE  
CENTRE FOR ENVIRONMENTAL HEALTH ACTIVITIES**

**AMMAN, JORDAN  
1992**

# **Chapter One**

## **Introduction**

## Chapter One: Introduction

### 1.1 Environmental Health

Environmental health as a standard term does not exist in glossaries and scientific dictionaries. In the technical literature, it has been used as two terms combined together: Environment and Health, and when talking about environmental health we actually mean an environment which is healthy. The term "environment" is defined as "the complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival." Health is defined as "freedom from disease." (1) WHO defines health as "a state of complete physical mental and social well-being and not merely the absence of disease or infirmity". De Bell quoted Dubos in saying: "The phrase health of the environment is not a literary convention. It has real biological meaning because the surface of the earth is truly a living organism..." (2). The health of the environment can be affected in various forms including pests and weeds, radioactive wastes, air pollution, water pollution, solid wastes and noise. Any of the above can be considered as an unhealthy type of environment, and efforts are being made to free the environment of such elements. The IRC Interwater Thesaurus defines environmental health as "aspects of human health affected by environmental factors." (3)

The study of environmental health has been done on various levels and in different colleges and academic institutions. It has been studied as "Environmental Engineering" which is defined as "The discipline which evaluates the effects of humans on environment and develops control to minimize environmental degradation" (4) or "the technology concerned with the reduction of pollution, contamination, and deterioration of surrounding in which humans live." Other academic institutions offer it within the subject of Public Health or Public Health Engineering; the first has been defined as "the art and science dealing with the protection and improvement of community health" (5), the second defined by the Institution of Public Health Engineers in the United Kingdom as "the installations needed by numerous and complex public services that safeguard the health of the community and protect the environment". The Dictionary of Waste and Water Treatment (6) considers public health engineering to be (in the UK) the same as water and waste treatment which covers design, building and operation of plants for water treatment and supply, sewerage, sewage treatment and disposal, and solid wastes treatment and disposal.

### 1.2 WHO and Environmental Health

From the WHO point of view, a healthy environment is of fundamental importance to the health of people. By that the Organization emphasizes the intimate relation between the health of the environment and the health of human beings. It has also emphasized the negative effect of the human activities on their environment as causing its deterioration. WHO believes that "healthy" environment will result in better health for human beings.

To improve environmental health, WHO programmes include:

- a) improvements of community water supplies and sanitation
- b) improvements in housing and municipal services, including solid waste disposal for the rapidly-increasing urban populations;
- c) improvements in living standards of rural populations through a sustainable economy and better housing and community facilities;
- d) improvements in environmental pollution control;
- e) assessment of health risks of potentially toxic chemicals;
- f) promotion of food safety.

### 1.3 Environmental Health Programmes in National Institutions: Dispersion and Disintegration

Environmental health programmes have been taken care of by a variety of institutions in each country. If we agree that environmental health is the responsibility of institutions whose decrees commit them to "keep the environment healthy," we will find that a number of institutions do that, one way or the other, depending on which component of the environment that institution wants to take care of. People working for these institutions are the potential users of environmental health information. Such institutions may include:

- a) legislative bodies and standards and specifications departments;
- b) departments in ministries of planning (e.g. infrastructures department), ministries of health (e.g. environmental health services), ministries of public works (e.g. water supply and sanitation), ministries of environment and municipal affairs, ministries of agriculture and fisheries, ministries of transportation;
- c) agencies for natural resources such as water authorities, coal, petroleum;
- d) local government and municipal sanitation agencies;
- e) universities;
- f) polytechnics, vocational training and continuing education institutions;
- g) research and development institutions;
- h) finance and technical cooperation agencies;
- i) development and community-based project teams;
- k) consulting and construction companies;
- l) societies and pressure groups.

In many cases, one finds a lack of coordination between such institutions, even though they work in the same field and the same country. That has created duplication of efforts, disparity of information systems and resources which consequently has negative economic and social effects. Dispersion has been characterized by the creation, in some countries, of an agency for water and another for sanitation or waste water treatment. Disintegration has been characterized by lack of communication between universities, research centers and other agencies practicing in the field. Lack of

coordination has also been apparent between international agencies working in the same country in the field. Every agency has its policies, procedures and programmes. This results in possibly contacting the wrong institution to implement a project.

#### 1.4 Implications for Information Systems

The above-mentioned factors, lack of definition of environmental health, multidisciplinary nature of the subject and lack of coordination in efforts in environmental health activities, have been reflected on the type, size, nature, distribution, organization and costing of environmental health information systems. As a result of all that, environmental health information services face some difficulties including:

- lack of availability of a standard list of environmental health journals;
- dispersion of bibliographic data in various bibliographies and lists;
- lack of communication between information specialists and environmental health professionals;
- lack of controlled vocabulary for indexing and information retrieval of environmental health documents;
- lack of bibliographic control tools specialized in environmental health;
- lack of environmental health information networking;
- lack of well-developed environmental health document delivery services;
- language barriers in this Region (Arabic, English, French, Urdu and Greek are used) in relation to the availability of indexing and abstracting services.

#### 1.5 CEHA Background and Justification

Increased activities involving the extension of basic sanitary measures during the International Drinking Water Supply and Sanitation Decade (IDWSSD) to provide, as far as possible, safe water and adequate sanitation to all, together with the implementation of global programmes related to air pollution control, water quality monitoring, and food hygiene and safety, among others, were straining the capabilities of staff in the Eastern Mediterranean Regional Office of the World Health Organization in Alexandria, Egypt to respond to the needs of Member States.

Increased interest in strengthening and upgrading its environmental health programmes as well as the successful experiences in Latin America with the establishment of the Pan American Centre for Sanitary Engineering and Environmental Sciences (CEPIS) in Lima, Peru, and in Asia with the Western Pacific Centre for the Promotion of Environmental Planning and Applied Studies (PEPAS) in Kuala Lumpur, Malaysia, led the Regional Director of EMRO, therefore, to commission in 1979 a study to assess the need and feasibility, potential benefits, optimum location, organization, staffing and financial requirements for the establishment of a

similar centre for the Eastern Mediterranean Region. The study took cognizance of the fact that in several of the countries of the Region, infant mortality rates - an indicator of unsanitary environmental conditions - are among the highest in the world. Resolving this problem requires the improvement of water supply and sanitation facilities, a process that depends on the national availability of a cadre of skilled and well-informed personnel in addition to pipes, pumps and other hardware.

The study found that there was a real need for establishing such a centre because of the observed rapid urbanization and industrialization in the Region, the lack of professional and trained manpower at all levels in the environmental health field, the TREMENDOUS LACK OF CURRENT INFORMATION, severe environmental problems and deficiencies in basic sanitation. It recommended, inter alia, that the Centre's establishment would strengthen the role of WHO in the environmental health field, would be fully compatible with the regional and global policies of WHO, and would be an intrinsic element in implementing them.

As a result, the Centre for Environmental Health Activities (CEHA) was established in line with the resolution of the Thirtieth Session (1983) of the Regional Committee for the Eastern Mediterranean Region, and an agreement was concluded on 12 January 1985 between WHO and the Government of the Hashemite Kingdom of Jordan to host CEHA in Amman.

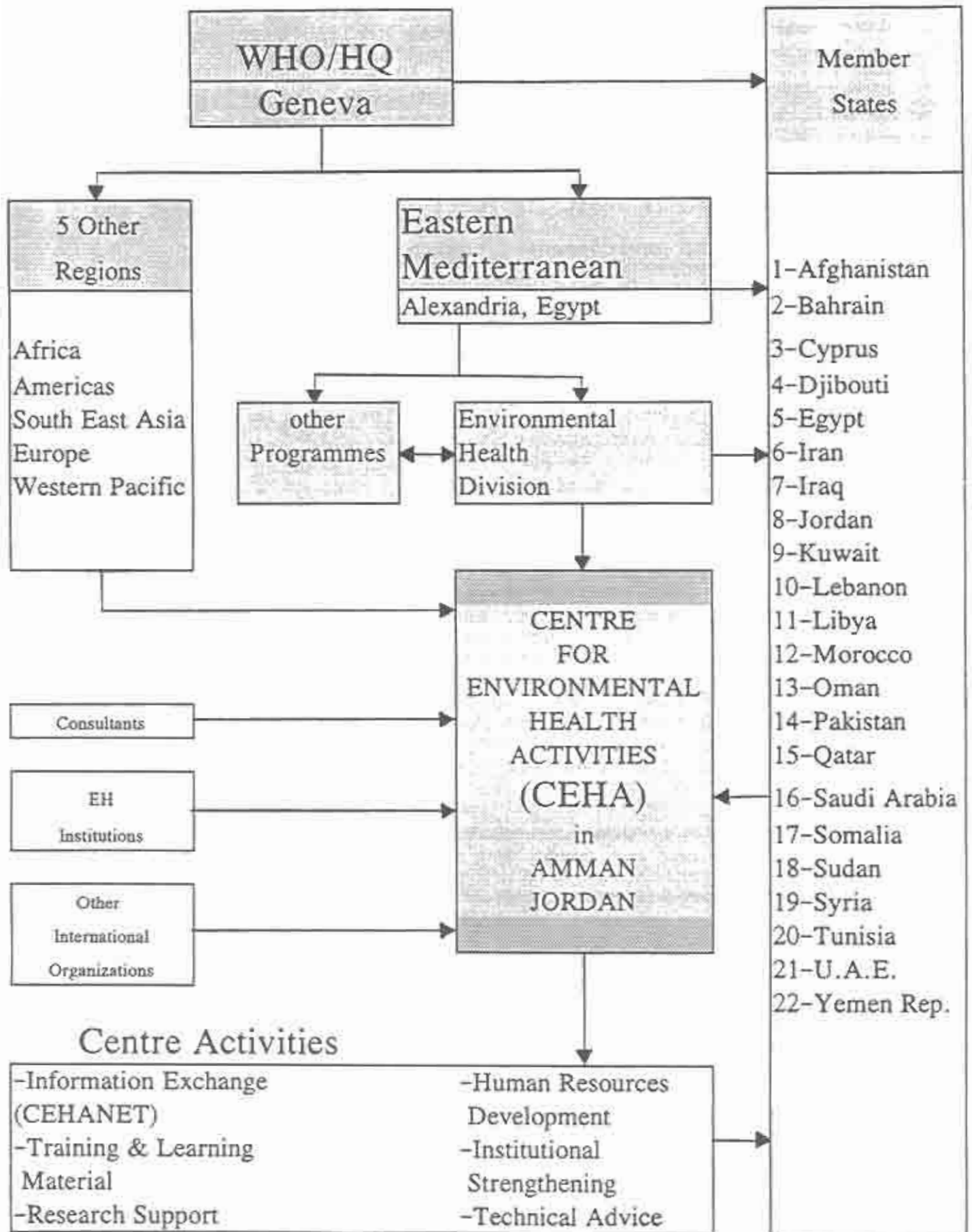
THE MAIN PURPOSE OF THE CENTRE IS TO PROVIDE TECHNICAL AND SCIENTIFIC COOPERATION TO THE COUNTRIES OF WHO EASTERN MEDITERRANEAN REGION FOR THE SOLUTION OF THEIR ENVIRONMENTAL HEALTH PROBLEMS.

Figure 1 shows CEHA's position in WHO and its scope of activities.

According to the agreement signed between WHO and the Government of Jordan, the objectives of the Centre will be achieved through: (7)

- a) Developing effective means of dealing with environmental and ecological problems;
- b) Encouraging applied environmental research and developing low-cost and appropriate technology for solving environmental health problems with the emphasis initially on water supply and wastewater treatment and disposal to cope with the accelerated development of the sector during the International Drinking Water Supply and Sanitation Decade (IDWSSD).
- c) Developing comprehensive and integrated educational and training capability in the field of environmental health;
- d) DEVELOPING A COMPREHENSIVE REGIONAL INFORMATION REFERENCE CENTRE INCLUDING WIDE DISSEMINATION OF INFORMATION AMONG NATIONAL ENVIRONMENTAL HEALTH AGENCIES AND THEIR PERSONNEL;
- e) Strengthening national and regional environmental health programmes;
- f) Coordinating with the national institutes in the Region;

Fig. 1 CEHA Position in WHO and Scope of Activities



In the first years of its operation, CEHANET has concentrated on collecting and disseminating information on water supply and sanitation, i.e. first focussing on information relevant to the International Drinking Water Supply and Sanitation Decade. In a subsequent phase, CEHANET will expand the scope to cover the goals of "Health For All By The Year 2000".

Support for the first phase (1988 to 1990) and the second phase (1991 to 1993) of the project was provided by the International Development Research Centre (IDRC), Canada.

### 1.6.1 CEHANET Users

The target users for the services of CEHANET are the following types of individuals working in the environmental health field:

- . policy-makers
- . planners
- . managers and administrators
- . engineers and technicians
- . researchers, academics and students
- . consultants, officials of finance and technical cooperation agencies
- . information specialists.

These users are located in institutions concerned with environmental health activities identified earlier as national institutions.

### 1.6.2 Specific Activities of CEHANET

#### 1.6.2.1 First Phase

The specific activities of the first phase of the project were:

- a. establish a CEHANET Consultative Group and convene two consultation meetings;
- b. strengthen documentation centre staff in modern information handling procedures;
- c. produce Arabic version of the "Interwater Thesaurus";
- d. adapt existing information tools and manuals for use by CEHANET;
- e. compile and publish a directory of institutions and individuals working in the Region in the area of environmental health with emphasis on water and sanitation;
- f. publish three issues of a regional environmental health bibliography and provide document delivery service;
- g. convene two regional workshops on CEHANET procedures.



## 1.6.2.2 Second Phase

The specific activities of the phase II (9) of the project are:

### 1.6.2.2.1 National Training & Institutional Strengthening

- a. Third Regional Training Course on CEHANET procedures;
- b. First Regional Workshop for training of trainers;
- c. National Training Courses (six countries);
- d. Technical Cooperation Missions I: appraisal; and
- e. Technical Cooperation Missions II: follow-up for institutional strengthening.

### 1.6.2.2.2 Bibliographies/tools

- a. to make available the Arabicized Interwater Thesaurus, CEHANET Procedures Manual and Criteria for Selection of Materials, and provide the necessary training on them;
- b. to produce an Arabic-French version of the Interwater Thesaurus;
- c. to publish the second edition of the Regional Directory of Environmental Health Professionals and Institutions;
- d. to publish three volumes of the Environmental Health Regional Bibliography;
- e. to compile, publish and make available Union Lists on national and regional bases, including:
  - Environmental health journals;
  - Ongoing research projects in environmental health;
  - Environmental health training materials;
  - Environmental health documents held in libraries of the CEHANET National Focal Agencies and National Collaborating Centres;
- f. Technical documentation services including:
  - Cataloguing
  - Classification
  - Indexing

### 1.6.2.2.3 Current Awareness and Information Services

- a. to provide information and document delivery services in current awareness mode and in response to requests from professionals;
- b. to publish CEHA Index on a quarterly basis;
- c. to publish CEHA Newsletter on a bimonthly basis;

- d. acquisition and making available of environmental health data bases internationally produced on CD-ROM; and
- e. establishing a financially sustainable networking operation among National Centres based on exchange of services, with initial seed money provided by CEHANET. In this regard, a coupon scheme will be tested for this purpose with compensation at the end of a specified period for those centres who have provided more services to the network than they have received.

#### 1.6.2.2.4 CEHA Staff and Resources Development

- a. Third Consultative Group Meeting on CEHANET;
- b. Development of CEHA Data Processing Facilities;
- c. Document Acquisition and Collection Development;
- d. Staff Development and Training; and
- e. Technical Progress Reports.

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## **Chapter Two**

### **Library Cooperation and Information Networks**

## Chapter Two: Library Cooperation and Information Networks

### 2.1 Introduction

It is well recognized that no individual library whatsoever can be in a position to satisfy all its users' needs all the time. It becomes evident that libraries should use each other's resources in a cooperative manner to be in a position by which users can satisfy most of their needs through their libraries, but not necessary from them. As a result of the need for each other's resources, the library cooperation programmes and information networks have evolved. Library cooperation is characterized by sharing of responsibilities, and united efforts to make better use of available resources by having more accessibility to literature, to offer better and more services and to achieve goals which are difficult to realize individually.

### 2.2 Prerequisites for Cooperation

For cooperation programmes to succeed and to ensure quality and shared responsibilities, the following points should be taken into consideration:

- a) participants in cooperative programmes should have the willingness to cooperate. Where there is will there is power. They should all be convinced that it is for the benefit of all of them to cooperate;
- b) participants should have information resources to make available for others and to contribute to the cooperation programme. These resources include:
  - data, information, knowledge. It is the commodity to be exchanged, packaged in books, periodicals, maps, reports, data bases, images etc.
  - Manpower to operate the system.
  - Hardware to store the commodity for next pouching, dispatching and exchange.
  - Software to make the hardware function.
  - Communication system to be used to exchange data through.
- c) the cooperation programme should have a clear vision of the next step. Plan ahead and read the future according to specific aims and objectives;
- d) availability of systems, tools and techniques to facilitate cooperation;

- e) availability of legislation, regulations and rules to organize the work and functioning of the cooperative programme;
- f) user group(s) of the cooperative programme should be clearly defined. This group should have information needs actual and potential, which can be satisfied by the cooperative programme;
- g) financial resources should be made available to support the programme.

## 2.3 Motives to Cooperate

Every library/information unit participating in a cooperative programme keeps in mind that it MUST benefit from the system one way or the other. Information managers usually think of the pros and cons of such programmes. They decide to participate only when they are convinced that it is good for their library/information users. The following points can be identified as benefits from cooperation:

- a) to avoid duplication of effort in most of the documentation services;
- b) to make better use of the available human resources and make use of their skills in an integrated manner;
- c) standards and specifications can be put and used in a more organized way for the unification of procedures;
- d) saving which results from certain areas of spending through participation can be directed to other areas of library work and development;
- e) cooperation allows better use of information resources available;
- f) all the above mentioned points will not only increase availability of information resources, but also accessibility. This will result better satisfaction among users and would save money as well.

Although cooperation and resource-sharing has the above mentioned positive aspects, some shortcomings have been identified:

- a) existence of different systems, tools and equipment in individual libraries may require radical changes in some participating libraries;
- b) the special characteristics of some libraries have to be overlooked for the sake of the common cause;
- c) some libraries may have to reorganize their catalogues, collection and even mode of functioning to conform with the network which will need more financial support;
- d) the larger libraries and information units may fear that they will be more used rather than making use of other's resources.

## 2.4 Areas of Cooperation

The following list is not an exhaustive list of areas of library networking and cooperation. Libraries may implement the area(s) which they think suit them best:

- Cooperative acquisition
- Centralized acquisition
- Cooperative cataloguing
- Centralized cataloguing
- Union catalogues
- Microfilming and reproduction
- Cooperative storage
- Inter-library lending
- Reference services
- Current awareness services
- On-line bibliographic services
- Selective Dissemination of Information
- Training and human resources development
- User education/sensitization
- Telecommunications

## 2.5 Levels of Cooperation

- Local: between libraries in the same area, city, sector
- National: between libraries in the same country
- Regional: between a group of countries in a specified category (geographical, political)
- International: among nations.

## 2.6 Library and Information Networks

### 2.6.1 Definition

The word "network" is borrowed from electronic engineering where a number of electronic elements are linked together to satisfy certain needs. In library networks, the elements are substituted by libraries/information services. A library network is seen as a number of libraries and/or information services linked together to satisfy specific information needs. When talking about library or information networks certain concepts are used frequently: library cooperation, resource-sharing, library consortia, information networks. The terms "information network" and "library network" are more frequently used. The simplest definition of information network would be then "the participation of two or more libraries in a formal way to exchange information on a large scale among them and aiming to develop communication methods to disseminate information to users". Other definitions were cited in the literature with some common elements in them.

A simple way to represent a network is Figure No. 2 which shows three nodes (libraries) linked together by a communication method to transmit messages, exchange information, provide/receive services. Computers have played a major role in library and information networks. But we should realize that a computer network is not necessarily an information network and vice versa. Information networks can function without computers. Computers are only tools to facilitate networking.

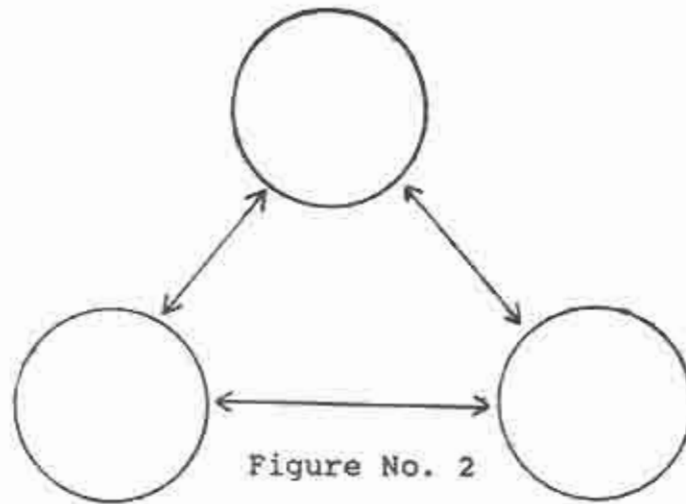


Figure No. 2

## 2.6.2 Classification of Networks

### 2.6.2.1 Classification According to Output/Input

Two types of networks have evolved as far as the type of input/output by the participating centres or the nodes of the network:

- a. A type which includes a central unit which has data storage facilities, information resources, communication etc., and a number of nodes (libraries) which retrieve information from the system. The type of relation that exists is Question > Answer. Among the well known networks of this type are: DIALOG, SDC, EURONET-DIANE and ESA/IRS. Figure No. 3 shows the information flow direction in this type.

