

