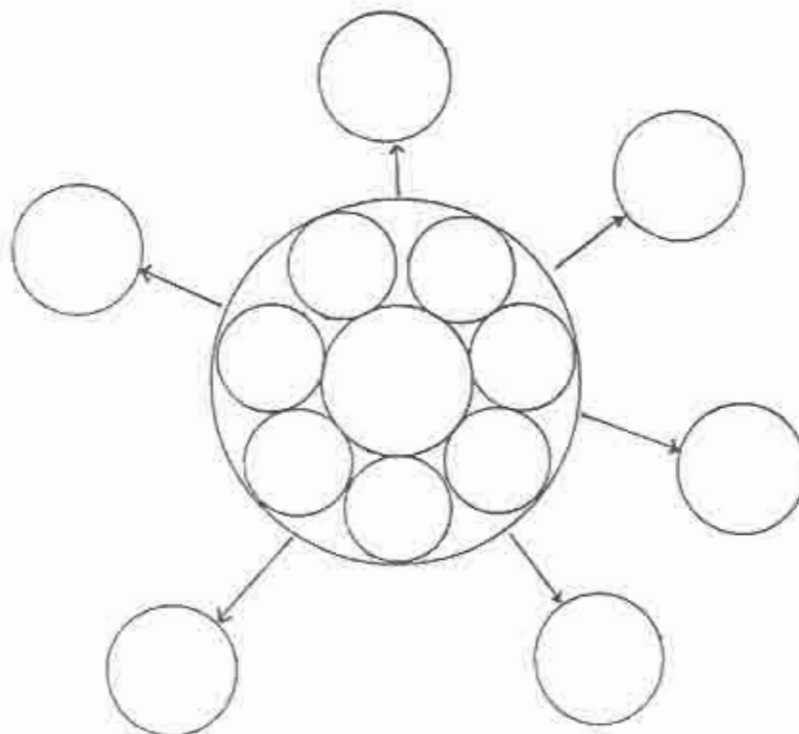


Figure No. 3

- b. A type which includes a central unit which has data storage facilities, information resources, communication, etc., and a number of nodes (libraries) which contribute in building the data bases of the central unit by inputting data from their library holdings and who use the services of the central unit and the other nodes. OCLC is an example of this type. Figure No. 4 shows the information flow directions in the network.

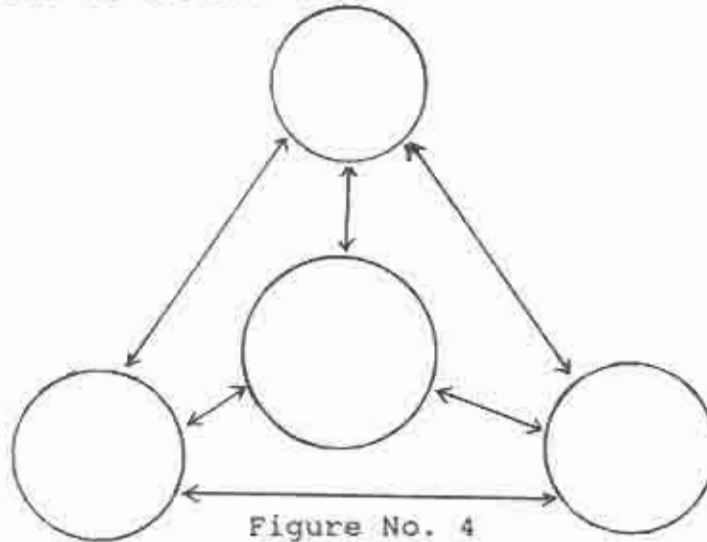


Figure No. 4

#### 2.6.2.2 Classification According to Type of Link Between Nodes

Information networks can be of various categories according to the relation between the nodes of the network or participating centres:

- a. Centralized/Decentralized. In the centralized network, the centre is responsible for all the network's functions. All other participating centres are linked to the centre, but not with each others. Figure 5 shows the type of link that exists.

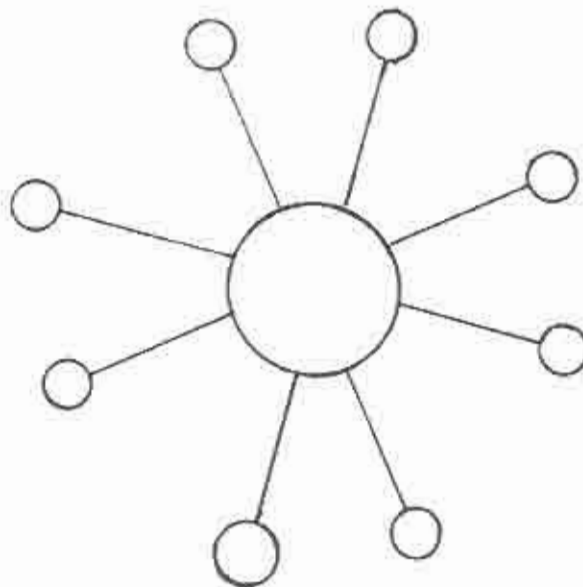


Figure No. 5



A combination between two or more centralized systems can be done. Figure No. 6 shows the link between the three systems via the central units.

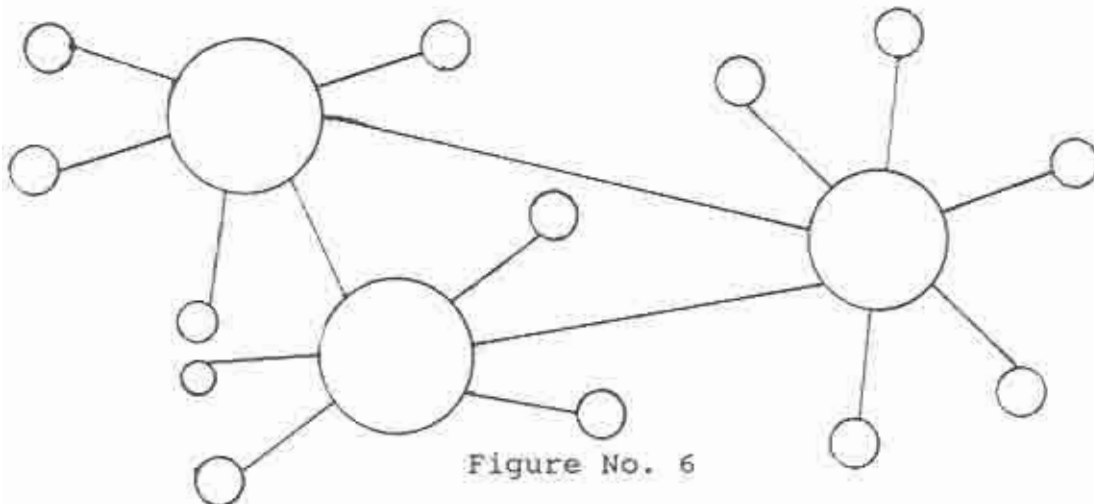


Figure No. 6

In a decentralized (or distributed) network, participating centres share the responsibility and the functioning of the system. Link is mutual between each of the nodes and all others. Figure No. 7 shows the link.

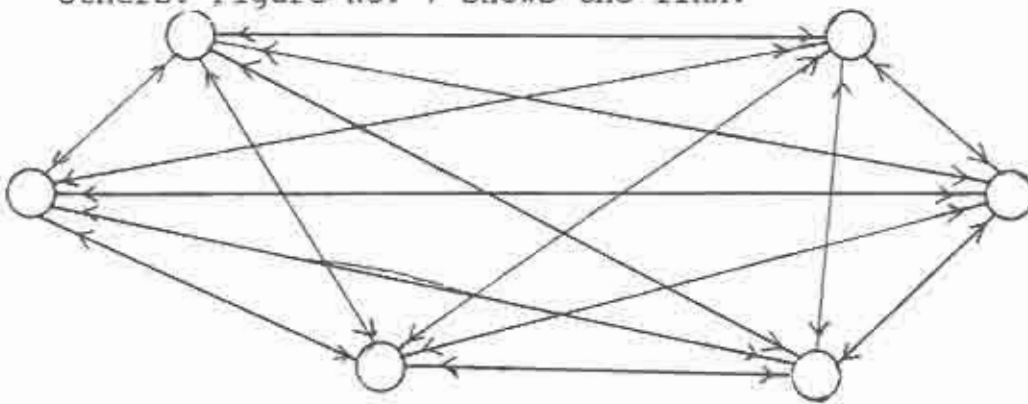


Figure No. 7

- b. Hierarchical/Non-hierarchical Networks. In the hierarchical networks, various levels are built up with a central unit on top of the hierarchy. Communication may be done through these levels. Figures No. 8 & 9 show the structure of a hierarchical network.

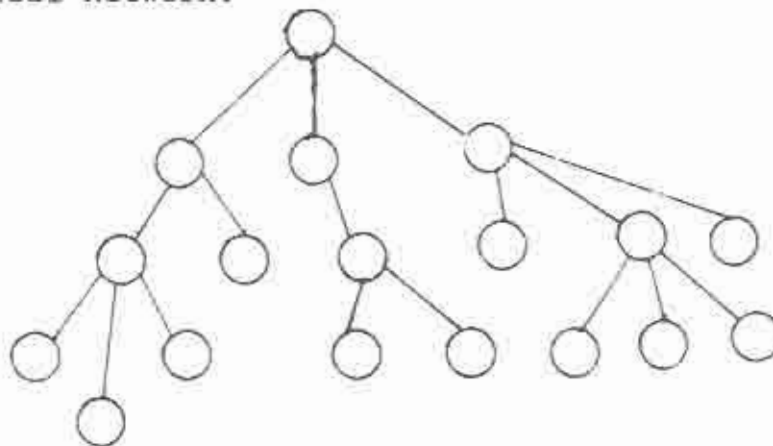


Figure No. 8

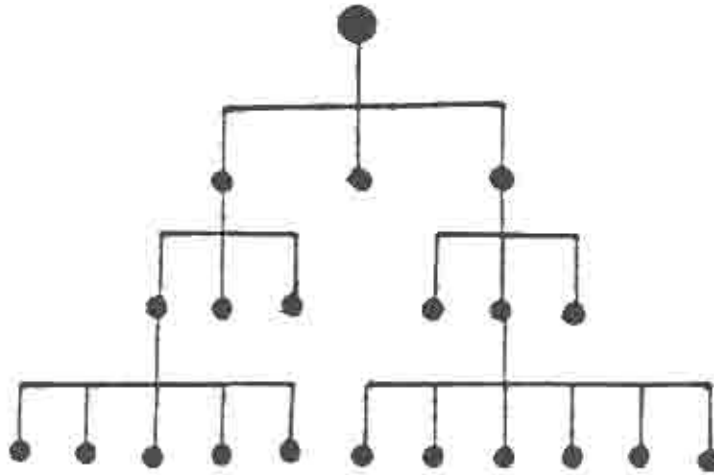


Figure No. 9

- c. Cycle Type Networks. Where every node is connected to the two neighboring nodes. Figure No. 10 shows the link between the nodes.

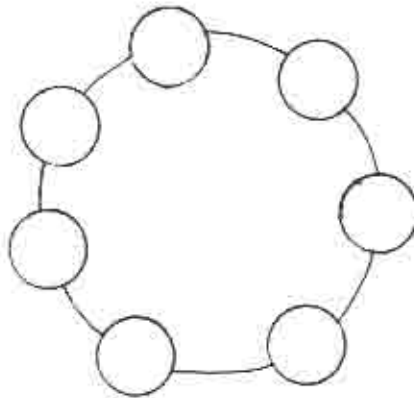


Figure No. 10

- d. Wheel Type Networks where every node is linked to the central unit and to the two neighboring nodes in the structure. Figure No. 11 shows the links in this structure.

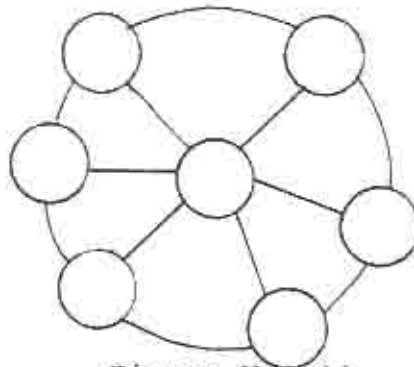


Figure No. 11

- e. Mixed Networks, where more than one structure are used to accommodate certain nodes with difficulty in communication, or who have special requirements. Figure No. 12 shows such a structure.

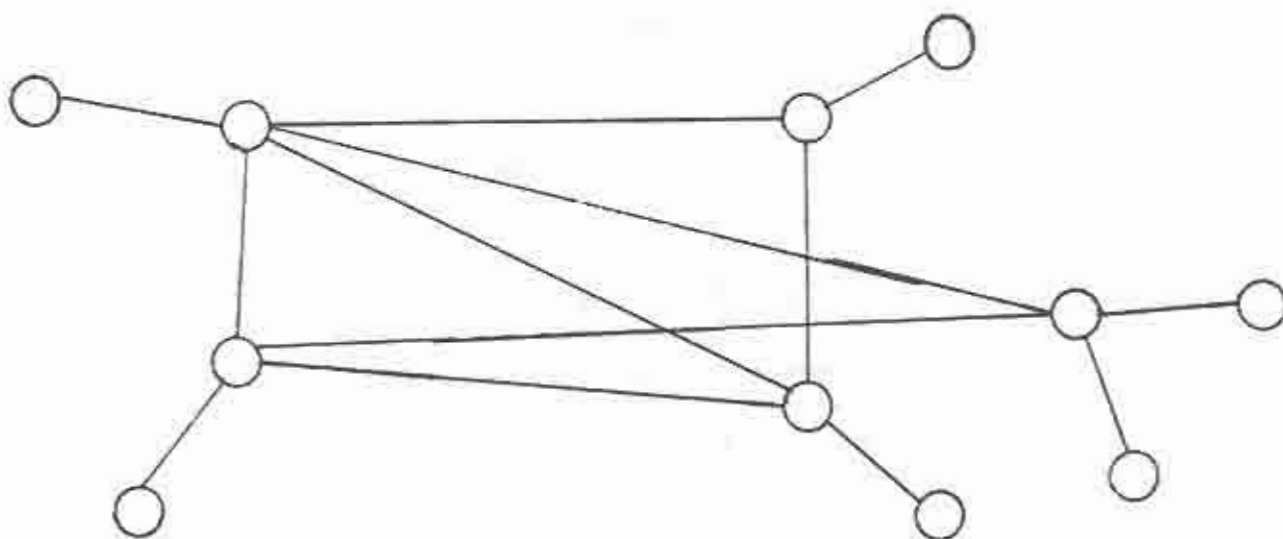


Figure No. 12

### 2.6.2.3 Classification According to Participants

Networks can be classified according to type of membership/subject coverage:

- a. Open/Closed Membership Networks. In open networks, the structure and policy allow for unlimited number of centres to participate. While in the closed membership, only centres of specific criteria may be allowed to participate.
- b. Public/private Sector Networks. According to affiliation and financing of the network.
- c. General/Specialized Networks. According to the discipline(s) defined for coverage in the network. ARIS-NET, OCLC are general networks. MEDLINE, ARGIS, and CEHANET are specialized networks.

The choice of a structure for a network is usually done during the design stage. It is very important to know the situation so as to be able to design a network (a system) to fulfill the requirements and satisfy the needs.

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## **Chapter Three**

### **CEHANET Structure and Role of National Centres**

## Chapter Three:

### CEHANET Structure and Role of National Centres

#### 3.1 Introduction

CEHA and CEHANET have been introduced and described in Chapter 1. This Chapter aims at describing CEHANET structure and the role of National Focal Agencies and National Collaborating Centres in the Network. It is well recognized that networking is a collaborative and cooperative effort, and for a network to succeed and achieve its aims all its participants should be committed to these aims by way of inputting in the network, using its services and developing it.

#### 3.2 CEHANET

##### 3.2.1 Characteristics

CEHANET is characterized as decentralized, mission-oriented regional information system.

**3.2.1.1 Decentralized** A decentralized (computer) network is a one having computing power and/or control functions distributed over several network nodes and distributed (computer) processing as a computer processing system in which several control functions and/or computer functions are shared among several network nodes. A distributed network is a network design in which each node is connected to every other node either directly or through an intermediate node. See Figures 5, 6 and 7.

In the above stated definitions, the difference between distributed and decentralized networks or processing does not exist, the terms are used synonymously.

In CEHANET system, the double task of processing documents to feed the system and providing information services to users will be the responsibility of the national centres, located in national institutions or selected regional/international organizations. This approach will permit the efficient identification and inputting of data to the system especially on the nationally produced or nationally related information, in addition to the rapid dissemination of such data after being assimilated in the Regional data bases. It will also ensure local autonomy in selecting input and self-sufficiency in providing information services and avoids costly duplications.

The orientation of CEHANET towards decentralization or distributed type of system came about as the developments in networking, internationally, favor that over centralized processing. Centralized processing involves several problems:

- a. By attempting to meet the needs of a broad range of users, it cannot meet all of a specific user's needs, while offering options he may not need or want;

- b. A specialized staff is required to maintain the system and coordinate its use by asserted clients or partners. When changes are made for one user, great care must be taken not to interfere with other users;
- c. Great risk is involved in developing such a system. It seems a long term commitment of money, equipment and manpower to a project from which it becomes harder and harder to withdraw as time goes on, even if the initial plan begins to appear unsatisfactory;
- d. For new participants or newcomers, it will be more difficult to integrate into the system. A great deal of change has to take place to make them compatible with the central system. That in itself will push institutions away from participation.

Distributed processing, on the other hand, allows for organic and modular growth of the system. Computing power and data processing are distributed as needed, where needed and when needed. At the same time, some functions may remain centralized, if that allows great efficiency or flexibility.

Based on the above mentioned conclusion, it has been proposed that CEHANET will be a decentralized/distributed network system. This approach may offer CEHANET some advantages:

- a. It is affordable, cost effective and less dependent on sophisticated data processing and communication equipment;
- b. The initial investment, as far as CEHA and the participating national centres, is modest;
- c. It will serve as a training and experimentation ground for personnel who will eventually be responsible for running and operating the system at a larger scale;
- d. Participating in the system will not involve major changes in the institutions;
- e. Developing the system will be a shared responsibility between the central body of the network (CEHA) and the national centres, with variable degrees of involvement in development.

**3.2.1.2 Mission-Oriented** CEHANET is viewed as an interdisciplinary information system with a specific objective: the urgent improvement of water supply and sanitation services and environmental health conditions in the Region. Therefore, any information related to this objective will be incorporated in the system. The six technical programmes of CEHA mentioned earlier constitute the boundaries of the subject coverage of the Network.

**3.2.1.3 Regional** Although the characteristics of environmental health problems in the Region are heterogeneous in many aspects, similarities between many countries do exist. These similarities include geographical, linguistic and socioeconomic factors. This situation would justify the creation of a network of this type with

a high potential of success through facilitating information exchange among countries of the Region. From administrative point of view, the WHO Eastern Mediterranean Region is to be covered by the Network. Other WHO Regions of the world are covered by other systems.

As a regional information network, CEHANET, is made up of a mixture of ingredients which together should make the system work, including:

- a. People, suppliers and users of information, local, national and international affiliation with various degrees of training, qualification and specializations;
- b. Policy, institutional policies in each participating centre, national policies in each country and policies of international bodies supporting the network (WHO and IDRC);
- c. Documentation Stocks in almost all types of libraries and documentation units and all types of information sources are to be utilized with emphasis on environmental health information systems;
- d. Experience and expertise of participants which vary in the field of information exchange in general and networking in particular;
- e. Integration, in addition to the above mentioned points, information centres and libraries in environmental health institutions do not exist in isolation of the overall information situation in each country and in the Region at large. A library does not live in a vacuum, it is part of the system that exists in the country. Awareness of the situation would facilitate interaction and collaboration among institutions within CEHANET.

### 3.2.2 CEHANET Structure

The network is managed and coordinated by CEHA. It will operate through a network of participating institutions in the countries of the Region. At the first stage, these institutions were linked directly to the Network. Now this style is being developed to form in each country a national subnetwork with multiple input and services points coordinated by a designated national centre (National Focal Agency) according to a specific set of criteria.

Figure 13 shows a typical CEHANET National Network where communication is direct between CEHA (the Network's Coordinating Body) and the National Focal Agency (NFA) in each EMR country.

It is well recognized, not only for CEHANET, but for all networks, that the network works if participants or the national centres want it to work through their effort, input and use. The process of developing a network involves professional and managerial decisions on the one hand, and technical considerations on the other hand. Only if both sides of this coin are carefully evaluated can

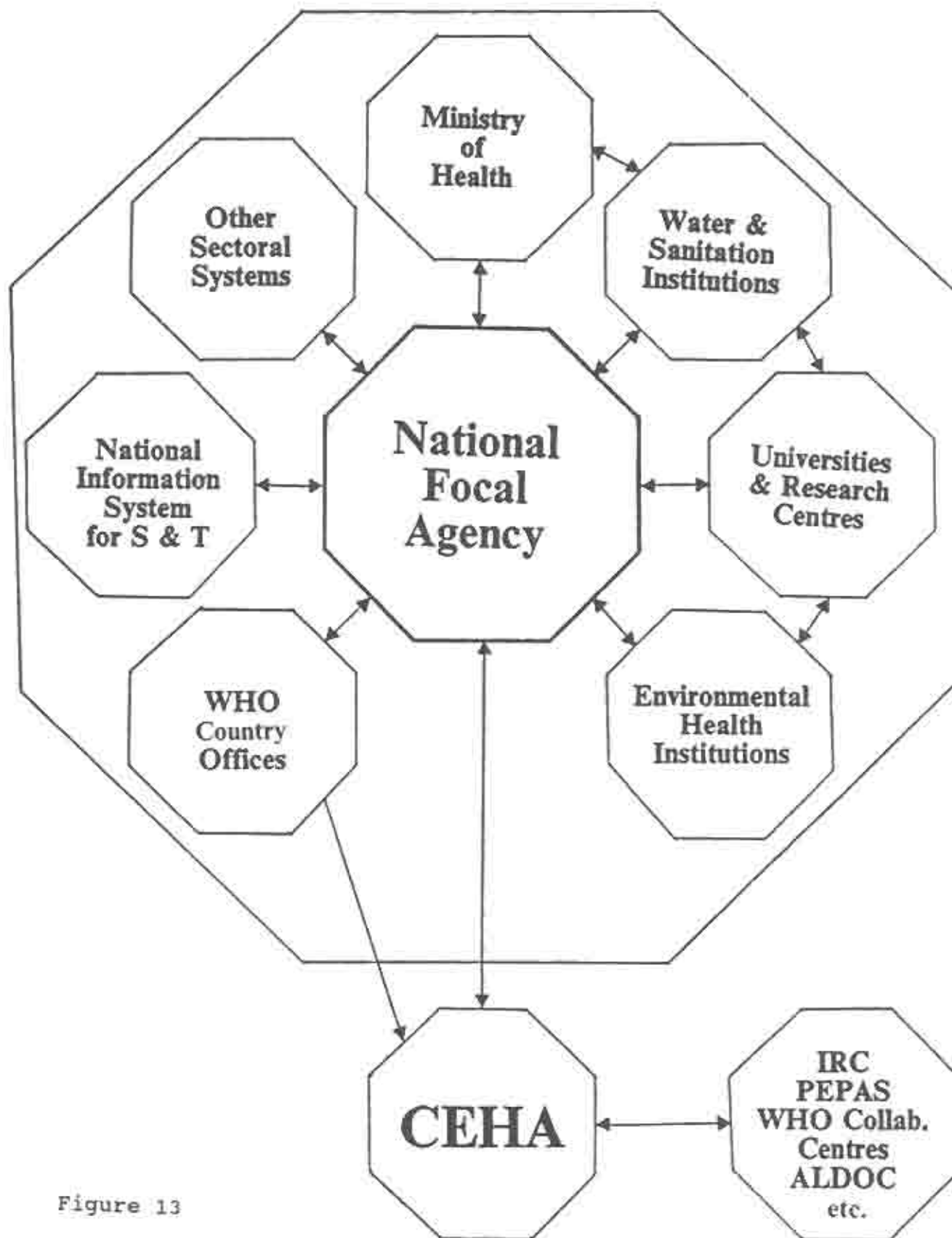


Figure 13



there be any hope for success. Based on that CEHA initiates contacts and mounts appraisal missions to institutions in the Region to create its nodes in the countries.

### 3.2.3 Selection of CEHANET National Centres

Like a business, a network must know its clientele and "keep the customers satisfied". Conversely, since members of a network should be participants rather than merely clients, some assessment should be made of the contributions that may be expected from users, and whether these offerings will be of a genuine usefulness to other members. The appraisal missions which have taken place or planned to countries of the Region constitute the assessment process in development of the Network. This assessment is based on first hand information collected from each institution during these missions. Annex I is the form used as a basis to collect the data for assessment.

#### 3.2.3.1 National Focal Agencies (NFAs)

As has been mentioned earlier, in each country there will be one National Focal Agency. The criteria used for selecting an Agency were:

1. Information Users. Availability of personnel specialized in environmental health or related disciplines in the institution;
2. Information Needs. Environmental health activities should constitute part of the institution's total orientation;
3. Information Resources that includes:
  - a. availability of a science and technology library/information unit which covers environmental health literature,
  - b. Availability of library/information personnel who can handle or maybe able to handle through training, such services and functions that networking requires,
  - c. Availability or the potential for availability and utilization of information technology to function as a network node,
  - d. The location of the centre in the country should permit easy communication and accessibility,
  - e. The institution should be of a good reputation for its information infrastructure, services and the potential to develop as a national centre in the field of Environmental Health,
  - f. Willingness. The institution should be ready to commit itself to the network requirements, standards, procedures, policies and activities.

### 3.2.3.2 National Collaborating Centres (NCCs)

The criteria used for selecting National Collaborating Centres are:

1. Information Users. Availability of personnel specialized in Environmental Health or related disciplines in the institution;
2. Information Needs. Environmental Health activities should constitute part of the institution's total orientation;
3. Information Resources. Availability of a library/information unit or a staff member to liaise between CEHA the NFA and the centre as far as the network activities are concerned;
4. Willingness. The institution should be ready to commit itself to the network requirements, standards, procedures, policies and activities on the basis of cooperation.

### 3.2.4 Role of CEHANET National Centres

#### 3.2.4.1 Introduction

The network is the responsibility of all people concerned: suppliers and users of environmental health information in the Region. Its success is theirs. Mahon talking about any network says "Information networks are only efficient if the participants wish them to be so. They can not, in most cases, be imposed from above. They can certainly be assisted in their development by judicious direction through national or regional authorities but their success will depend upon the willingness of the individual participants to make them work". (3)

CEHANET works towards the practical aim of providing its user group with easy access to information and library resources anywhere in the Region. Librarians and library users of environmental health collections within the framework of CEHANET would visualize a system that emphasizes on accessibility of information rather than on size of library holdings. Although availability is a very important factor in information use, it is well acknowledged that it is more frustrating for a user to know that a certain piece of information or a document is available but not accessible to him in the system.

For this, cooperation in improving accessibility of library materials among participating centres has been considered the essence of the Network. It is very important that environmental health library managers and users should recognize that for CEHANET to achieve the maximum accessibility factor they themselves have to work towards this aim by putting their efforts together and combining forces.

It will be the responsibility of the Network to utilize all the information resources available for environmental health personnel in the Region. To do that, such personnel must realize the fact that they are the most valuable and richest sources of information and that none of them can seclude himself away from this situation. One should realize that he needs the information available somewhere in the Region as much as someone in the Region needs the information he has. It is the responsibility of librarians and information specialists to try to bridge the gap between information users and suppliers.

As a result of taking the decision to participate in the Network each centre should know the inputs expected of it and, in turn, will be able to identify, and probably to quantify the benefits it (its user group) gets from participation.

#### **3.2.4.2 Role of National Collaborating Centres**

The tripartite Memorandum of Understanding proposed to be signed between WHO/CEHA, the National Collaborating Centre (NCC) and the National Focal Agency shows that the designated national collaborating centre will collaborate in performing the following functions as part of CEHANET system:

- a) disseminating the products and services of the network within the institution;
- b) identifying, selecting and when appropriate obtaining documents produced by the institution within the scope of the network;
- c) preparing data entry sheets for documents selected and making them available to the National Focal Agency designated by CEHANET in the country;
- d) identification of environmental health personnel in the institution;
- e) completion, in collaboration with such personnel, the forms for the Environmental Health Directory data base and making it available to the National Focal Agency in the country;
- f) identification and study of information needs of environmental health personnel in the institution;
- g) providing CEHA, upon request, with copies of documents produced by or stocked in the centre;
- h) identification of problem areas and proposed solutions in relation to systems and tools used within the Network.

#### **3.2.4.3 Role of National Focal Agencies**

The Memorandum of Understanding proposed to be signed between WHO/CEHA and the National Focal Agency shows that the designated national focal agency will collaborate in performing the following functions as part of CEHANET system:

- a) coordinating with national institutions (CEHANET National Collaborating Centres) and other national focal agencies;
- b) promotion and dissemination of products and services of the Network;

- c) identifying and selecting documents produced in and about the country within the scope of the Network;
- d) obtaining relevant documents produced in the country;
- e) receiving and verification of data entry sheets prepared by CEHANET Collaborating Centers and making them available to CEHA;
- f) the provision of the environmental health national bibliographic data base and making it available to CEHA;
- g) monitoring environmental health information needs at country level to assist CEHANET to match services with needs;
- h) compiling and updating environmental health institutions' and professionals' directories and making them available to CEHA;
- i) participating in the initiation of new services and development of existing ones;
- j) assisting in user sensitization programmes at country level;
- k) organizing training programmes for environmental health library/information personnel at country level;
- l) providing CEHA and/or the national centers with copies of documents produced in the country, upon request;
- m) identification of problem areas and propose solutions in relation to systems and tools used in general and for Thesaurus and software in particular.

#### 3.2.4.4 Functions of CEHA as CEHANET Coordinating Centre

Within the available resources and capabilities, CEHA will be responsible for the performance of the following functions:

- a) planning and coordinating the development of the Network;
- b) preparation and distribution of manuals, systems, tools and other operating standards;
- c) training and technical support for the national participating centres in document input and processing techniques;
- d) reception of national input worksheets, quality control and data entry into the bibliographic data base;
- e) input documents produced outside the Region;
- f) produce copies of the bibliographic data base to be distributed among participating centres;
- g) processing the regional document data to produce CEHA Index: CEHANET Regional Bibliographic Data Base;
- h) processing and maintenance of other regional data bases;
- i) organization of a document delivery system;
- j) liaising with other regional and global information systems;
- k) promotion of the Network products and services;
- l) mobilization of international support and funding for the development of the Network at the national levels.

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# **Chapter Four**

## **Automation in CEHANET**

## Chapter Four: Automation in CEHANE

### 4.1 Introduction

This chapter will discuss the role of automation in CEHANET and the requirements to introduce it to CEHANET national centres including how to select hardware and software. The chapter will also review techniques and discuss problems of information transfer.

As shown in Figure 1 earlier, CEHANET national centres are agencies operating in the country in various fields. Some of them are not necessarily environmental health, therefore, each CEHANET national centre can be part of one or more other information systems. The relationship of each centre with these other systems can be explicitly formulated or implicit to the functions of the centre. The activities related to these other information systems can in some cases have a higher priority over CEHANET related activities. It is therefore essential for the success of CEHANET operations that each centre clearly understands the position of CEHANET activities in relation to its other information activities and accordingly takes the necessary action to harmonize the former with the latter.

With this in mind, it is easily seen that each centre will be confronted with the following two fundamental tasks:

- a. to develop its own information resources. This includes systematic development of the centre's library collection both quantitatively and qualitatively, as well as tapping external information resources at sectorial, national, regional and/or international levels;
- b. to improve services provided to its user community. This includes a wider range of services to be offered and an improved response time to individual service requests.

Although there has been variation in the level of complexity/development of documentation services (automated or manual) between the NFAs and NCCs, experience in implementing these two fundamental tasks in the Region indicates that these tasks are rather time-intensive and that the resources usually made available are generally insufficient for a satisfactory implementation of these tasks in the development context. In particular qualified manpower is very scarce and the available personnel at the centres are usually working under frequent overload conditions.

It is precisely here that automation plays a crucial role in rationalizing the entire process and in improving dramatically the efficiency and productivity of the available qualified manpower. By taking over the time-consuming tasks of repetitive nature, automation frees the personnel of the centres for more intelligent and demanding tasks.

As an example: Instead of spending the larger part of the time necessary for an information retrieval operation on the manual scanning of card catalogue, a computerized centre would allow the larger part of that time to be spent on formulating and refining the search strategy.

In general, automation includes two distinct areas, which are sometimes confused with each other. They are:

1. Automation of the in-house keeping operations of the centre through Informatics (Computer-based information systems). This can start with the computerization of a single activity, such as the establishment of a specific database on a microcomputer, or it can span the entire range of the centre operations including acquisition, cataloguing, indexing, circulation management, user profiles management, serials control, etc. Depending on the type and resources of the mother organization, to which the information centre is affiliated, the in-house automation can be carried out using one of the following alternatives:
  - a. Stand-alone (SA) computer equipment dedicated to the purposes of the centre, ( e.g., personal computers (PCs) or small minicomputers), which is usually located at the centre's premises, administered by its staff and supported under its control.
  - b. Sharing of the computer resources of the mother organization, which are located outside the premisses of the information centre and are administered and supported by the data processing (DP) staff of the organization:
  - c. A combination of both "a" and "b" above, whereby the information centre has some dedicated equipment for certain tasks (e.g., data entry, report generation, circulation updates etc.) which is connected to a larger computer (so called host) at the DP centre of the mother organization, where bulk data is stored and heavy processing and printing take place. Data is up-and-downloaded to and from the host computer as necessary by the local SA computer(s) of the centre.
2. Automation of the access to external information resources through Telematics. This area is closely related to the new trends in information service provision, which encourages the departure from traditional concepts (limiting the majority of services provided to the inventory of the centre itself) towards providing comprehensive services irrespective of the geographical location of the needed information. These trends have resulted in an increasing importance of the access to external information resources or networks at different levels mentioned earlier (local, national, regional, and/or international).

The access to external information resources located on a server host is implemented using one or more of the following telematics techniques:



a. Dedicated Data Link

The dedicated link usually consists of a private or leased communications circuit between the centre and the server locations with data communications equipment (e.g., modems) at both ends, which allows the remote access to the server and data transfer over the circuit. This technique is often used to connect the centre to the DP host computer of the mother organization.

b. Dial-Up Link

This connection technique uses the public switched telephone network (PSTN) to establish through a phone call a temporary circuit between the centre and the server host, which can then be used in conjunction with data communications equipment for remote access and data transfer similar to the dedicated data link described in "a" above. This technique is widely used in developed countries and increasingly in developing countries to access a large number of information vendors such as DIALOG, BRS, ESRIN, etc.

c. Public Switched Data Network (PSDN)

Such networks are operated by the national PTT organization of each country such as TRANSPAC in France, DATEX in Germany or PSS in the U.K. In some countries where communications are not a monopoly of the government they are operated by private carrier companies such as TYMNET and TELENET in the U.S.A. or DATAPAC in Canada. The connection to the PSDN can be one of several types: connection of a terminal to the PSDN, connection of the centre's computer to the PSDN or connection of the mother organization's computer to the PSDN. Because of the public nature of these networks many information service providers have connected their servers to one or more of such PSDN. A centre connecting itself to a PSDN has thus access to a rich offering of information services consisting of all services available through the PSDN.

d. Telex Gateway

This technique of connection is used predominantly in developing countries, where a PSDN is not yet available, the PSTN not sufficiently reliable and dedicated lines to remote hosts too expensive to operate. It uses the normal public telex service to establish a long-distance low-cost circuit between the centre and a special gateway, which translates telex signals to computer signals and relays them via a PSDN to the required host. The telex teleprinter is thus used as an interactive terminal to access the remote host (Figure 3.c).

The exchange of information stored on magnetic or optical media is a valid option for information exchange and in some cases the only option available. It should be realized however that this technology is more in the field of Informatics than Telematics and hence can have much more impact on the first area of automation.

## 4.2 Advantages of Automation

- 4.2.1 Increased Efficiency in All Functions of the Centre** As explained before time-intensive routine tasks of repetitive nature can be taken care of by the automated system, thus freeing the personnel for more intelligent or more visible tasks.
- 4.2.2 Access to Higher Levels of Information** The search for information according to multiple interrelated criteria in a manual system is a difficult and prohibitively time-consuming operation. With automation, such complex search becomes possible and hence gives access to a new level of information, which was not possible before. Applying so-called Boolean algebra (AND, OR and NOT logical operators) to the criteria of such search often uncovers new implicit relationships in the available information, which was unknown earlier.
- 4.2.3 Improved Services to Users** , increased efficiency of the centre's functions, reduced load on its personnel and access to higher levels of information in less time improves dramatically the response time and the quality of services provided to the user community without the need to increase capital resources of the centre in the same proportions.

## 4.3 Limitations and Problems of Automation

- 4.3.1** Automation turns over parts of the functions of the centre to computer hardware and software and relies on these to carry out the functions reliably. It requires therefore an extremely detailed analysis of all steps to be automated and of all possible alternatives, which could be encountered during operation within the full information cycle. Once the design of the automated system is completed, such details are not visible to the users of the system. Any errors or omissions could result in erroneous data or incomplete information without the user knowing it. This would jeopardize the entire purpose of the automated system. Thus automation requires from the personnel of the centre precision and thoroughness levels at work as never before. Considering that work habits are deeply rooted in social, managerial and psychological environment, achieving these requirements is not trivial and necessitates a considerable amount of awareness-building, motivation and training of the personnel.
- 4.3.2** The introduction of automation has an impact on the qualifications of the manpower at the centre. New fields of specialization must be introduced for the successful operation of the automated system. These new specializations vary in scope and depth with the degree of autonomy targeted by the centre. If the centre relies on the DP department of the mother institution for the operation, administration and support of the computer

hardware, its personnel need only be trained on the utilization of the software package used by the centre. Dial-up access to remote servers requires additionally a basic understanding of telecommunications and remote access procedures. If the centre operates its own equipment, its staff must be qualified for the operation, administration and support of this equipment. While the first of these skills seems relatively easy to acquire, the two others are unfortunately more difficult and tend to be neglected. It is up to the management of the information centre to assess the possibilities for training and/or expanding its personnel and for selecting an automation alternative suitable for these possibilities.

- 4.3.3 Information technology is a very dynamic technology. Significant changes are occurring in ever shorter time intervals and accelerating the "virtual" obsolescence of the previous generation of hardware and software. It is also causing a so-called "deskilling" of manpower. A steadily increasing amount of continuing education, training and recycling is needed to maintain the qualifications of manpower involved with this technology.

The successful introduction of automation into a CEHANET national centre must therefore be based on the following prerequisites:

- a. a well organized manual system with clearly defined functions, responsibilities and information flow;
- b. a precise and detailed definition of the parts to be automated, the inputs and outputs of the automated system and the users expected to benefit from it;
- c. a realistic assessment of the centre's resources and capabilities from the perspective of automation, leading to the selection of an appropriate mode of automation;
- d. an implementation approach integrating the need for comprehensive support with the specifications of the hardware and software, and favoring a step-by-step process;

It should be well understood that a centre, which is not able to provide CEHANET basic services manually, will not be able to do so with automation.

## 4.4 Automation Requirements

### 4.4.1 Manpower

Once the prerequisites for automation have been made available and a decision has been taken concerning the optimal mode of automation for the centre, detailed planning should follow. Such planning involves usually many people but an expert in the following areas must be present if the planning is to be successful:

- a. Application: In our case the application is the automation of an information and documentation centre. The planning team should have therefore someone with detailed knowledge of how the information centre operates, what procedures and rules are used, how the document or information circuits within the centre are defined and exactly what operations or processes within the centre are to be automated.
- b. Hardware: Depending on the mode of automation opted, it is necessary that the planning team includes someone knowledgeable in computer hardware and in its major characteristics, possibilities and limitations. An idea about cost of computer hardware is also useful. If mode "b" has been selected (sharing the computer resources of the mother organization), such expert would come from the DP department of the organization. For other modes it would be wise to recruit a qualified person, who would stay beyond the planning stage and become staff of the centre.
- c. Software: The planning team must include a person with adequate knowledge of software. Proficiency in a programming language is not sufficient. More important is knowledge about operating systems, software packages and their operational requirements and about the major issues to be considered when selecting an application software. This expert can also be provided by the DP department for mode "b" or by external consultancy for the other modes. Recruitment similarly to 2. is possible but very unlikely due to shortage in such personnel.
- d. Communications: For automation of the access to external resources mode "a", "b" and "c" (dedicated data link, dial-up link and PSDN) an expert in communications is required, who have knowledge about locally available data communications services, their performances and their pricing.

In the operational stage the following qualifications are required within the staff of the centre:

- a. Systems Engineering: this qualification is necessary for modes "a" and "c" to ensure proper administration of the system. It includes the software qualifications described in "c" above, but must be complemented with some practical experience in running and administering systems. As mentioned earlier persons with such profile are very hard to find due to the large demand. The selected mode of automation should be carefully reviewed in the light of the availability of this person.
- b. Application support: it is necessary to have someone dedicated to support the application software developed or customized for the centre. This is usually the programmer who has done the development or customization. For mode "b" and "c" this would be provided by the DP department. For mode "a" either a programmer is hired or the task is divided between the system administrator and the staff member, who represents the application expertise on the planning team. This variant requires additional involvement of this staff member in computer technology to be able to cooperate with the system programmer efficiently.

- c. **Maintenance:** this is mainly required for mode "a" and partly for "c". The qualifications needed are close to those described in "hardware" within the planning team and should be complemented with some practical experience in maintenance and repair of the computer and its peripherals.
- d. **Communications:** in many cases the staff responsible for maintenance can provide the necessary technical support for the communications activities, by interfacing with the PTT or common carriers involved.

The problems and difficulties encountered in many automation projects can be often traced back to insufficient consideration of the manpower requirements BEFORE the project started.

#### 4.4.2 Site

In addition to the manpower prerequisites there are also a number of conditions related to the site of the automation project. These conditions can be grouped into three categories:

- 4.4.2.1 **Allocation of Space** in many cases the required work space is estimated very roughly taking into consideration only the space needed directly for the equipment. Space requirements should be rather examined for the entire SYSTEM. This includes:
  - a. the space actually taken by the equipment, its accessories, consumables and ancillaries;
  - b. the space needed to work with this equipment, including desk area for work documents etc;
  - c. the margins left for accessing the equipment during reconfiguration, maintenance and repair;
  - d. the storage area for magnetic media, user manuals, system documentation and consumable reserves;
  - e. office space for the manpower operating the system;
  - f. office area for system related activities such as user's queries or printout packaging etc.

Even for microcomputer based systems these requirements can add-up to space requirements at least an order of magnitude larger than the net area taken by the computer. For multi-user minicomputer space planning and allocation is major planning activity.

- 4.4.2.2 **Environmental Requirements** most computer equipment is specified to work within well defined environmental conditions. Although operating the equipment at the margin or even outside the specified range of any of its environmental parameters will not result in visible damage immediately, it is now well proven that the life cycle of this equipment and its reliability are significantly reduced. With advancing technology the general

environmental requirements for operating computer equipment are being relaxed, but there are still well defined requirements for each equipment to be respected, if the investment made in the automation is to be recovered in any form. The major environmental parameters effecting the computer operation are:

- a. Temperature: Usually two ranges are specified, one for the storage and the other for the operation of the equipment. In addition the maximum permitted gradient (or rate of change) of the temperature is given sometimes. This can be significant in arid zones found in most of the EMR countries.
- b. Humidity: In addition to the equipment, all removable magnetic media, printer inking ribbons and listing paper used in computer operations have characteristics which are only valid under specified environmental conditions. In particular, humidity plays an important role in this context. Humidity is also important for some electronic and connector assemblies within the computer. Unfortunately, more often than not the air conditioning equipment used for equipment rooms in the Region only control temperature but not the humidity. This can have adverse effects not only in arid zones, where natural humidity need to be increased, but also in coastal areas, where natural humidity must be reduced to avoid any condensation on the electronic boards and connectors resulting from temperature conditioning.
- c. Dust: An accumulation of dust can be detrimental to many components of a computerized system: the keyboard, printer mechanisms, removable magnetic media and their drives, connectors and even electronic circuitry. The geographical nature of the Region implies relatively high amount of dust in the air. The dust risk can be countered by a range of measures starting with dust covers for the equipment (when it is not in use), the method of cleaning chosen for the computer rooms, regular cleaning of the components at risk (within the scheduled preventive maintenance) and installation of dust filters (which stop all particles above a certain size in microns) in the ventilation circuits of the equipment rooms.
- d. Static: Many materials used in the office environment nowadays (in particular synthetic materials used in on clothes) tend to accumulate a substantive electrostatic charge through friction. The amount of static is inversely proportional to humidity. If such a static is discharged into computer equipment including sensitive electronic chips, permanent damage to the equipment may result. Protection against static electricity can be provided through choice of appropriate floors and through grounded conductive areas around the equipment, which cause any accumulated static to be discharged into the earth before touching the equipment.

- e. **Electrical Power:** For computer equipment to operate correctly the mains outlet must provide electrical power according to the specified values and tolerances for amplitude and frequency. Usually the actual values of these tend to vary according to the loading of the public electrical grid or to the quality of the generator source used. The on- and off-switching of appliances in the vicinity of the equipment can also cause significant distortions and changes in the voltage characteristics for a short time. The remedy to this situation consists in additional electrical equipment placed between the mains outlet and the computers or peripherals. Such equipment is available in a wide range of performance and pricing. The range spans from normal voltage regulator to uninterrupted power supplies (UPS), which isolate the system completely from the mains and provide electrical power stable in all its parameters as well as some autonomy in case of mains failure.

A further aspect of the electrical environment is earthing. All important electrical appliances need a protective earth connection and their plugs are designed accordingly. The electrical wiring of the building (or at least of the site) must be capable of providing three-wired sockets (2 for electricity and 1 protective earth). Often in this Region such sockets are provided but without really connecting the earthing pin to the earth. The status of the electrical installation and its capacity to take the additional load of the system should be checked by qualified technicians. Finally in countries with frequent thunderstorms the lightning protection of the building should be checked to ensure that no damage results to the equipment.

- 4.4.2.3 Operational Requirements** based on space and environmental requirements there are some additional aspects related to operations, to be taken into consideration when selecting a site for the system. One such aspect is the disposition of the different equipment of the system in relation to other activities of the centre. The work flow within the centre and in particular the document circuits related to the automated functions must be taken into consideration when studying this aspect.

Another important aspect is security of the system in relation to the site. This aspect includes a suitable choice of the system's site within the centre so as to ensure physical access control as necessary. It also includes planning locations for the safe storage of magnetic media holding backup information of the system, so that recovery is possible despite system crashes or disasters. The extent of security measures to be implemented should be proportional to the answer to the question: what is the loss of the centre if all information in the system is lost, garbled or maliciously tampered with? In many cases this question is asked much too late (after something went wrong) only to find that the losses are much higher than anticipated.

### 4.4.3 Procedures

The introduction of an automated system into any organization and particularly into an information centre has always a deep impact on the way the work is carried out in such an organization. If this impact is not reflected on the set of rules, conventions and procedures governing that organization, the system will most certainly either have a mediocre performance or completely fail to attain its objectives. The necessity to modify current procedures and rules or even develop new ones results from the nature of the information chain within any organization. These procedures and rules govern the interaction between the different entities (individuals or groups) performing specific information processing. A computerized system can only automate parts of this chain as long as human beings are involved in any stage of the process. Modified procedures and rules are therefore needed to govern the interaction between the human and the automated information processing entities. It is the task of the centre's management to undertake the analysis of the former and the design of the new procedures in relation to the computerized system.

### 4.4.4 Hardware and Software

Automation has some general requirements pertaining to hardware and software independently from any specific application or from the make and type of the hardware or software considered. These requirements can become crucial, when looked at from the perspective of an NFA and its related NCCs. These requirements can be summarized as follows:

**4.4.4.1 Compatibility** Compared with manual systems, automated systems have a higher information content and a greater communications need. Experience has shown that sooner or later such systems will need to be connected to other similar systems or at least to exchange information with these. In attempting to do so, great difficulties may be encountered if the different systems are not compatible with each other. The compatibility needed is twofold: First towards the "past", that is compatibility with older already installed systems which cannot be discarded and; second towards the "future", that is compatibility with the dominant industry and official standards. Without these two facets of compatibility, previous systems will become obsolete early and future expansion will be very expensive.

**4.4.4.2 Expandability** If the system is designed for today's needs, it could become quickly unsuitable and require replacement. On the other hand, if the system is designed for tomorrow's needs a lot of its capacity might stay unused for a long time and may even become obsolete through rapid technological developments. To solve this dilemma a system suitable for today's needs and capable of expansion to meet tomorrow's requirements would be ideal. Such systems exist indeed. Almost all well established suppliers offer a "family" of systems, compatible with



each other and possessing staggered performance and prices, whereby a smaller system can be upgraded to a larger model, avoiding the replacement of the system.

**4.4.4.3 Ease of Use** Considering the difficulties of recruiting sufficiently qualified manpower, of introducing automation to several centres (NFAs and NCCs) simultaneously and of training information and documentation staff in these centres on utilizing the system, great importance should be attached to the "friendliness" of both software and hardware, which can relax to a large extent the training and qualification requirements. Software friendliness encompasses many features including menu-driven commands, ease of data input and correction, clear displays, unambiguous messages, on-line context-sensitive help and recovery from errors. Hardware friendliness includes clear status indicators, built-in diagnostic routines, simple access to the interior of the equipment and easy exchange of assemblies (sometimes measured in MTTR = Mean Time To Repair). Both for software and hardware detailed high quality documentation is an essential feature for friendliness.

**4.4.4.4 Low Cost** As mentioned in 1. the resources made available to information activities in this Region are generally insufficient, which has caused the scarce qualified manpower to work under frequent overload conditions. This in turn made the productivity of the information workers a crucial issue. A luxurious automation solution would contradict the assumption of insufficient resources made above. The logical approach is to concentrate on increasing the productivity through means attainable with the available resources. An evaluation of such resources should be based not on the cost of hardware and software, but rather on the overall system cost as discussed above and should include the recurrent operating cost.

#### **4.4.5 Technical Support**

Information technology is a very dynamic field. Technical support for such technology should therefore obtain considerable attention in order to avoid early obsolescence or uneconomic operation. Such support includes not only installation, maintenance and repair of the computer systems involved, but also installation, configuration and upgrading of both the hardware and the software, migration of applications and data as the system evolves, support to users developing or customizing their applications, assessment of available alternatives for the evolution of the system and its adaptation to changing requirements. The availability of a comprehensive support is far more important than the equipment or software itself in the selection process of the automation mode and tools. Without such support even the best computer equipment and the most sophisticated application software can only be short-lived.

Technical support can be obtained through different alternatives depending on the mode of automation chosen and on the particular situation of the centre. For modes "b" and "c" (stand alone and share of computer resources) support could be provided by the DP department. For mode "a" there are two major possibilities: either develop technical support capability within the centre or rely on external support contractually. The second approach obviously has the advantage of obtaining support without taking responsibility for the infrastructure required nor for the updating of the manpower. It has however the disadvantage of dependency on an external source, which could at times leave the centre without support of any kind. In a region where offerings of such comprehensive support are not too frequent, a simple difference in opinion with the provider of support resulting in no renewal of his contract could take disastrous proportions. The first approach is more difficult and more costly as it builds up the entire infrastructure needed. If successful, however, it could provide the centre with independence and a strong position.

## **4.5 Selection of Equipment**

### **4.5.1 Fundamentals and Terminology**

Computer systems have been historically divided into five technological generations. The current generation is the fourth and the fifth is in the design. Three major classes of systems are distinguished according to performance and size:

#### **Mainframes:**

These are the top-of-range systems with highest storage capacity, processing performance and the number of users supported simultaneously.

#### **Minicomputer:**

These are middle range systems supporting multiple users and possessing medium to large storage capacity and processing power.

#### **Microcomputers:**

These are the lower-end systems usually supporting a single user only. They have low to medium storage capacity and processing power. They are designated often as personal computers, although some limited capability for multi-user support has recently appeared in this category. Modern trends are towards providing microcomputers with increased processing power, storage and communications capabilities under the new designation of workstation, and to network large numbers of such workstations together.

Although the lines separating these categories are often blurred by rapid technological advances as the performance of the smaller systems reach that of the next higher class and the latter leapfrog to new records of performance, these categories remain valid for the time being and are useful for indicating roughly the class of the system discussed. The main building blocks of a computer system are:

Central Processing Unit (CPU)  
Input/Output Subsystem (I/o)  
Mass Storage Subsystem (MSS)  
Power Supply Subsystem (PSS)

Although these blocks are applicable to all categories of computers in general, we will limit ourselves in the following to microcomputers, as CEHANET has adopted this category for its first phase. Where needed minicomputers will be explicitly discussed. In the following the main terms of the hardware jargon are briefly explained in order to facilitate the understanding of the issues related to the selection of equipment.

#### 4.5.1.1 Central Processing Unit

**CPU:** This is the heart of the computer system. It consists of three distinct functional units: an Arithmetic/Logic Unit (ALU), a controller and storage, which is called primary storage or memory to distinguish it from the MSS called secondary storage or memory. The (ALU) is the electronic unit that actually performs the processing operations, which can be of arithmetic nature (calculations) or of logical nature (comparison, sorting, branching etc.). The controller determines the sequence of operations to be carried out according to the instructions of the programmer. This set of instructions is referred to as program. The primary memory is the working space where the data currently being processed and some fundamental instructions are stored. This primary memory is subdivided into two types: RAM and ROM.

**RAM:** This is a Read-And-Write Memory. As the name implies data can be read (retrieved) from it or written (stored) to it. RAM is called a volatile memory because it loses all stored data when it is switched off. A variant of RAM has an adjacent battery providing standby power and thus can hold data for very long time when the main power is switched off. This variant is used to store configuration data and other similar information.

**ROM:** This is a Read-Only-Memory. Stored data can only be retrieved from it but cannot be altered. The data is therefore written into ROMs at the factory. ROMs are used to permanently store start-up routines and fundamental programmes needed by the computer to get initialized and begin operation. In the recent past, several variants of ROMs have appeared: PROMs are onetime user programmable ROMs. EPROMs are electrically programmable PROMs which can be erased through exposure to strong ultraviolet radiation, EEPROMs are electrically programmable and erasable PROMs.

The ALU and controller are implemented together on a microchip and packaged as an integrated circuit (IC) called microprocessor. Two major families of microprocessors exist today: INTEL's and MOTOROLA's. The Intel family's commonly used models include 8088, 8086, 80286 and 80386. The Motorola family's most widely used models are 68000, 68010, 68020 and 68030. Many other suppliers manufacture microprocessors compatible with one or the other of these two families. In addition to these general processing units both lines

offer so-called coprocessors specialized in certain operations. Intel's 8087, 80287, 80287 and Motorola's 68881 mathematical coprocessors are examples of such processors specialized in arithmetic operations and used to accelerate the execution of such operations with the computer.

#### 4.5.1.2 Input/Output Subsystem

The data and instructions on which the CPU operates must first be supplied to the CPU and the results of the processing must be retrieved from it. These are the tasks of the input and output subsystem respectively. When a unit includes both functions it is called an I/O unit and the way such unit works is called "interactive" to emphasize the combined input of instructions or data and the immediate monitoring of the corresponding results.

The main input device is the keyboard. It has four groups of keys: the typewriter keys, the numerical pad, control keys and programmable function keys (PFK). The typewriter keys include all alphanumeric and special characters displayed by the computer.

According to the sequence of the first six letter keys in this group different national keyboards are identified: QWERTY is the American/English version, AZERTY is the French and QWERTZ is the German variant etc. In Arab countries computers can have two languages on their keyboards: a Latin one and Arabic.

The Arab Standards & Metrology Organization (ASMO) defined the layout of the standard Arabic keyboard. The numerical keypad is used to input of large amounts of numerical data. Control keys are used generate invisible characters used for controlling the computer, such as for example the movement of the cursor. In some computers, cursor-control keys are integrated with the numerical pad. Finally the PFKs are keys which can be defined dynamically by the user of a certain application running on the computer.

The main output-device is the Video Display Unit (VDU) sometimes also called Monitor or Screen. There are several different sizes available, which can display alphanumeric and/or graphics. A further option is monochrome vs. colour display. Alphanumeric VDUs can display 24-26 lines of 80 normal size or (132 condensed) characters each. Graphic displays are characterized by their resolution (number of distinct dots) horizontally and vertically. There are different proprietary standards for graphic display. The one used in the computer must comply with the one specified in the application, if correct graphics display is to be obtained. Some of the most widely used graphic standards are Hercules, CGA, MCGA, EGA, VGA, and SVGA.

Printers and plotters are output devices producing a hard copy of the desired results. Printers are subdivided according to their printing technology into impact, matrix, ink-jet, laser and thermal printers, or according to their printing method into character, line and page printers. In addition to alphanumeric in several fonts and sizes many printer can printout graphics. Some printers have also colour capability. Plotters are used to output graphic information

such as drawings, schematics and diagrams. They are classified according to the maximum size of paper sheet (A4 to A0), the motion mechanism (flatbed or drum) and the number of drawing pens (1-8). Printers and plotters can be connected to the computer through standard interfaces. The most commonly used interfaces are the serial interface (also called RS-232c or V.24) and the parallel interface (also called Centronics). The serial interface is suitable for local and remote connection while the parallel interface can only be used for local connections.

Another input device which has recently won increased popularity is the so-called mouse. This is a device which is used to control cursor movement and select an item out of a menu displayed on the VDU through movement of the device itself on a flat surface. Most microcomputers possess also a loudspeaker as an acoustical output device.

#### 4.5.1.3 Mass Storage Subsystem

The MSS is intended for the nonvolatile storage of large quantities of data or programs (instructions). Currently the main technology used is storage on magnetic media, which can be subdivided into two groups: tapes or disks. The first group has a sequential storage and retrieval technique and is therefore said to provide sequential access. The second group provides random access as data can be written or retrieved from any part directly. Several forms of magnetic tape exist: cassette, reel and cartridge.

Similarly disks exist in several forms: floppy disks, removable hard disks, cartridge disks and sealed fixed hard disks. Tape media are used mainly for archiving, backup and software distribution because of their sequential access property. Disk media are widely used in microcomputers. Almost all brands today offer a hard disk drive with capacities ranging from 10 to 600 Mbytes in addition to a floppy disk drive used for transfer of software and data to the fixed system. Floppy disks exist in 8, 5.25 and 3.5 inches diameter and have capacities ranging from 360 to 2000 Kbytes. In addition to the disk drive the MSS includes the electronics for communicating with the CPU. Because information can flow between the CPU and the MSS in both directions, the MSS can be considered as an I/O device.

More recently a new technology has emerged which is gaining increased attention as an MSS technology. This is the optical storage technology. The first widely accepted product of this technology in the computer field is the CD-ROM (Compact Disk Read-only memory) which holds enormous quantities of data in a small volume. The data is recorded at the factory and can be only retrieved but not altered (ROM). This product is finding applications in the distribution of information in electronic form (such as dictionaries, encyclopedias, indexes of publications etc.,). There are also so-called WORM (Write Once Read Many times) optical disks. Similarly to PROMS information can be recorded on these disks by the user once but retrieved many times. They are finding application in the document archiving field. Finally a read-and-write optical disk has been announced but has yet to establish itself for MSS applications.

All the main components of the computer are connected with each other through a bus to form the computer system. The bus is high-speed communications device allowing exchange of information between the different components. Because any additional system components must also communicate with the system through the bus, the latter has been provided with reserve positions for such additional components. These are called the expansion slots and are designed to receive any expansions complying with the specifications of the bus. A wide range of expansion cards exists which include functions such as memory expansion, graphics, communications, telefax, data acquisition, image processing, voice synthesis, optical character recognition and automatic control. The number of expansion slots is therefore one of the parameters to be considered when selecting equipment.

#### **4.5.2 Specifications for CEHANET Compatibility**

CEHANET has standardized its requirements on hardware by specifying IBM compatibility. The IBM microcomputers and their "clones" (this is name given in the hardware jargon to all computers which claim IBM compatibility) use Intel microprocessors and have the largest market share today. Suppliers of clones are very numerous. This choice thus ensures availability of suitable equipment from many sources and at reasonable prices because of the fierce competition among these.

A CEHANET national centre's computer system should have at least 512 Kbytes of RAM (640 KB are required to ensure full features), a (monochrome) screen, a floppy disk unit and a sufficiently large hard disk as MSS. A minimum of 20 Mbytes is recommended. While the software package selected by CEHANET can display in monochrome, colour display provides some enhancement and a colour monitor and an EGA graphics card are desirable. The EGA card is compulsory if arabicization of the computer is required for running the Arabic version of CDS\ISIS. The system must include a printer and according to the selected printer model the computer should include a serial or a parallel port for its connection. This minimum configuration can be expanded to cater for any further requirements such as an additional serial port for connection of a modem or a special interface for connection to a Local Area Network (LAN). A suitable UPS and sufficient consumable materials to ensure the backup of the hard disk's information, the exchange of data with other CEHANET national centres and the printing of bibliographies and selective search results are necessary for adequate operation.

#### **4.5.3 Outlook**

The equipment specified for CEHANET activities based itself on assumptions valid for most national centres (NFAs and NCCs). It was clear however that these centres will evolve and their requirements could increase at some stage beyond the capabilities of the current equipment. In addition there were already some centres with higher requirements and possibilities. It was therefore important to cater for the needs of such centres and for the future of the others.

CEHANET operations at the Coordinating Centre of the Network (CEHA) are fully computerized. A number of CEHANET national centres are also, partially or fully, computerized. Exchange of data in electronic form started and in two directions. CEHA has supplied many national centres with copies of the Environmental Health Regional Bibliography and the Regional Directory of Environmental Health Professionals and Institutions on disks using CDS/ISIS Export/Import services. Some national centres have also supplied CEHA with bibliographic data on disks using CDS/ISIS.

As CEHANET evolves more and more NCCs will be automated and provide their users with the full range of CEHANET services. CEHANET's coordinating centre will evolve towards a multi-user system capable of dedicating some ports to remote queries. This would allow NCCs to dial-up CEHANET hostcomputer and query the data bases on-line or exchange information electronically using their microcomputers as terminals. With the introduction of data communications networks recently to several countries in the Region, the possibilities for remote access will improve steadily in quality and cost.

## **4.6 Selection of Software**

### **4.6.1 Fundamentals and Terminology**

Software designates generally all kinds of computer programs independently from the programming language in which they were written or from the purpose or functions of these programs. While hardware ultimately determines the capacity of a computer in terms of storage and processing power, software determines the efficiency and the performance achieved with this capacity. Software is also the interface of the user with the computer and the means to obtain the desired processing and results. Software can be divided into three major categories:

#### **4.6.1.1 Operating System**

Operating System (OS) is the software controlling the internal operations of the computer and the interaction between its different components discussed earlier. It is closely associated with the hardware and offers a range of commands and functions which can be used by other software categories or by a user to obtain services offered the OS. In the past, most OSs were proprietary and limited to a particular computer architecture and to a particular equipment supplier. The recent widespread of compatible microcomputers has created de-facto industry standards, which while still proprietary are now available for many computers from a multitude of suppliers. The most widely used OS for microcomputers is Microsoft's MS-DOS (the version running on an IBM PC is also called PC-DOS). The wide acceptance of this OS has made available a plethora of programs, which run on any MS-DOS compatible machine, thus decreasing the cost of such programs and making information exchange possible. Another popular OS is XENIX, which is the adaptation of UNIX, a well established OS for minicomputers, for microcomputers.

With the technological developments showing a trend towards increased processing power and multi-user capability for micro-computers, UNIX itself has been ported to several microcomputers. This brought to the microcomputer users the availability of a large number of programs, which run on any UNIX compatible machine. Another OS aimed at the new generations of IBM is OS/2. This OS is relatively a newcomer and has yet to prove itself as an industry standard.

#### 4.6.1.2 Programming Tools

This category of software permits the preparation of instructions and programs which can use the services of the OS and are dedicated to implement a certain function. Among such tools are utilities for sorting and merging data files and the interpreters and compilers of programming languages such as BASIC, COBOL, FORTRAN, PASCAL and C. With programming languages commands to the computers can be formulated more easily in an English-like language and then translated into machine-readable instructions by the interpreter or compiler of that specific language. Interpreters translate on an instruction-by-instruction basis while compilers translate the entire program before executing it. Programming tools are important for programmers and for organization planning to develop their application software in-house.

#### 4.6.1.3 Application Software

Application software determines ultimately how the computer is to serve specific user need. It is the most visible of all software categories. As mentioned before it can be developed in-house, externally according to the specific needs of the user, or purchased as off-the-shelf application packages. In-house developments are costly due to the high cost of software development and are only a viable alternative when the size and the human and technical resources of the organization allow such development to be less expensive than massive purchasing of off-the-shelf software. External development is chosen mainly when off-the-shelf packages do not fulfill the needs of the user and in-house development is not possible. For external software development to be successful the user must be capable of identifying his needs with great detail and of specifying the product needed accurately.

Application packages exist for a very large number of different applications. Some types have found wide acceptance because of their generality in the function they offer and of their adaptability to specific user requirements. Major types of application packages are:

**SPREADSHEET:** These packages are specialized in applications involving numerical data on which arithmetic operations are to be carried out. The user can specify the names and types of cells, rows or columns as well as arithmetic relations between these according to his needs. Once these relations are defined any new input or change in the data can be immediately reflected onto the entire sheet. Spreadsheets are best suited for financial, statistical and structural design applications and generally for applications of the what-if type. Examples of popular spreadsheet packages for micro-computers are Lotus-1-2-3 and Multiplan.



**WORD PROCESSING:** These packages are specialized in handling textual data. They allow input, editing and formatting of text as well as printing of documents, reports and letters. They have found wide acceptance in the modern office environment, where computers are often dedicated to word processing functions. Examples of popular word processing packages are WordPerfect, MS-WORD, Wordstar 2000 and Multimate.

**DATA BASE MANAGEMENT SYSTEMS (DBMS):** These packages are specialized in the efficient storage and retrieval of structured data. They are suitable for sophisticated manipulations of data, which has recurrent fields (e.g., personal data, directories etc.), is in tabular form or is interrelated within a hierarchy. DBMSs allow selective search and information retrieval to be performed effectively in large amounts of such data. Examples of popular DBMS are Cardbox, DBase III+ and IV, FoxBase, FoxPro, R:Base, CDS/ISIS and Professional ORACLE.

**GRAPHICS:** Graphic data includes drawings, pictures, charts, diagrams etc. Even text pages can be scanned and represented as picture elements in the computer. Graphics can often convey more information than text and allow easier understanding of the information conveyed. It is independent of languages. Graphics packages allow the preparation of graphs and plots from numerical data, preparation and manipulation of drawings, acquisition and processing of pictures and images etc. Examples of graphics packages are BUSIGRAPH, MACPAINT, MACDRAW, MS-PAINTBRUSH, Harvard Graphics and AUTOCAD.

**STATISTICAL:** These packages are used for storing numerical raw data and applying statistical methods to it. The raw data can thus be characterized by its statistical parameters, and trends or correlation patterns detected. An example of such packages is SPSS/PC.

**BIBLIOGRAPHIC:** These packages are used for the storage, manipulation and retrieval of bibliographic information. They could be one application of DBMS and some of their types are called "textual" data base. They differ from standard DBMS through their capability of accommodating fields of variable length but mostly through additional facilities specific to bibliographic data handling such as multiple sub-fields within a field and lexicon and thesaurus management modules. Examples of such packages are Micro-JLBDOC and Micro-CDS/ISIS (versions of both exist also for some minicomputers). Micro-CDS/ISIS has been selected by CEHANET as its standard bibliographic software package.

## **4.6.2 The Choice of CDS/ISIS**

### **4.6.2.1 Introduction**

CDS/ISIS is a generalized information storage and retrieval system designed specifically for the computerized management of structured non-numerical data bases.

One of the major advantages offered by the generalized design of the system is that the same set of computer programs is able to manipulate an unlimited number of data bases each of which may consist of completely different data elements.

The CDS/ISIS user is therefore freed from the expensive task of having to design and write computer programs each time a new project requires the use of information retrieval techniques. Although some features of CDS/ISIS require some knowledge of and experience with computerized information systems, once an application has been designed the system may be used by persons having had little or no prior computer experience.

#### 4.6.2.2 CDS/ISIS Development

ISIS (Integrated set of Information systems) was originally developed by ILO to run on Mainframe computers. Two minicomputer versions exist. UNESCO's version for minicomputers runs only on VAX of Digital Equipment Corporation and MINISIS to run on Hewlett-Packard's HP3000 minicomputer. Because of their tight coupling with a single brand of equipment, CDS/ISIS was developed by UNESCO, with funding from IDRC and has found wide acceptance because of its ability to run on a large number of different microcomputers under the popular OS, MS-DOS. The Arab League Documentation Centre (ALDOC) arabicized both MINISIS and CDS\ISIS making their utilization in Arabic and the manipulation of Arabic data bases possible.

#### 4.6.2.3 Micro-CDS/ISIS Specifications

The minimum hardware requirements for running micro-CDS/ISIS are the following:

- IBM-PC/XT or compatible equipment
- 512 Kbytes RAM (640 KB required for full features)
- 1 Floppy disk drive
- 1 Hard disk Unit
- 1 (monochrome or colour) VDU
- 1 Printer
- OS: MS-DOS Release 3.0 and above

The software is known to run on a number of IBM compatible machines such as:

IBM/PS2 (under MS-DOS)	Olivetti M2x
Compaq 286, 386	Goupil III, IV, V
Amstrad PC 1512	ACER PC
Philips PC	Commodore PC10, PC20
HP-Vectra	Sakher (IBM Compatible)

A special version is also available for WANG-PCs working under the native MS-DOS operating system. The minicomputer version is currently available for the VAX series (including micro-VAX) produced by Digital Equipment Corporation, operating under the VAX/VMS operating system, but not Arabicized.

The following system restrictions are currently holding:

Maximum number of data bases	unlimited
Maximum number of records in a data base	16 millions
Maximum record size	8000 characters
Maximum number of fields (defined in FDT) (excluding repetition of repeatable fields)	200
Maximum number of fields in a worksheet page	19
Maximum number of pages in a worksheet	20
Maximum size of a display format	4000 characters
Maximum number of stopwords	799 words
Maximum number of subfields in a field	20
Maximum field size	8000 characters
Maximum size of one help message	160 characters
Maximum size of all help messages	4000 characters
Maximum number of field select lines	200

#### 4.6.2.4 Distribution of CDS/ISIS

Micro-CDS/ISIS is provided to public organizations and government agencies free-of-charge at the present. To order a copy of Micro-CDS/ISIS the user has to fill and sign a Special License Agreement Form which can be obtained from UNESCO office of Information Programmes and Services.

When the License Agreement is signed by UNESCO a copy of the software and the manual will be delivered.

Users interested in obtaining the arabicized version of Micro-CDS/ISIS have to follow a similar procedure. A License Agreement Form in Arabic must be filled, signed and forwarded to ALDOC.

CEHANET National Centres (NFAs and NCCs) may get a copy of the software from CEHA directly. Users who get the package from CEHA will get a sample data base built according to CEHANET Procedures Manual in Arabic and English.

#### 4.6.2.5 Outlook

The new version (2.3) of Micro-CDS/ISIS can handle an unlimited number of data bases of 16 millions records each. With the current trends of providing microcomputers with increased storage and processing capacity, a saturation of the currently specified standard CEHANET configuration is not to be expected in the near future. The user community interested in a multi-user minicomputer version of CDS/ISIS has exercised considerable pressure on both UNESCO and IDRC to develop a highly portable version of CDS/ISIS and MINISIS respectively. IDRC has approved plans for such development and UNESCO is considering a cooperative effort for porting CDS/ISIS into a UNIX environment. As user needs evolve, more powerful microcomputers supporting multi-users and running under industry-standard OS like UNIX and OS/2 will become at their reach. The portable version of CDS/ISIS or MINISIS will be available to run on such computers and the transition including the transfer of data from the former to the newer system can proceed smoothly.

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## **Chapter Five**

**Application of CEHNET Procedures Manual**

## **Chapter Five:**

### **Application of CEHANET Procedures Manual**

#### **5.1 Introduction**

When several documentation centres agree to form a network and to exchange information with each other, as it is the case of CEHANET, they must agree to follow common rules and standards so they can easily retrieve each others data. When such centres serve different language groups, there must be an agreement on the language or languages of the network, particularly if they are going to contribute to a central data base, in our case CEHANET centre, from which common outputs will be produced. It is thus mandatory that data in other than the three languages of the network, i.e., Arabic, English, and French, should be translated (or at least transliterated) into one of these languages.

#### **5.2 CEHANET Procedures Manual**

CEHANET Procedures Manual is intended for use to create a bibliographic data base and to provide services such as on-line search, accession lists, current awareness bulletins, and catalogues and indexes to the collection in computer printout form.

More specifically, it has been prepared to provide a working tool for the members of CEHANET comprising the various documentation and information centres of the EMR countries concerned with environmental health.

As it aims towards standardization, uniformity and compatibility on national, regional and international levels, this Manual is based on applied rules, standards and formats that are universal accepted. Among these the following may be highlighted:

##### **5.2.1 Sources of the Manual**

###### **5.2.1.1 Common Communication Format (CCF)**

Developed by UNESCO in order to provide a common method for structuring bibliographic records so that such records could be freely exchanged among different information systems. This format was translated into Arabic. However, the following should be noted in the Manual:

- a) all the mandatory CCF fields are included;
- b) many of the optional CCF fields are included;
- c) fields not included in the CCF, but considered useful are included;
- d) the CCF tagging system has been retained, although this could be changed by any centre if its computerized system requirements are different;
- e) not all CCF subfields are used;

- f) the mechanisms for linking fields and segments in CCF are not adopted, as a separate set of fields has been defined to describe parent item when the item being processed is an analytic, i.e., a chapter of a monograph or an article from an issue of a periodical. The fields that describe the parent (host) document are referred to as second level fields.

### 5.2.1.2 Anglo-American Cataloguing Rules (AACR2)

The rules for describing the content and form of the fields are based on the 1988 revision of the Anglo-American Cataloguing Rules, Second Edition (AACR2). However it has been felt that it is not necessary to mention the punctuation prescribed by AACR2 under each field as this can be created easily using a computer program. Any how they are listed at the end of the second part "Bibliographic Description in the Manual.

### 5.2.1.3 Interwater Thesaurus

The guide to subject indexing and retrieval (part 3 in the Manual) is based on INTERWATER THESAURUS in its revised edition - including Arabicization. This is a trilingual thesaurus on environmental health with emphasis on water supply and sanitation, and related disciplines.

The thesaurus will be published in four volumes:

- Volume One English/Arabic
- Volume Two Arabic/English
- Volume Three French/Arabic
- Volume Four Main terms listing  
Arabic/English/French  
English/Arabic/French  
French/English/Arabic

## 5.2.2 Bibliographic Control Using the Manual

Most of us have already catalogued documents, looked through catalogue cards in a library, or used a list of publications (called a bibliography). Cataloguing for CEHANET is not very different from preparing catalogue cards.

Cataloguing is describing a document according to its physical or external characteristics which are called bibliographic elements. Thus catalogue cards are considered the identity cards for the documents in a library. But what are the important elements for identifying a document?

The main elements that could be recorded here will be:

The Title of the document;  
The Title of the Original if the document is a translation;  
Name(s) of Author(s);  
Place where the author(s) Works;  
Place of Publication;  
Name of Publisher;  
Date of Publication;  
Number of Pages;

This list is definitely not exhaustive. To be able to do so and to be consistent in the order of describing the document, one has to follow specific rules to ensure that he gets a standardized CEHANET entry. These rules are included in the Manual. In order to help cataloguers/indexers to note down the required elements they should use a standardized form - The CEHANET Input Sheet.

### 5.2.3 General Description of the Data Base

Any computerized or manual system can create a data base. The bibliographic type of data bases is named differently when a manual system is used i.e., catalogue or index. A computerized data base is not different in this sense except in that data is stored in a machine-readable form, and once data is entered various outputs can be produced not enabled in manual systems.

Each data base comprises of records - similar to the catalogue card in the manual system - and each record consists of fields the bibliographic or other elements - and each field consists of words which in turn are strings of characters. No matter what computer system the centre chooses for its service, it should enable the following:

1. Accepting fields of variable length;
2. Accepting the minimum number of required elements for each record, i.e., the maximum length of the record should accommodate this;
3. Fields should be allowed to repeat;
4. Use of standardized character sets.

As a computerized system aims at speed and efficiency, there are some features that should be present, while absolutely not enabled in a manual system. Among these the following are the most important:

#### 1) Bibliographic Level

When the document being catalogued is part of a parent (host) document, for example, a chapter of a book, the bibliographic record must describe both the document in hand and the parent one. When describing the relationship of the document to the parent we use the term "bibliographic level". Thus the chapter is considered at the analytic level while its parent at the monographic level. The various levels and their possible combinations are described under field 070 in the Manual.

Let us take, as an example, a set of 10 conference papers published in a monograph. To catalogue them all, eleven bibliographic records have to be created: one for the monograph as a whole, in which the bibliographic description of the monograph only is entered, and one for each of the papers, in which you enter the description of the paper and the author and title of the monograph are entered.



## 2) Acquisitions

Acquisitions fields are added to the data base so that a computerized record can be created for the document at the moment it is ordered or received. The same record is then up-dated by the cataloguer/indexer. The advantage of this method is that it permits to monitor whether a document is on order but not received, received but not catalogued, catalogued but not indexed, or indexed and on the shelf. The status code entered in field 025 should be changed at each stage in the cycle. A search on the code will allow knowing how many outstanding orders the library has, or how many documents are received but are waiting for cataloguing, or how many documents have been catalogued but are waiting for indexing, or how many documents have been processed since a particular date. It should be noted that the acquisitions are only suggested fields, as different fields might be required to satisfy the particular needs of the system.

## 3) Inversion

There are fields that require inversion to enable fast access. There is no fixed rule for this, and it is left for individual centres to decide on their own requirements for inversion. Nevertheless, the presence or absence of free text searching capability is an important factor in this respect, as its absence necessitates the inversion of all fields on which retrieval is required.

## 4) Data Entry

An operator may enter data in upper or lower case according to the rules of capitalization relevant to the language concerned. Moreover, appropriate accents have to be entered.

## 5) Fields

The fields that make up the record for CEHANET data base are listed in the Manual. The details of each field are given within the parts of the manual. These details are presented uniformly covering the following information:

- a. Definition: Definition of data field;
- b. Representation: The form in which the field is represented in the record. The form should always conform to the rules, norms, conventions and standards specified there to ensure uniformity and compatibility;
- c. Use: Here are mentioned the characteristics of the field as follows:

- 1) Mandatory or optional: mandatory means that the field must be entered if it is relevant to the document being processed, e.g., the serial title if the document is an article from that serial. Optional means that cataloguer is free to choose whether or not it is required for the centre. Consistency in choice is very important.

- 2) Repeatable or non-repeatable: a repeatable field is one that allows more than one element of equal weight to be entered. Each element will be treated separately. For example, the personal author field is repeatable because there might be more than one author, and a heading for each of them will be needed. Each heading is considered an occurrence of the field.
  - 3) Subfielded or elementary: a subfielded field is one that allows to treat the elements in the field either separately or together. For example, in the field for corporate author, the country code is in a separate subfield and it could therefore be used on its own as an element for sorting the records
  - 4) Maximum length: the maximum number of characters, including letters, numerals, spaces, punctuation marks and any other codes or symbols, that will fit in that particular field. Sometimes this maximum is dictated by the limitations of the computer system used. Moreover this will be affected by the limit of keyword length in the inverted file, or the thesaurus structure.
- d. Subfields: When the field is a subfielded one the subfields are given each having details given in the same manner as the field itself, namely:
- definition
  - representation
  - use
- e. Rules for entry: How the data is entered in this field, including cataloguing rules.
- f. Examples: To indicate how data is entered.
- g. Notes: Explanation of any ambiguity that might occur.

The Manual includes the field definition table which consists of the following columns:

- 1) Tag: a code which can be of numeric or alphanumeric characters that identifies the field. The tag chosen for this manual is a numeric three digit code for the field itself, with a single Roman letter added for each subfield when appropriate. But it has to be remembered that some systems do not accept this as it is, as some may require alphanumeric codes, while some require separate tag for each subfield. So, one has to be acquainted with the requirements and limitations of the system before creating the data base.

- 2) Name of field and subfields.
- 3) Repeatable or non-repeatable.
- 4) Mandatory or optional.
- 5) Suggested maximum length (in characters).
- 6) Notes.

#### 5.2.4 CEHANET Input Sheet

As previously mentioned, there is a need for a standardized form - an input sheet - to note down the elements of description. This input sheet need not include all the fields that are present in the data base for two reasons:

- a) The data required is automatically generated when the data in other fields is entered.
- b) Data will not be available and/or required at the time of data entry. Some of this data will be provided into the appropriate fields when exchanging data with other centres.

Moreover, upon gaining experience in cataloguing and indexing, there will be no need to fill out the input sheet completely; but may be used to enter data that was gathered prior to sitting down at the computer terminal, such as the correct form of corporate author or personal author name, the classification number, and the descriptors. While entering the bibliographic record on-line, the cataloguer will be guided by the screen worksheet's help messages defined for data base.

Based on the field definition table, the Manual provided a complete CEHANET worksheet. Other supplementary shorter worksheets can be created for specific purposes. As mentioned earlier, a complete CEHANET data base structure will be provided to national centres including the CEHANET field definition table, worksheets, field select table and print formats.

#### 5.2.5 Levels of Application of the Manual

Being aware that the sizes of CEHANET national centres are variant, the Manual made provisions for different levels of details to suit all cases. But these provisions were in the form of alternatives without stipulation as to what should be done. Consequently, this is to survey all such cases in the Manual so that each centre will take its decision concerning the interpretation to be adopted by CEHANET. This is essential for all of us as it guarantees uniformity and harmonization among CEHANET participants.

The Manual has been designed to be "Universal" and is able to serve not only collection management procedures in all types and sizes of libraries, but also to facilitate information exchange between and among computerized and manually operated systems. The flexibility it provides, guarantees ease of use, uniformity and standardization without deviation from normal standards of information exchange.

## 5.2.6 Options

### 5.2.6.1 Absolute Option

This is defined in the various fields at the field level. In this case, smaller centres, particularly those not adequately manned may not need to include them in their data bases. Among such fields are the following:

Among such fields are the following:

Field	021	Record completeness
	041	Language of summary
	201	Key title
	230	Other title
	330	Affiliation
	480	Monographic series statement
	600	Abstract

### 5.2.6.2 Conditional Option

This option has repeatedly occurred in the Manual, where the field will be absolutely optional or even unrequired if a prerequisite is nonexistent. The following are the cases for such option:

#### 1. Exchange

Field	011	Alternative record identifier
	020	Source of record
	030	Character set used
	213	Translated title - Arabic
	214	Translated title - English
	215	Translated title - French

There is a need here, regarding fields 213-215 to instruct the centres that are involved in exchange to which language the title should be translated as it is undesirable to leave this to subjective decisions among the centres. Since the three languages are used by CEHANET, it is recommended when possible to translate titles in languages in other than any of these languages into English since it is the most commonly used language in environmental health communication.

#### 2. Existence of other records in the Data Base

Field	013	Related record
	802	Number of copies
	803	Microform

#### 3. Entering data in one or more fields

This is the case for entering descriptors where the centre has the option to use one field, namely 620 = Primary Descriptors instead of using the other two fields:

- 621 Secondary Descriptors
- 622 Geographic Descriptors

Here, a decision is required to help centres in adopting a uniform indexing policy. Related to this is field 623 = Local Descriptors where indexers are instructed to include here what is required locally but has not been adopted in CEHANET policy on regional for the limitations of the Interwater Thesaurus, namely:

- a) Geographic descriptors at the sub-national level
- b) Names of bodies (mostly national and, or sub-national)
- c) Names of persons as subjects
- d) Names of projects

For the above mentioned cases it is recommended that field 622 as prescribed in the Manual is used by the national centres and 621 be merged as in field 620. Only the primary descriptors (from the Interwater Thesaurus) are included for the Regional Data Base. For a, b, c, and d above they constitute the major part of the local descriptors (623) and should be used on the national level. Proposed descriptors (624) should be included and communicated to CEHA if they fall in the primary descriptor's area.

### 5.2.6.3 Partial Option

This is the case where the field as a whole is mandatory while one or more of its subfields are optional. Such options are mostly not required for small centres. Of such fields the following may be mentioned:

Field 200 Title

- (b) statement of responsibility
- (l) language of title

Field 250 Title - 2nd level

- (b) statement of responsibility
- (l) language of title

Field 300 Personal Author

- (c) date

Field 310 Corporate Author

- (c) city

Field 320 Meeting

- (c) country

Field 350 Personal Author - 2nd level

- (c) date
- (d) role

Field 360 Corporate Author - 2nd level  
(c) city  
(e) role

Field 400 Publisher and Place  
(c) address  
(d) country

Field 440 Physical Description  
(c) dimensions  
(d) Accompanying material

The last subfield has two other options:

- a) The accompanying material may have its own record, or
- b) The accompanying material may be mentioned in the field 500 (Notes).

## 5.2.7 Application of CEHANET Procedures Manual

The tools should be adopted for proper applications. But there are cases on which some questions need to be answered so that the tools are universally interpreted.

### 5.2.7.1 Serial Accessioning

- a) Is accessioning for volumes or titles?
- b) Is accessioning for multiple or single copies?
- c) How it should be in each case?

The decision is left to the centres themselves as per their common practices.

### 5.2.7.2 Mixed and Shared Responsibility

If there is more than one author, how are they going to be entered?

- a) All?
- b) All up to a certain number?
- c) The first?

A computerized system would allow the use of as many authors as needed. It is recommended that upto three authors are entered in addition to editor(s), translator(s), adaptors(s) ... etc., if available. For documents that have more than three authors, it is recommended to enter the first and omit the others, with the ... [et al].

### 5.2.7.3 IRC Classification System

- a) For classifying the collection?
- b) For published lists?

- c) For both?
- d) What about other classification schemes already used in some centres?
- e) What about centres with no classification and require a general scheme?

For small centres specialized in water supply and sanitation, or who have a physically separated specialized collection in WS & S, the IRC Classification Scheme is recommended. For libraries with multidisciplinary collections and who use general classification schemes (DDC, LC, UDC, etc) it would be unwise to change to a specialized system like IRC Classification Scheme. It should be noted that a flexible general scheme can make use of the specialized nature of another scheme.

#### 5.2.7.4 Indexing and the Thesaurus

Is indexing going to be:

- a) In one language?
- b) In the language of the text?
- c) In one of the languages of the Network if in a different language?
- d) What about centres not using thesauri?
- e) What about centres already using a different thesaurus?
- f) What is CEHANET going to do with unindexed materials received from CEHANET centres?

These questions were answered taking into consideration that Interwater Thesaurus is the CEHANET tool for indexing and that CEHANET is a multilingual system.

Indexing will be in one of three languages either Arabic, English or French and that will depend on the language of the text. A document in Arabic will NOT be indexed in English, a French document will be indexed using French descriptors from the Interwater Thesaurus.

For centres who do not use Thesauri, it will be part of CEHANET mission to promote using the controlled vocabulary for information retrieval including the use of Interwater Thesaurus.

Centres who use different thesauri may develop their own to include the descriptors of the Interwater Thesaurus for their specialized WS & S library collection.

Unindexed documents received from CEHANET national centres will be indexed by CEHA and included in the Regional Data Base, although this is unlikely to happen because anything sent to CEHA from National Centres should have been indexed by the centre who sent it.

#### **5.2.7.5 Abstracting**

- a) Are we going to provide abstracts? comprehensively? selectively? How?
- b) What kind of abstracts? indicative? informative?
- c) In what language(s)?

At a later stage of its development, abstracting services will be provided by CEHANET. Each national centre will be responsible for preparing abstracts for the documents input from that centre.

It is recommended that informative abstracts should be included when that stage comes. The abstract supplied by the author / publisher should be utilized.

Abstracts should be prepared in the original language of the document if it is one of the languages of the network; otherwise it should be in one of them. No attempt should be made to translate abstracts, unless the original document is seen as most essential or most important

#### **5.2.7.6 Subject Category**

- a) Is the name of category in words or code? or both?
- b) If in words, do we need a controlled list?
- c) If a code, will it be IRC classification code? or what?

Subject categories used in the Interwater Thesaurus will be used. Using words is left to the Thesaurus which has a controlled vocabulary.

#### **5.2.7.7 Component Parts**

- a) Is the use of // acceptable, noting that it has been adopted by IFLA?
- b) Are we to mention the abbreviations (vol) and (no) or omit them? This option has been allowed by IFLA.
- c) Are we going to mention the dash (-) after the point (.) or omit it? This option has been allowed by IFLA.

The use of // is recommended in the component parts as it is an acceptable replacement of the "in" alternative. CEHANET will follow that in its printed indexes. "Vol." and "No." will also be used for component parts (articles). The use of dash (-) after the point (.) is also recommended. National centres will be free to use/not to use this option in their printed indexes.

#### **5.2.7.8 CEHANET Languages**

- a) Is it acceptable to have the three languages (Arabic, English and French) as the official CEHANET languages?
- b) Titles in other languages should be translated:
  - into Arabic?
  - into English?
  - into French?



- c) If not possibly translated, they should at least be transliterated:
  - into Arabic?
  - into English?
  - into French?
  - according to which standards?
- d) Will the names of persons (authors or biographies) be transliterated?

It has been agreed upon that the three official languages of CEHANET are Arabic, English and French. This has come as a reflection of the distribution of languages spoken in the Region. (Arab countries = Arabic/English/French; North African countries = Arabic/French, other countries in the Region = English). For countries whose official language(s) is not one of the three languages, it is recommended that they translate entries into English. But it should be noted here that English is the mostly used language for scientific communication in general and environmental health in particular.

No attempt will be made to translate titles from their original languages if they are in one of the three official languages. As mentioned earlier CEHA would be inclined to have translated titles into Arabic, French or English, if they are not in one of the official languages.

Transliteration will be considered at a later stage, no attempt will be made at least for the coming two years to do so. When a decision is taken on the transliteration, the international and regional standards will be applied.

For names of persons, it is planned that authority file will be established and maintained by CEHA, based on contributions from national centres. This file will include names of institutions at the first stage and then names of persons later on.

#### 5.2.7.9 CEHANET Coordinating Centre

- a) How will CEHANET Coordinator Centre receive data from the various participants?
  - copies of input sheets?
  - printouts?
  - machine-readable form?
  - in the last case who is going to bear the expenses?
  - how frequent dispatch should be?

CEHANET Coordinating Centre prefers receiving data from national centres with the following preference:

1. Machine-readable form using CDS/ISIS Export/Import facility on 5.25" or 3.5" diskettes.
2. Copies of input sheets which are adopted and used in CEHANET Procedures Manual.

3. Printouts of data bases (this is not recommended unless the centre uses a package which does not have interface facility with CDS/ISIS or MINISIS).

The national centres will bear the expense of supplying such data to CEHA. In the case of exchange of data on disks there will be no gain or loss as every national centre will send disks and receive others from CEHA on exchange basis. For postage cost, the WHO pouch service takes care of the cost of sending printed materials or input sheets from each EMR country.

Regularity of dispatch of data to CEHA is highly recommended, but a monthly dispatch is the preferred policy.

#### 5.2.7.10 The Authority File

- a) Do we need one:
  - for names of persons?
  - for names of institutions?
  - for names of places?
- b) Is it going to be centralized or decentralized?
- c) Is it going to be manual or computerized?
- d) Who is going to do what?
- e) How to collaborate with others outside CEHANET?
- f) How is it going to be utilized?

As has been shown in the Manual, authority files are most needed and are of priority at CEHANET. At the first stage CEHA will develop an authority file for Environmental Health Institutions in this Region. The work is underway and will be ready soon. The input to this file has been coming from the national centres and CEHANET users.

For names of persons, it is a second priority. The Regional Bibliography, the Regional Data Base and the Directory of Environmental Health Professionals are being used as a basis for initiating this authority file.

The authority files will be centralized at CEHA as far as the input, processing, integration and distribution are concerned. National centres will be able to get copies of these files in machine-readable or printed forms. This means that both computerized and manual files will be available at CEHA.

National centres, as part of their contribution to the Network, will be responsible for supplying entries from their respective institutions/countries for the authority file data base.

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## **Chapter Six**

### **Assessment of Needs for Environmental Health Information Resources and Services**

## Chapter Six: Assessment of Needs for Environmental Health Information Resources and Services

### 6.1 Introduction

The aim of studying users' needs is basically to know the clientele who will use the information service. An information system is designed to serve a user group. If we know that group we can serve it best. The user is the start and the end of an information system. Information systems and services which have not defined user groups are most likely to fail.

The user group of an information system can be the general public (public libraries and national libraries), academicians (university and college libraries) and specialized professionals who are serviced by specialized libraries and documentation centres. These professionals usually belong to a specific discipline (in our case environmental health in its broadest sense) and work for specialized agencies as practitioners, educationalists or researchers, some professionals work for non-specialized agencies, but still practice the profession. In chapter one we tried to list the types of CEHANET users i.e. potential environmental health information users and their places of work.

### 6.2 Information Needs, Wants, Demands, Requirements and Use

In studying the information needs of users, the user may know what he wants, but he is in no position to know what he needs, and that because he does not know what the system can offer to further his work. The concept of "NEEDS" is taken from psychology as man has various needs that he seeks to fulfill or achieve the state of satisfaction.

Line gave a concise distinction between these concepts in relation to information use. He said "need is what an individual ought to have; want is what an individual would like to have; demand is what an individual asks for and use is what an individual actually uses"(1). Information need usually results when the individual feels the uncertainty about his personal or work-related life. It is a condition in which certain information contributes to the achievement of a genuine or legitimate information purpose. One has an information need if he has a problem that he wants to resolve. Information needs can be of two types:

1. Applicable needs, which are concerned with finding answers to specific questions or problems;
2. Nutritional needs, which are concerned with maintaining the general competence of the individual.

Information need as far as CEHANET is concerned is defined as "The necessary (environmental health) information that coincides with the proper development of activities by an individual or a group (environmental health professional(s))". That individual or group lies within the user group of CEHANET as a specialized information system.

"Demand" is another term used in this perspective. It is the action taken by a library or information system user to acquire data, information or documents, from, or through the agency of, that library or information system. Related to information needs is the information seeking behavior which is any activity of an individual that is undertaken to identify a message that satisfies a perceived need. It is the manner in which a scientist or technologist conducts himself in relation to a given information environment.

### **6.3 Factors Affecting Information Needs**

Information needs come about as a result of interaction between various factors related to the personal characteristics of the information user and his external environment. These factors together influence the type of information need and the information seeking behavior. These factors can be divided into:

#### **6.3.1 Personal Factors**

- Age of scientist, older users need different information
- Subject specialization; science or technology
- Level of education
- Length of experience
- Language skills and other abilities
- Other personal factors including motivation, self-discipline and devotion
- Group affiliation, professional societies, research groups... etc.

#### **6.3.2 Work Environment**

- Type of organization: Information needs/types/sources of academic institutions are different from that of government agencies or regional/international organizations.
- Principal activity practiced in the organization: Teaching, research and development, technical advisory, consultation and practical work are activities practiced by different professionals. A professional would need different information (types, sources, forms) to do his work being a teacher or practitioner.
- Job title and supervision level: It is expected that managers need different information from practitioners.

### 6.3.3 Availability and Accessibility of Information and Resources

Accessibility, ease of use and availability are primary criteria for selection of an information source, even when the anticipated value is low. Availability of information affects the efficiency in selecting among various sources. When more information is available, and presumably accessible, users become more efficient in selecting information to satisfy their perceived needs. It should be noted here that accessibility includes both physical and mental, e.g., to access the material itself on the shelf must not be high and the library must be reachable; for mental accessibility, the catalogues and indexes of materials must be easy to use and free of any complex. To establish the link between availability and accessibility, it should be stated that if the information is available but not accessible it is more frustrating than not being available at all. The two factors together dictate the behavior of the user when he needs information. For CEHANET, it is assumed that information is available at national centres, what we need is to improve its accessibility through CEHANET system.

Awareness of library and information services is another factor linked with availability/accessibility. A professional has to be aware of the existence of a service before he/she approaches it with his/her information needs. It is the responsibility of the information system to improve awareness through user sensitization and education programmes.

### 6.3.4 Preference of Use of Information Sources

Different information sources serve different information needs. A practitioner in the field needs a manual to solve a problem or to operate an equipment. A researcher needs literature on new methods in his field of interest. An academician needs text books and reference materials to give lectures and to supervise students work. Information sources are of two broad types:

- Formal sources; printed and published materials such as books, journal articles, reference books, maps, etc.,
- Informal sources; meetings, lectures, conferences and seminars.

## 6.4 Application and Use of Information

A very important aspect of use studies is the application/use of information. What professionals do with the information provided to them. The same information can be used by different people to serve different needs, knowing the reasons behind a professional searching information may help in providing the right information (sources). Communication between the user and the system helps to bridge the gap between what is needed and what is available.

## 6.5 Satisfaction with Available Information Services

Information services are provided with the aim of satisfying information needs. If those needs are not satisfied then the system is a failure. Measuring failure or satisfaction is a process to help modifying strategies and techniques used to supply information. A method or an information service can be good at the point of time, but might not be so all the time. The feedback from the users is the reflection of the service whether that feedback carries positive or negative opinions. Positive stands encourage the way the system functions and reinforces it. Negative stands should make managers of the system think of improving the design, the services and the outputs.

A complete questionnaire is attached as Annex 4. That questionnaire covers all the aspects discussed above. Documentalists who want to conduct use surveys may use it or modify the parts necessary to meet their needs. The IRC within POETRI Project provided guidelines for conducting user survey and studying information needs.(2)

## 6.6 Techniques Used for Data Collection

Various techniques are applied to collect data from information users to study their information needs, sources, use/application and satisfaction.

Among the most well-known techniques are:

- a. Questionnaires. Heather and stone defined the questionnaire as "a structured schedule of questions which is either self-completed by the respondent or completed by an interviewer who reads out the questions and records the responses.", and added that the most common form of questionnaire is the postal questionnaire, although questionnaires may also be handed out to people to complete, for instance as they enter or leave a library.(3)
- b. Interviews. The interview is a form of questionnaires as shown in the definition of the questionnaire. It involves verbal interaction between the researcher/interviewer and the respondent(s). It can be face-to-face or through telephone conversation. Interviews are usually done to support other techniques.
- c. Observation. Observation, stated Mullings, "is a way of collecting data in a purposeful and systematic manner about the behavior of an individual or group of people at a specific time and place".(4)
- d. Records. Data can be collected from library records on various aspects of statistics and incidents. Examples of records are number of reference questions, on-line searches, lending, phone calls, etc.



- e. Critical Incidents Techniques. A method for data collection on specific aspects of information use such as recording the actions of all staff (or some) at a certain point of time during the day. This can be done by the researcher or by the respondent himself.

The selection of any of these techniques or a combination of two or more of them is usually dictated by the environment of the study. That environment includes the purpose of the study, the nature of the population to be studied, the resources available and the personal abilities of the researcher. It is always good to use more than one method at the same time to study the same problem.

Stone and Harris showed that choosing a technique often involves compromise as a number of different considerations have to be weighed in the balance. The technique chosen needs to meet the following requirements:(5)

- It must be suitable for studying the problems
- It must be within the available resources
- It must be within the competence of the staff who will be using it
- It must produce the kind of data needed.

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# **Chapter Seven**

**Collection Development in  
Environmental Health  
Libraries and Documentation Centres**

## **Chapter Seven:**

### **Collection Development in Environmental Health Libraries and Documentation Centres .**

#### **7.1 Introduction**

Acquisition is one of the technical services provided by libraries and documentation centres. It is the process of developing and updating the library stocks or the information centre according to specified needs. Collection development is another term being used as a synonym for acquisition. But in any case acquisition is the foundation of all library and information services, in that it ensures that the material for which there is a known demand or which is likely to be required at short notice is in the collection.

#### **7.2 Environmental Health Literature**

Environmental health as discussed in Chapter 1 is a multidisciplinary subject. Its users are dispersed in various specializations, professions and affiliations. They can be medical doctors, civil engineers, sanitary engineers, public health workers, etc... . The literature of environmental health is dispersed and libraries stocking such literature are of all types. As an example we see complete collections on water resources or pollution control, or sanitary engineering. Some libraries have only part of their collections in environmental health. Every library has its own characteristics as different user groups are being served. Before a librarian thinks of his library acquisitions, he should think of the purpose of the library, what users, what literature and how to arrange for a successful combination of information needs and information resources. In other words he should study the information needs of his user group.

#### **7.3 Need and Policy for Selecting and Acquiring Materials**

Although it may be difficult to anticipate specific needs, it is possible to gain a broad understanding of the kinds of demands that the library will be called upon to meet. An understanding of the nature and scope of the host organization and a study of its internal working documents such as work programmes, etc., should give an indication of the likely subject information needs of the staff members. The maintenance of records of unsatisfied needs and additional services required, and analysis of inquiries and requests for documents and information will provide a guide to selection and acquisition policy.

One should always remember that no library can be completely self-sufficient. The acquisition of material should always be done bearing in mind the possible alternatives. If you do not have the financial resources to buy everything you would wish to, it may always be possible for the item to be borrowed or consulted in another library may be through a network.

The purpose of an acquisition policy is to act as a guide for the selection of materials to be added to a collection. The following points should be clarified by the policy statement:-

Subject coverage	a listing of both the core and the fringe subject areas to be covered.
Country emphasis	if the library serves an international, regional or national clientele, then the focus of the collection will be accordingly.
Languages	the major language of the collection should be established, as well as any foreign language materials to be collected.
Dates and Editions	any limit as to the age of materials to be collected. Description of historical or archival collection if there is to be one.
Types of documents	a listing of the different types of materials to be collected, e.g. monographs, conference proceedings, periodicals, press clippings, etc.
Gifts and exchange	the same criteria should apply to the selection of gifts and exchanges as apply to purchased materials.

The acquisition policy is also linked to the nature of the reference work undertaken and the dissemination strategy, i.e., the production and circulation of certain types of publications.

Resource centres geared to a scientific clientele, for example, should endeavour to acquire the most up-to-date and exhaustive publications, some of them highly priced. On the other hand, documentation centres serving the public at large should be equipped to answer the same request several times by keeping stocks of inexpensive pamphlets for distribution.

In all cases, the best use of limited financial resources is to have more than one copy of an important basic work, which is constantly in use, rather than several more marginal and less basic works.

## 7.4 Acquisition of Books and Documents

There are four stages in the acquisition process: selection, ordering, accessioning and payment. To each of these stages corresponds certain operations and records. Their essential characteristic is that they are linked with each other and constitute an uninterrupted flow of reference points. Also, in the last phase, that of payment, the records of the library must be fully matched with those of the Accounts Department.

The procedures described below apply to a medium or large size documentation centre. Evidently they would have to be simplified for smaller libraries, still retaining the most essential records, including in the Acquisition Register.

### 7.4.1 Selection

#### 7.4.1.1 Criteria

Apart from the established criteria of accuracy, authority and good production, the decision as to whether to acquire a particular item depends on:-

- (a) how expensive is it?
- (b) does it fill a gap in the collection or is the subject already well covered by other works?
- (c) is the information more up-to-date, more comprehensive, or more helpfully presented than in any of the other works held?
- (d) how much of the text is applicable to the interests of the organization?
- (e) how often will it be consulted?
- (f) can it be readily borrowed or consulted elsewhere?
- (g) if it is likely to be in great demand, should multiple copies be bought?

If there is any doubt about the suitability of a book, it may be possible to obtain it on approval. When it is received, the specialist expertise of particular staff members may be sought as to its suitability. Normally the book may only be retained for a short period (2 weeks) and should be returned in good condition if it is decided not to add it to stock.

Alternatively if this procedure is impossible for geographic reasons especially in the EMR countries, the advice of large libraries in the country or the Region be sought. For this purpose it is useful to maintain an index of contacts, both individuals and libraries.

### 7.4.1.2 Selection Tools

For the establishment of a collection, information about what material exists in a certain subject field will be found in subject bibliographies and published library catalogues.

In Environmental Health field the following are examples of sources to be consulted:

1. List of Basic Publications on Community Water Supply and Sanitation: a Selected Bibliography and Glossary of Expressions. The Hague, IRC, 1987.
2. Community Water Supply and Sanitation: Publications and Documents.- Geneva: WHO, 1989.
3. Food Safety.- Geneva: WHO 1988.
4. Food Safety: an International Source List of Audiovisual Materials.- Geneva: WHO, 1987.

Annex III is a bibliography of bibliographies of environmental health. It includes lists of documents from various national/international agencies.

National bibliographies should always be consulted especially the parts concerned with engineering, public health and other allied subjects. International bibliographies and data bases should also be consulted in addition to other trade bibliographies.

Periodicals should be scanned carefully since the required information may appear in book notices, reviews, publishers advertisements, sections listing new publications received and announcements of forthcoming meetings.

- Publishing trade journals, e.g., Bookseller (UK) and Publishers Weekly (US).
- Publishers' catalogues and advance notices, e.g., Excerpta Medica, Academic Press, World Health Organization.
- Booksellers lists - some booksellers now provide an announcement for new publications, e.g., Blackwells, Elsevier, Pergamon.
- Library acquisition lists, e.g., IRC Accessions List, UNDP Acquisitions List, UNEP Accessions all include useful entries.

If the time available for scanning is rather limited, library acquisition lists which have a subject breakdown will prove to be the most useful and efficient means of selection.

### 7.4.2 Ordering

The essence of obtaining items quickly, cheaply and with a minimum of administrative procedure depends on identifying the correct source. Depending on the document format, libraries have to use different methods.

#### **7.4.2.1 Books**

Books published through normal book trade channels should be ordered from one supplier, rather than individual publishers. Some suppliers with international experience are:-

Kimptons Medical Backshop  
205 Great Portland Street  
London W1N 6LR/United Kingdom

Omnibus Book Centre  
25 East Street  
Farnham, Surrey Gu9 7SD/United Kingdom

Blackwell (B.H.) Booksellers Ltd  
50 Broad Street  
Oxford/United Kingdom

Key Book Service, Inc  
425 Asylum Street  
Bridgeport, Connecticut 06610  
United states of America

#### **7.4.2.2 United Nations Publications**

Priced books from the United Nations and its related agencies (WHO, UNESCO, FAO, etc.) can be ordered from UN sales agents. Less widely circulated UN materials and unpublished documents should be ordered from UN Publications in New York or Geneva, or direct from the sales departments of the individual subsidiaries:-

WHO (Geneva); UNESCO (Paris); UNDP (New York); UNEP (Addis Ababa), IRC (the Hague), CEPIS (Lima), FAO (Rome).

#### **7.4.2.3 Documents**

These items, usually mimeographed and often intended for in-house circulation only, are most easily obtained by getting as close to the source as possible. Materials published by non governmental organizations usually fall into this category and are often free-of-charge.

#### **7.4.2.4 Conference Papers**

Reports of meetings which are eventually published pose no particular acquisition problems. However, many conference proceedings, although of interest, do not reach the publication stage. When (staff) members attend meetings they should be encouraged to collect as many of the papers presented as possible, to be given to the library on their return. Particular authors of papers can also be contacted, although there may be some difficulty in tracing addresses. In addition to sending an official order form, it is both helpful and polite to attach a short covering note.

Local agents or suppliers should always be considered as sources of acquisitions. They have usually good contacts and bibliographic tools.

### **7.4.3 Ordering Procedure**

#### **7.4.3.1 Checking**

Once the initial selection for purchase has been made, each item is checked against the library catalogue and the orders file, to ensure that the item is not already in the collection or on order. Some computer packages especially integrated system do that automatically.

#### **7.4.3.2 Addresses**

A decision is then made to obtain the selected items direct from the publisher, or from a bookseller. Having decided, the appropriate addresses may be located; it is useful to build up a file of publishers' and organizations addresses for this purpose.

#### **7.4.3.3 Order Forms**

Each order is typed on a numbered order form (one form per item), stating author, title, edition, publisher, date of publication, ISBN number of copies required, data ordered and vendor. The following information should also be included: an indication of whether the item should be sent by sea or air mail and the source in which the item was mentioned. Different libraries use different forms and there is no one single method as most appropriate.

#### **7.4.3.4 Standing Orders**

A number of publishers encourage the placing of standing orders for their publications in a particular series. This is a useful procedure for reference books, for example, which are purchased every year. A separate file, in alphabetic order by the title of the work, should be kept for these records.

### **7.4.4 Accessioning**

#### **7.4.4.1 Unpacking**

As parcels of books arrive, the contents are checked against the invoice (either enclosed or sent separately) to ensure that the current items have been sent and that nothing is missing. The documents are also checked to make sure that they are not faulty.

#### **7.4.4.2 Recording**

The arrival of each item is recorded in the following way:

- the date of arrival is entered.
- the date of arrival, invoice number, final cost, and in the column headed "remarks" any difficulty encountered in the acquisition process, are recorded in the right place of the file.



#### **7.4.4.3 Unsolicited Items**

Acquisition by unsolicited gift is common, but the librarian should always reserve the right to exclude any item not considered suitable.

An accessions card is completed for each item added to the collection, and this is interfiled usually in the alphabetic section of the orders file. The following information is recorded: date of receipt, author, title, date of publication, publisher and any other remarks. If the section on Acquisition in the CEHANET Data Base then what will be needed is to change the status of the record every time there is a transaction on the item.

#### **7.4.5 Payment**

The organizational procedures are followed to settle the accounts. Careful should be taken concerning currency problems, and change of prices, etc.

### **7.5 Acquisition of Periodicals**

In a small library, with limited staff, the number of periodical subscriptions should be kept to a maximum of 25-35 since periodicals are extremely time-consuming to deal with and usually quite expensive. In fact recent studies on information retrieval show that 66% to 70% of the relevant information on any subject is to be found in approximately 30 "core" periodicals(1). They require very accurate procedures to ensure the adequate control of their receipt and handling, but with careful thought it is possible for one record to serve a number of purposes. Whatever system is used it must be capable of expansion and alteration, since periodicals are among the most changeable of items and alterations in titles, frequency etc. are very common.

#### **7.5.1 Selection**

The factors governing selection of periodicals depend upon:

##### **7.5.1.1 The Financial Resources of the Library**

While some periodicals are very expensive, there are some important journals containing useful information which are available free-of-charge.

##### **7.5.1.2 The Scope of the Library**

The periodicals collection should reflect the subject coverage of the rest of the library, having at least one major periodical covering each core subject.

### **7.5.1.3 Demands of Readers**

When a staff member suggests a new periodical for subscription, it is advisable to obtain a sample copy from the publisher before making a final decision. It will be possible to have full and accurate publication details about the periodical (including the price) as well as being able to judge the value of its contents.

### **7.5.1.4 Availability of Periodicals Elsewhere**

It is always useful to keep lists of periodicals holdings of other libraries to which you have access. If there is any doubt about subscribing to a periodical which may not be heavily utilized, it is possible to consider the feasibility of borrowing particular issues of the periodicals as they are required or obtaining photocopies of relevant articles. Union list of environmental health periodicals available in some CEHANET national centre is a useful tool for this.

## **7.5.2 Ordering**

### **7.5.2.1 Sources**

Once it has been decided to make a subscription, it must be decided whether to use a regular bookseller/agent, or to subscribe direct. In a small library, with a limited number of periodicals, direct purchase from the publisher may be the easiest procedure. Agents are only able to handle regularly published, priced, periodicals not journals which are available free from some non-governmental organizations.

Journals may often be obtained on an exchange basis, by offering to regularly send copies of the newsletter or periodical produced by your own organization.

### **7.5.2.2 Procedure**

Since periodical transactions are carried out over a number of years, and the correspondence concerning each title may be considerable, it is advisable to keep a separate series of order forms. These may be kept in alphabetical order of the title of the journal, and subsequent correspondence attached to them.

Each order is typed in duplicate - one copy sent to the publisher or agent, and one copy to be retained. The information on the order should include: the title of the journal, ISSN, publisher's name and address, frequency, price and number of copies required.

Most overseas journals are sent by sea-mail, but should early receipt be essential it is usually possible to have them sent by air mail at extra cost.

One may wish to align all the periodical subscriptions, so that each journal is paid, for example, on a January to December basis. This has the benefit of allowing all renewals to be dealt with at the same time.

### **7.5.3 Accessioning**

When issues begin arriving, a periodicals record card is made for each individual periodical title. These are kept in alphabetical order of the title, either in a periodicals register, or filed loosely in a box, or using a computer data base designed for the purpose.

The periodicals record card (manual or electronic) is dual purpose. The essential information to be recorded on the front of the card is: the title, frequency, location, the volume number and part number of each issue received, and the date it was received on.

On the back of the card may be recorded all the details concerning ordering, payment and binding.

As each issue is received it is marked in on the card. Issues not received should be claimed promptly, since the publisher's stock may soon be exhausted.

### **7.5.4 Payment**

The procedures for paying for periodicals is essentially the same as for books and documents and in accordance with the organizations's procedures.

The time of renewal of a periodical subscription, however, provides a good opportunity to review its usefulness and consider whether it still deserves a place in the collection.

## **7.6 Evaluation of Collection and Weeding**

It is very important to evaluate the library collection on a regular basis. Updating the collection involves not only adding to it, but also withdrawing or weeding what is not being used or not usable.

Various methods are being used to evaluate the collection and to take the weeding process decisions. Statistical methods are the most frequently used for such purpose. Statistical data can be collected through observation of use of certain materials, but the right method is to keep records of use, especially for journals, annual books and expensive and updatable reference materials. Taking the opinions of professionals into consideration is very important in the evaluation process. Computer based lending system can provide automatic and frequent monitoring of use of library materials.

## 7.7 Criteria for Selection of Materials for CEHANET Data Base

CEHANET data base comprise mainly of bibliographic data on relevant documents available at CEHA Documentation Unit and the bibliographic data provided or collected by the NFAs and NCCs.

Participation and input of National Centres are of major importance to the development of the Regional Data Base. As stated earlier, national centres (NFAs and NCCs) are responsible for collecting data on national scale and make it ready for incorporation in the Regional Data Base. Incorporation or addition of materials in the data base should be done in a rational way. To do this selection there should be criteria for selection. The "Criteria for Selection of Materials for CEHANET Data Base"(3) puts the boundaries and lines regarding what should and what should not be included. The Criteria defines the subject coverage of the document to be included, its form, date, language and geographic coverage.

### REFERENCES

1. Gorman, G.E.; Howes, B.R.  
Collection development for libraries. London: Bowken-Saur, 1989
2. Evans, G.E.  
Developing library and information centre collections. Littleton, libraries unlimited, 1987
3. Criteria for selection of materials for CEHANET Data Base.  
Amman: CEHA, 1989.

## **Chapter Eight**

### **Bibliographic Services and Information Systems in Environmental Health**

## Chapter Eight: Bibliographic Services and Information Systems in Environmental Health

### 8.1 Introduction

It was shown in chapter one that environmental health is a multidisciplinary subject and as an activity is practiced by various types of institutions whether according to their affiliation (government, non-government, private or regional/international) or according to the type of activity practiced (education, research, application, surveying ...etc.). In each country a number of ministries handle environmental health issues from different angles. Ministry of health, Ministry of Environment, Ministry of Planning ...etc. in addition to Universities provide education and training in environmental health.

Other agencies concerned are those who look at environmental health as public concern. They are interested in environmental health issues, but are not specialists. Each group or staff working for any of these institutions are served by an information unit or a library system. Interaction and exchange of services occur as professionals go to other institutions or colleagues to access information. This chapter aims to draw a sketch of what information systems available for the environmental health professional at any institution.

### 8.2 National Information Systems

#### 8.2.1 National Science and Technology Information System

Such systems encompass all services involved in the provision of information for all sectors of the community and for all categories of users which implies that national, state or local governments should maximize the availability of all relevant information through these services. These systems are general in nature of information that they collect, process and disseminate. They do not put emphasis on a certain aspect, environmental health will be just one of the disciplines covered by the service.

An example of this type is the Jordan National Information System which has two subsystems: Social and Economic Information System and Scientific and Technical Information System (based at the Royal Scientific Society). Other national systems are concerned only with scientific, technical and technological information. An example of this type is the National Documentation Centre in Khartoum, Sudan and the Syrian National Information System of the Syrian Institute of Scientific Research. Other types of information systems are concerned only with supply of scientific information (no research) like Pakistan Scientific and Technological Information Centre. In these systems environmental health is one of the major sectors served. Services from such centers can be accessed through their bibliographic and non-bibliographic services and publications,

search of data bases, current awareness bulletins and selective dissemination of information services and production of bibliographies.

### **8.2.2 National Water (Related) Information Systems**

A more specialized environmental health information systems are those affiliated to research centres specialized in one or more aspects of environmental health. An example of this type is the Pakistan Council for Research in water Resources in Islamabad which has its national information network (National Documentation Centre, Library and Information Network for Water Resources) which includes in its membership over 10 libraries and documentation centres. Another example of this is the Kuwait Water Resources Development Centre which is concerned with the whole country.

### **8.2.3 Special Libraries of Environmental Health Agencies**

An important type of national systems serving environmental health information are libraries and documentation services affiliated to national institutions working in the field. Each institution has its own library system or specialized collection to serve staff members and researchers there. Such systems usually limit themselves to what is needed by the staff of the institution and library collection development is done based on this assumption. Information services at these centres vary according to needs, facilities and resources available.

### **8.2.4 Academic Libraries**

A fourth type of information systems available nationally for environmental health professionals are university libraries. Although such libraries include more general collections, but environmental health documents can be found also. University libraries are supposed to serve all the university community including staff members and students of environmental engineering and public health engineering departments.

### **8.2.5 National and Public Libraries**

These libraries are for use by researchers and general public. National libraries deposit documents published in the country or about the country. They most likely stock environmental health documents especially if published in the country. National archives and documents centres are also a good sources of information of unpublished literature. Public libraries stock all types of documents of general nature. Those might be useful for the general public to create awareness and to disseminate public information.

The major problem facing environmental health information users is the lack of coordination and cooperation between national institutions as far as information services are concerned. Lack of interlibrary loans, union lists and national information networks limit accessibility and use of such libraries.

## 8.3 United Nations Information Systems

Probably with no exception all UN organizations have their own information systems and services, each information system is run by the concerned organization and its services are offered to all nations. To make use of such systems, the environmental health specialist should be aware of their existence, subject coverage and type of services offered.

### 8.3.1 World Health Organization

The work of WHO has been very significant in information supply for environmental health. During the last decade WHO acted as the Secretariat of the International Drinking Water Supply and Sanitation Decade which was designed to ensure access to safe water supply and hygienic waste disposal for all, with particular reference to the needs of developing countries. WHO in collaboration with the Institute of Civil Engineers published and updated the International Drinking Water Supply and Sanitation Decade Directory which includes administrative, technical and statistical data for each of the developing countries with sector policies and project finance available from the UN organizations, the major industrialized countries, development banks and some bilateral organizations. In addition to that WHO has published a number of documents on the Decade and other environmental health issues.

WHO has been supplying information services in Environmental Health areas from its documentation services from Headquarters which is represented by Environmental Health Unit. Services of this Unit include distribution of WHO publications in water supply and sanitation, provision of bibliographic data bases, reference services, current awareness services, training of documentation officers and has been active in strengthening information capabilities of water supply and sanitation libraries in developing countries.

In the Eastern Mediterranean Region, the library of EMRO supplies information and documents on water as part of its general medically oriented collection. CEHANET is the prime WHO environmental health information system to supply information in this Region.

In the American Region, The Pan-American Centre for Sanitary Engineering and Environmental Sciences (CEPIS) has its information network: Pan American Network for Information and Documentation in Sanitary Engineering and Environmental Sciences (REPIDISCA), Lima, Peru. REPIDISCA coordinates a decentralized information network of national collaborating centres for collecting and providing information on water supply, public health and sanitation with computerized data bases, in addition to journals.

The WHO Western Pacific Regional Centre for the Promotion of Environmental Planning and Applied Studies (PEPAS) Regional Information Exchange Programme is acting as a referral centre through its Focalized Network Information Programme (FNP). PEPAS is in the process of installing its computer systems and establishment



of bibliographic data bases with emphasis on water supply. CEHANET will be in a position to collaborate with PEPAS/FNP after formalizing the information exchange programmes at PEPAS.

WHO has designated a number of Collaborating centres and international references centres to act as referral and resource centres with special reference to developing countries. The International Reference Centre for Community Water Supply and Sanitation located in The Hague, Netherlands, is one such centre. It issues a monthly newsletter, a current awareness bulletin and a Directory of sources of Information and Documentation in Community Water Supply and sanitation. As part of its programme on Exchange and Transfer of Information (POETRI), the Centre supports establishment of libraries and supplies basic library influential in promoting information exchange in various countries in the world. The Centre has published some information tools including a Reference Manual for POETRI and the Interwater Thesaurus in three languages (English/French/Spanish). Another centre designated by WHO is The International Reference Centre for Waste Disposal located at the Swiss Federal Institute for Water Resources and Water Pollution Control in Switzerland. It has published a number of information tools such as the solid Wastes Thesaurus and literature review of groundwater pollution by on-site sanitation.

### **8.3.2 Other UN Environmental Health Information Systems**

A number of UN agencies have been involved in aspects of information exchange in environmental health, pollution, and other areas of interest. Among the most active and accessible are: UNEP: International referral system for resources of environmental information (INFOTERRA), global environmental monitoring system (GEMS), global resources information data bases (GRID), The UNEP industry and environment office, the International Registry of Potentially Toxic Chemicals (IRPTC), and the Regional Seas Programme; and UNESCO: Man and the Biosphere Information System. In addition, there are many other information systems which deal broadly with science and technology and development. Annex 3 lists UN Organizations Information Systems.

### **8.4 Commercial Environmental Health Information Systems**

A large number of vendors now offer their computerized data bases on international communication systems commercially, allowing access to their data files according to subjects and specialities. Libraries which have the necessary facilities (computer terminal, modem and telephone line) can access remote data bases at a cost and search thousands of files indexed and abstracted according to a specified technique used by the information supplier. As has been mentioned, environmental health is a multidisciplinary subject and this has resulted in its information being scattered between various data bases and files; it would require some effort to find which data base has the best coverage, has the most up-to-date environmental health information and is most cost-effective to search. One has to decide exactly which aspect of environmental health one is looking for (water, sanitation, water pollution, air

pollution, food safety, solid wastes, etc.). Nevertheless there are data bases which are more specialized in environmental health than others. Environmental health is covered with various levels of emphasis:

1. AQUALINE established in 1960 by U.S. Water Research Centre and includes now 125,000 records on water resources and supplies; water quality; monitoring and analysis of water and wastes; low-cost technology; water treatment; underground services and water use; sewage; industrial effluents; and effects on pollution.
2. AQUATIC SCIENCES AND FISHERIES ABSTRACTS established in 1978 by the U.S. National Oceanic and Atmospheric Administration. It includes 299,771 records on science, technology and management of marine and freshwater environments.
3. OCEANIC ABSTRACTS established in 1964 by the Cambridge Scientific Abstracts, U.S. It includes 201,620 records on oceanography, marine biology, marine pollution, ships and shipping, geology and geophysics, meteorology, and governmental and legal aspects of marine resources.
4. WATER RESOURCES ABSTRACTS established in 1968 by the U.S. Department of the Interior. It includes 217,510 records and covers a wide range of water resources topics including water resource economics, ground and surface water hydrology, metropolitan water resources planning and management, and water-related aspects of nuclear radiation and safety.
5. WATERNET established by the American Water Works Association in 1971. It includes 20,092 records, books and proceedings, journals, newsletters, standards, manuals, handbooks, and water quality standard test methods.
6. AQUACULTURE established in 1970 by the U.S. National Oceanic and Atmospheric Administration. It covers 1970-1984 and includes 10,340 records on marine, brackish and freshwater organisms.
7. ENVIROLINE established in 1971 by the R.R. Bowker, Inc. It includes 137,638 records on management technology, planning, law, political science, economics, geology, biology and chemistry as they relate to environmental issues. Water as a basic component of the environment is very well-covered in the data base.
8. ENVIRONMENTAL BIBLIOGRAPHY established in 1973 by the Environmental Studies Institute, Santa Barbara, CA, USA. It includes 371,540 records and covers the fields of general human ecology, atmospheric studies, energy, land resources, water resources, and nutrition and health.

9. NATIONAL ENVIRONMENTAL DATA REFERRAL SERVICE established by the U.S. Department of Commerce in 1983. Subjects covered include climatology and meteorology, ecology and pollution, geography, geophysics and geology, hydrology and limnology, oceanography, and data from remote sensing satellites.
10. POLLUTION ABSTRACTS established in 1970 by the Cambridge Scientific Abstracts. It includes 150,050 records on the following subjects: air pollution, environmental quality, noise pollution, pesticides, radiation, solid wastes, and water pollution.
11. CA SEARCH, produced by Chemical Abstracts Service. It includes 9,560,836 records since 1967.
12. CAB ABSTRACTS, produced by CAB International U.K. It includes 2,435,880 records since 1972.
13. COMPENDEX PLUS, produced by Engineering Information, Inc. U.S.A. It includes 2,520,437 records since 1970.
14. GEOBASE, produced by Geo Abstracts, U.K. It includes 343,983 records since 1980.
15. GEOREF, produced by American Geological Institute, U.S.A. It covers North American materials since 1735 and worldwide coverage since 1933, with a total of 1,532,943 records.
16. GEOARCHIVE, produced by Geosystems, U.K. It includes 630,300 records since 1974.

Annex 3 gives a number of useful addresses for commercial environmental health information systems.

## REFERENCES

1. UN  
Directory of United Nations Data Bases and Information Systems. New York; UN, 1985.
2. UN  
ACCIS guide to United Nations Information Sources on the Environment. New York; UN, 1988.
3. Hall, James and Marjoric Brown  
On-line bibliographic data bases. Detroit: Gale Research, (Various editions and updates).
4. Newsletters and News bulletins from venders:  
  
BRS Bulletin. Bibliographic Retrieval Services, 1200 Route 7, Latham, NY 12110. Monthly.  
  
Chronolog. DIALOG Information Services, Inc., 3460 Hillview Ave., Palo Alto, CA 94304. Monthly.  
  
Search Service News. System Development Corp., 2500 Colorado Ave., Santa Monica, CA 90406. Monthly.

# Annexes

**Annex 1:**

WORLD HEALTH ORGANIZATION  
EASTERN MEDITERRANEAN REGIONAL OFFICE (EMRO)  
CENTRE FOR ENVIRONMENTAL HEALTH ACTIVITIES (CEHA)  
ENVIRONMENTAL HEALTH REGIONAL NETWORK (CEHANET)

**Library and Information Services Questionnaire**

Q U E S T I O N N A I R E

Name of institution: .....

Mailing address : .....

.....

.....

Name of mother institution: .....

Is there a library/documentation unit? - Yes - No

Is there a full time librarian(s)/documentation officer(s)?  
- Yes How many? ..... - No

Physical size and facilities: Space .....  
Furniture .....  
Equipment .....

Size of collection: 1. Books ..... 2. Reports .....  
3. Bibliographies ..... 4. Maps .....  
5. Catalogues ..... 6. A/V Materials .....  
7. Journal Subscriptions .....

A. Arabic .....  
B. English .....  
C. French .....  
D. Others .....

8. Indexes and abstracts .....

Is the collection classified/catalogued? - Yes - No

Subject coverage of library collection .....

Availability of information technology:

1. Computer system .....  
2. Software package used .....  
3. Photocopier .....  
4. Microforms .....

## Annex 2:

### Bibliography of Bibliographies of Environmental Health Available at CEHA Library

- American Water Works Association (AWWA)  
Bibliographies on the water supply industry: data processing  
and automation in water systems. Denver: AWWA, 1983.- 10 p.
- Bibliographies on the water supply industry: emergency  
planning. Denver: AWWA, 1983.- 11 p.
- Bibliographies on the water supply industry: leak detection and  
unaccounted - for water. Denver: AWWA, 1983.- 6 p.
- Bahafzallah, A. A., et. al.  
Bibliography of earth sciences for the Kingdom of Saudi Arabia.  
Jeddah: King Abdulaziz University, 1989.- viii, 119 p.
- Baqain, Akram S.; ; Stoianova, Jordana T.  
Jordan agricultural documentation center: Jordan agricultural  
bibliography derived from AGRIS 1975 - 1985 , Vol. I. Amman:  
University of Jordan/ Faculty of Agriculture, 1985.- xxx, 89 p.
- The British Life Assurance Trust Centre for Health and Medical  
Education  
Food safety: an international source list of audiovisual  
material. Geneva: WHO, 1987.- 94 p.
- Burgers, Lizette; Boot, Marieke; Van Wijk Sijbesma, Christine  
Hygiene education in water supply and sanitation programmes:  
literature review with selected and annotated bibliography.  
The Hague: IRC, 1988.- xvi, 144 p.
- Chemonics  
Summary of environmental engineering reports and training  
manuals. s. l.: Chemonics, 1989.- v. p.
- Cointreau, Sandra Johnson, et. al.  
Recycling from municipal refuse: a state-of-the art review and  
annotated bibliography. Washington, D.C.: World Bank, 1984.-  
xiv, 214 p. UNDP Project Management Report Number 1.
- CRC Critical Reviews in Environmental Control  
New titles in biomedical sciences. Boca Raton: CRC, 1986.- 35 P.
- Egyptian National Scientific and Technical Information Network  
(ENSTINET)  
Egyptian science and technology abstracts, ESTA. Cairo: Egyptian  
National Scientific and Technical Information Network, 1990.-  
534 p. Sample Issue, March 1990.
- ENSTINET'S union list of periodicals 2nd ed.- Cairo: Egyptian  
National Scientific and Technical Network, 1989.- viii, 517 p.

## IRC

Participation and education in community water supply and sanitation programmes: a selected and annotated bibliography.- 2nd ed.- The Hague: IRC, 1979.- 238 p.

Slow sand filtration for community water supply in developing countries: a selected and annotated bibliography.- 2nd ed.- The Hague: IRC, 1977.- 50 p.

The environment of simple water supplies: a selected and annotated bibliography in support of public standpost water supplies. The Hague: IRC, 1983.- 144 p.

## Intermediate Technology (UK)

Books by post intermediate technology 1986-7. London: Intermediate Technology, 1986.- 46 P.

## Jenkins, Dale W.

Pathogens, parasites and predators of medically important thropods: annotated list and bibliography. Geneva: WHO, 1964.- 150 p. Supplement to Vol. 30 of the Bulletin of the World Health Organization.

## Kepinski, Alfred; Kepinski, Waldemar A. S.

Water supply and wastewater disposal, Vol. 1-8: International Almanac. Essen: Vulkan-Verlag, 1976.- v. p. Bilingual (English, German).

## KISR

Information guide to the literature and reference source in earth and environmental sciences. Kuwait: KISR, 1986.- 48 p.

## Martin, A. E.; Kaloyanova, F.; Maziarka, S.

Housing, the housing environment, and health: an annotated bibliography. Geneva: WHO, 1976.- iv, 113 p.

## Pineo, Charles S.

Appropriate technology for rural water supply and sanitation in El Salvador: a brief review and bibliography. Arlington: WASH, 1981.- i, 16 p.

## Royal Scientific Society

A list of periodical holdings, Nov. 1983: the library of Royal Scientific Society. Amman: Royal Scientific Society, 1983.- xii, 107 p.

Royal Scientific Society. Science and Technology Information Centre Library accession list. Amman: Royal Scientific Society, 1988.- v. p. Bilingual (Arabic, English).

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Appropriate technology for water supply and sanitation: low-cost technology options for sanitation, a-state-of-the-art review and annotated bibliography.- 3rd ed.- Washington, D.C.: World Bank, 1982.- 184 p.



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Environmental health management in natural disasters and other types of emergencies: a selected and annotated bibliography. Alexandria: WHO/EMRO, 1990.- 118 p.

US. EPA

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Waste minimization: hazardous and nonhazardous solid waste (1980 to present). 1987.

US. EPA. Office of Information Resources Management

Risk assessment, management, communication: A guide to selected sources.- 3rd.- Washington, D.C.: EPA, 1987.- v, 21 P.

Wesley, Cecile

Survey of data bases in science and technology with special reference to environment, water and desertification in Western Sudan. Khartoum: National Documentation Centre, 1986.- 37 p.

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National register of current research (1982/1983). Khartoum: National Documentation Centre, 1984.- xxii, 530 p.

National register of current research: supplement 1983-1985. Khartoum: National Documentation Centre, 1985.- vii, 273 p.

National register of current research: 1985 - 1988. Khartoum: National Documentation Centre, 1989.

Sudan science abstracts, Volume 2. Khartoum: National Documentation Centre, 1982.- v. 133 p.

Sudan Science Abstracts, Volume 3. Khartoum: National Documentation Centre, 1985.- vii, 161 p.

Sudan science abstracts, Volume 4.- 2nd ed.- Khartoum: National Documentation Centre, 1986.- viii, 245 p.

Sudan science abstracts, Volume 5.- 2nd ed.- Khartoum: National Documentation Centre, 1987.- viii, 237 p.

WHO

List of serials in the World Health Organization library, 1985. Geneva: WHO, 1985.- vii, 445 p.

List of serials ordered by the WHO office of library and health literature services for various WHO activities, July 1984. Geneva: WHO, 1984.- 318 p.

WHO programme for the promotion of environmental health: Bibliography of selected publications and documents. Geneva: WHO, 1990.- 119 p.

WHO; UNDP

List of basic publication on community water supply and sanitation: a selected bibliography and glossary of expressions.- 2nd ed.- The Hague: IRC, 1987.- vi, 63 p.

WHO. EMRO

A list of WHO/EMRO library periodical holdings.- 2nd ed.- Alexandria: WHO/EMRO, 1985.- 35 p.

Index medicus for WHO Eastern Mediterranean Region (IMEMR), first communication: 1981 - 1982 (two years). Alexandria: WHO/EMRO, 1987.- v. 869 p.

List of acquisitions and catalogue in book form. Alexandria: WHO/EMRO, 1987.- v, 115 p.

WHO/EMRO Library: list of acquisitions and catalogue in book form - first Cumulative Issue, June 1987 - April, 1988. Alexandria: WHO/EMRO, 1989.- V.P. Incorporates Temporary Issue No. 1, 1987.

WHO. EMRO. CEHA

Audiovisual material available at CEHA library. Amman: WHO/EMRO/CEHA, 1990.- 38 p.

Environmental health regional bibliography: Volume 1. Amman: WHO/EMRO/CEHA, 1989.- x, 254 p. (CEHANET Document No. 1)

Environmental health regional bibliography: Volume 2. Amman: WHO/EMRO/CEHA, 1990.- vi, 239 p. (CEHANET Document No. 5)

Environmental health regional bibliography: Volume 3. Amman: WHO/EMRO/CEHA, 1991.- vi, 210+63 p. (CEHANET Document No. 7).- In English and Arabic.

WHO. WPRO. PEPAS

List of environmental and health legislation and related material available at PEPAS library. Kuala Lumpur: WHO/WPRO/PEPAS, 1988.- 9 p.

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Rural water supply and sanitation in less-developed countries: a selected annotated bibliography.- 2nd ed.- Ottawa: IDRC, 1974.- 81 p.

### Annex 3:

#### Useful Addresses for Environmental Health Information Systems

1. UNITED NATIONS ORGANIZATIONS' ENVIRONMENTAL HEALTH INFORMATION SYSTEMS
  - Office of the Environment Programme  
International Referral System for Resources of Environmental Information (INFOTERRA)  
P.O. Box 30552  
Nairobi  
Kenya  
Cable UNITERRA NAIROBI  
Telex 22068 UNEP KE; 22173 UNEP KE
  - Global Environment Monitoring Systems (GEMS)  
P.O. Box 30552  
Nairobi  
Kenya  
Cable UNITERRA NAIROBI  
Telex 22068 UNEP KE; 22173 UNEP KE
  - International Registry of Potentially Toxic Chemicals (IRPTC)  
P.O. Box 30552  
Nairobi  
Kenya  
Cable UNITERRA NAIROBI  
Telex 22068 UNEP KE; 22173 UNEP KE
  - Industry and Environment Data Base  
P.O. Box 30552  
Nairobi  
Kenya  
Cable UNITERRA NAIROBI  
Telex 22068 UNEP KE; 22173 UNEP KE
  - Global Resources Information Data Base (GRID)  
P.O. Box 30552  
Nairobi  
Kenya  
Cable UNITERRA NAIROBI  
Telex 22068 UNEP KE; 22173 UNEP KE
  - Regional Seas Programme  
P.O. Box 30552  
Nairobi  
Kenya  
Cable UNITERRA NAIROBI  
Telex 22068 UNEP KE; 22173 UNEP KE
  - Man and the Biosphere Information System  
UNESCO  
7, Place de Fontenoy  
F-75700 Paris  
France

- Food and Agriculture Organization of the United Nations (FAO)  
Via delle Terme di Caracalla  
00100 Rome  
Italy
  - United Nations Centre for Regional Development  
Marunouchi 2-4-7  
Naka-Ku  
Nagoya 460  
Japan
2. INFORMATION SYSTEMS WITHIN WHO
- International Water and Sanitation Centre  
P.O. Box 93190  
2509 AD The Hague  
The Netherlands
  - Pan America Network for Information and Documentation in  
Sanitary Engineering and Environmental Sciences (REPIDISCA)  
CEPIS  
Casilla 4337 Lima 100  
Los Pinos 259  
Urbanization Camacho  
Lima 3  
Peru
  - International Reference Centre for Waste Disposal  
Ueberlandstrasse 123  
CH-8600 Duebendorf  
Switzerland
3. COMMERCIAL DATA BASES
- (Can be accessed through the following online information  
retrieval services)
- DIALOG Information Services, Inc.  
3460 Hillview Avenue  
Palo Alto, CA 94304  
USA
  - European Space Agency Information Retrieval Service  
(ESRIN)  
Cp 64  
Via Galilco Galilei  
1-00044-Frascati Rome  
Italy
  - BRS Information Technologies  
1200 Route 7  
Latham  
New York 12110  
USA
  - ORBIT Search Services  
3000 West Park Drive  
McLean, VA 22102  
USA

Annex 4:

Questionnaire for the Study of User Needs

1. Could you tell me your age group, please, tick one.

- Less than 25
- 31 - 35
- 41 - 45
- 51 - 55
- 61 or more
- 26 - 30
- 36 - 40
- 46 - 50
- 56 - 60

2. What type of organization do you work for?

- Governmental
- Regional or International
- Other (specify please) .....
- Semi-governmental
- Private

3. What is the principal activity practiced in this organization?

- Education
- Education and Research
- Industry
- Municipal services
- Others (specify please) .....
- Research
- Water distribution
- Consultancy

4. Could you tell me about your HIGHEST professional or academic qualification?

<u>Degree and Subject</u>	<u>Date</u>	<u>Country</u>
B.Sc.....	.....	.....
M.Sc.....	.....	.....
Diploma.....	.....	.....
Ph.D.....	.....	.....

5. How long have you been working in this organization?

- Less than 2 years
- 5 - 7 years
- 11 or more
- 2 - 4 years
- 8 - 10 years
- .....

6. Did you have any work experience before joining this organization?

- Yes
- No
- .....

7. If the answer to question 6 is "yes", where was that?

.....  
From 19.... to 19.....

8. If the answer to question 6 is "yes", was it the same type of work?

- Yes - No .....

9. If the answer to question 8 is "no", what type of work did you have?

.....  
.....  
.....

10. What is your exact job title in the organization you work for?

.....  
.....

11. Are there any environmental health professionals working under your supervision?

- Yes - No .....

12. If the answer to question 11 is "yes", how many of them?

- Less than 2 persons - 2 - 4 persons  
- 5 - 7 persons - 8 - 10 persons  
- 11 - 13 persons - 14 or more

3. In percentages can you indicate which of the following activities take up most of your time?

	33%	66%	100%
Management/administration	-	-	-
Research and development	-	-	-
Teaching	-	-	-
Engineering (production, design, testing, quality control, etc.)	-	-	-
Water survey	-	-	-
Report writing	-	-	-
Consultation (technical services to help others in their work)	-	-	-
Laboratory work and experimentation	-	-	-
Others (specify please)	-	-	-
.....			

14. Are you a member of any scientific or professional society?

- Yes - No .....

15. If the answer to question 14 is "Yes", could you list it (them) please?

- 1.
- 2.
- 3.
- 4.
- 5.

16. Do you think membership in such societies proves to be useful to you?

- Yes
- No
- .....

17. How?

.....  
.....  
.....  
.....

18. What are the languages that you can read, write and/or benefit from the literature written in them?

- Arabic
- English
- French
- German
- Russian
- Others (specify please)

19. If you come across a reference which appears to be relevant in a foreign language you do not understand, do you:

- Ignore it?
- Try to obtain an Arabic summary?
- Try to obtain an English summary?
- Try to obtain a French summary?
- Ask someone to clarify what it's all about?
- Try to obtain a full translation?
- Other methods (specify please)

20. Have you ever required translation of foreign language information?

- Yes
- No
- .....

21. If the answer to question 20 is "yes", what language(s)?

- English
- French
- German
- Russian
- Others (specify please)

22. Do you find any obstacles in keeping up with advances in your field in foreign countries?

- Yes
- No
- .....

23. If the answer to question 22 is "yes", what kind of obstacles are they?

- Language problems
- Acquisition policies in your organization
- Lack of time
- The management does not encourage
- Others (specify please)

24. How many periodicals do you consult on a regular basis?

- None - 1 - 3
- 4 - 6 - 7 - 9
- 10 - 12 - 13 or more

25. What are the most important five journals in your specialization from your point of view?

- 1.
- 2.
- 3.
- 4.
- 5.

26. What are the important five abstracts or indexes journals in your specialization from your point of view?

- 1.
- 2.
- 3.
- 4.
- 5.

27. How well do you feel you are able to keep with advances in your field?

- Very little - A little
- Moderately - To a good extent
- A great deal .....

28. How do you become aware of sources of information in your field(s) of interest?

- Through conversations with colleagues at work
- During meetings, conferences, forums, etc.,
- By regularly pursuing the major publications in the field
- By consulting indexing and abstracting journals
- By consulting the library acquisitions lists
- By consulting the library catalogues
- By consulting references given in pertinent books or articles
- From book reviews and publishers, announcements
- By consulting bibliographies
- Using the library's Current Awareness Bullettins
- By using other libraries outside the organization
- By the selective dissemination Services offered by the library
- By searching library shelves
- Others (specify please)



29. Please, in order of importance to you, rank the 4 most important sources of information in calling to your attention to the current developments in certain fields?

1. The most important:
2. The 2nd most important:
3. The 3rd most important:
4. The 4th most important:

- a. Listening to paper at meetings and conferences
- b. Scanning abstracts of meetings
- c. Periodical abstracts
- d. Reports from students you supervise
- e. Reports from your assistants
- f. Own scanning of journal contents
- g. Conversations with colleagues in your organization
- h. Conversations with environmental health engineers elsewhere
- i. Correspondence and preprints from authors
- j. References in reading on other subjects
- k. Presentations at seminars

30. Where do you do most of your technical reading?

- In office
- In laboratory
- In the organization's library
- At home
- In a library outside the organization
- While travelling
- Others (please specify)

31. Do you attend any technical or scientific conferences, meetings, symposia, etc.,

- Yes
- No

32. Do you attempt to keep in touch with colleagues in other organizations?

- Yes
- No

33. If the answer to question 32 is "yes", how do you keep in touch with them?

- By social contact, e.g., visits, telephone
- Exchange of draft papers or off-prints
- Correspondence
- Conferences, meetings, etc.,
- Committees and working groups
- Others (specify please)

34. Do you face cases when you find a personal contact (formal or informal) to be better and more convenient than a written information source?

- Yes
- No

35. If the answer of question 34 is "yes", please indicate your reasons?

- In conversation I can focus only on relevant topics
- In conversation I can interact freely
- I prefer the colloquial language in my conversations
- I can ask for visual demonstration
- I can ask lately for references or material on the subject
- I can raise new issues and questions related to my work
- Others (specify please)

36. Please rate the value of conferences, meetings, symposia, etc., to you as means of obtaining information pertinent to your work?

- |               |          |
|---------------|----------|
| - Very useful | - Useful |
| - Limited use | - No use |
| - Don't know  |          |

37. Indicate ways in which attending conferences and meetings of professional societies has been useful to you by providing you with:

The scale: Not useful 1 2 3 4 5 Very useful

- Answer to specific questions that arise in the course of work
- A knowledge of what work is being carried on, where, by whom
- Scientific knowledge I might otherwise not have learned early enough
- An opportunity to inform others of my work
- An opportunity to secure useful criticisms of my work
- An opportunity for discussions of broader scientific topics
- New contacts with environmental health professionals which can later be followed up through correspondence, or in other ways
- Any other way (specify please)  
.....

38. In what discipline, other than your own, do you have most contact with a professional?

None  
Or: .....

39. Is there a library in the organization you work for?

- |       |      |       |
|-------|------|-------|
| - Yes | - No | ..... |
|-------|------|-------|

40. If the answer to question 39 is "yes", do you use this library?

- |                     |                      |
|---------------------|----------------------|
| - Never             | - Once a week        |
| - Twice a week      | - Three times a week |
| - Four times a week | - Five times a week  |
| - Daily             | .....                |

41. Do you use the library for the purpose of?

- Current awareness and to keep up-to-date
- To find specific information
- To read the newspaper
- To meet other colleagues
- Other (specify please)

42. If you don't use the library in your organization, is that because?

- Its physical location is inconvenient
- Incomplete and poor collection
- Too time consuming
- Poor previous experience
- I access the journals I need through subscription and buying them
- Other (specify please)

43. Does the library of your organization produce:

- Current awareness bulletin?
- Special bibliographies?
- New acquisitions lists?
- Library newsletter?
- Library guides?
- Other (specify please)
- Don't know

44. Which of the services listed below have you made use of?  
Please indicate the value that corresponds with your usage from the scale

Always = 5                      Frequently = 4                      Sometimes = 3  
Rarely = 2                      Never = 1

<u>Value</u>	<u>Service</u>
-	Quick reference service (numerical data, trade name, title, author, etc.,
-	Loans and photocopies supplied to you
-	Brief literature search on request, (e.g., selection of references of literature on certain topic(s))
-	Comprehensive literature search on request (e.g., list of the whole available literature on certain topic(s))
-	Critical survey of the literature searched on your request in which attention is paid to the value of the reported results
-	Continuous scanning of the literature on subject requested by you
-	Translation of foreign language material
-	Abstracting articles specified by you
-	Editorial assistance, proofreading, diagrams, etc.,
-	Guidance by the library staff when you are searching the literature
-	Other (specify please)

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-	-	-	-	-	Meetings with professionals outside the organization in conferences etc.,
-	-	-	-	-	The organization's library publications, eg., Current Awareness Bulletins, bibliographies, acquisition lists
-	-	-	-	-	Raw materials (samples, core, etc.)

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55. Do you keep any personal information file?

- Yes
- No
- .....

56. If the answer to question 55 is "yes", what do you keep?

- Journal articles
- Trade literature (catalogues)
- Reports (you wrote)
- The organization's reports
- Cuttings
- Other (specify please)

57. The last time you needed job-related information what was the first source you went to in order to obtain this information?

- Received with task assignment
- Colleague in the organization
- Information specialist (librarian)
- Library
- Own files and notes
- Supervisor or team leader
- Other (specify please)

58. What was the principal reason that you used this first source?

- Received with task assignment
- Most authoritative
- The only known source to me
- Previously found helpful
- Recalled that specific information was available in this source
- It saves time and effort to use it
- It is the cheapest I know
- Other (specify please)

59. What do you do if you have a problem in your work?

- Try to solve it myself
- Inform my supervisor
- Try to contact somebody who knows the field in which the problem occurred
- Study the relevant literature
- Other (specify please)

60. Could you estimate the time you spend per week on searching and reading literature related to your work? and/or to keep up-to-date in your specialization?

- Less than 3 hours/week
- Between 3 to 6 hours/week
- Between 7 to 10 hours/week
- Between 11 to 14 hours/week
- More than 14 hours/week

61. The last time you needed information related to your job, what did you use it for?

- To define a problem or hypothesis
- To build a background about a problem
- Preparing for teaching purposes
- To find a solution for a technical problem
- To find a solution for an administrative problem
- To estimate the cost of a project
- To find out about legal regulations related to on-going project
- To find literature about a specific field
- To keep abreast on related field(s) of specialization
- To find out whether anybody or organization has done anything similar to what I am doing
- Other (specify please)

62. In what form do you prefer to receive information?

- |                                  |                                    |
|----------------------------------|------------------------------------|
| - Book format                    | - Journal                          |
| - Reproduced loose pages (Xerox) | - Microformats (film, fiche, card) |
| - Computer print-out             | - Verbal                           |
| - Letter, memo, note             | - Other (specify please)           |

63. Have you ever been instructed on the availability and use of bibliographical sources such as abstracts, indexes, bibliographies, etc.,?

- Yes                      - No                      .....

64. If the answer to question 63 is "yes, at what stage did you receive this instruction?

- During undergraduate education
- During post-graduate education
- When I took the job in the organization
- Other (specify please)
- I can't remember

65. If the answer to question 63 is "no", do you think that some instruction would have helped in your information finding activities?

- Yes                      - No                      - Don't know                      .....

66. Have you, after graduation, felt the need to improve your skill in the use of information sources and literature?

- Yes                      - No                      - Don't know                      .....

67. If the answer to question 66 is "yes", what did you do to improve your skill

- Nothing
- Asked the librarian
- Asked a colleague for some help
- Read the instructions on how to use certain sources
- Other (specify please)

## Annex 5:

### List of Abbreviations

ALDOC	Arab League Documentation Centre
ALECSO	Arab League Educational, Cultural & Scientific Organization
ALO	Arab Labor Organization
ALU	Arithmetic Logic Unit
ASMO	Arab Standards & Metrology Organization
CCF	UNESCO Common Communication Format
CD-ROM	Compact Disk - Read Only Memory
CEHA	WHO Regional Centre for Environmental Health Activities
CEHANET	CEHA Environmental Health Regional Information Network
CEPIS	Pan American Centre for Sanitary Engineering and Environmental Sciences
CPU	Central Processing Unit
CDS\ISIS	UNESCO Computerized Documentation Services/Integrated Set of Information Systems
DBMS	Data Base Management System
EEPROM	Electrically Erasable Programmable Read Only Memory
EMR	WHO Eastern Mediterranean Region
EMRO	WHO Eastern Mediterranean Regional Office
EPROM	Electrically Programmable Read Only Memory
ESCWA	Economic & Social Council for West Asia
FAO	Food & Agriculture Organization
IC	Integrated Circuit
IDWSSD	International Decade for Water Supply and Sanitation
IFLA	International Federation of Library Associations and Institution
ILO	International Labor Organization
ISBN	International Standard Book Number
ISSN	International Standard Serial Number
IRC	International Water and Sanitation Centre, The Hague
ISESCO	Islamic Summit Educational, Scientific & Cultural Organization
LAN	Local Area Network
LCC	Larger Cooperating Centre
MSS	Mass Storage Subsystem
MTTR	Mean Time To Repair
NCC	National Collaborating Centre
NFA	National Focal Agency
OCLC	On-line Computer Library Centre, Ohio
OS	Operating System
PC	Personal Computer
PEPAS	Western Pacific Centre for the Promotion of Environmental Planning and Applied Studies
PFK	Programmable Function Key
PROM	Programmable Read Only Memory
PSDN	Public Switched Data Network
PSS	Power Supply Subsystem

PSTN	Public Switched Telephone Network
RAM	Read And write Memory
ROM	Read Only Memory
SDC	Systems Development Corporation
SDI	Selective Dissemination of information
SA	Stand Alone
UNDP	United Nations Development Program
UNEP	United Nations Environment Program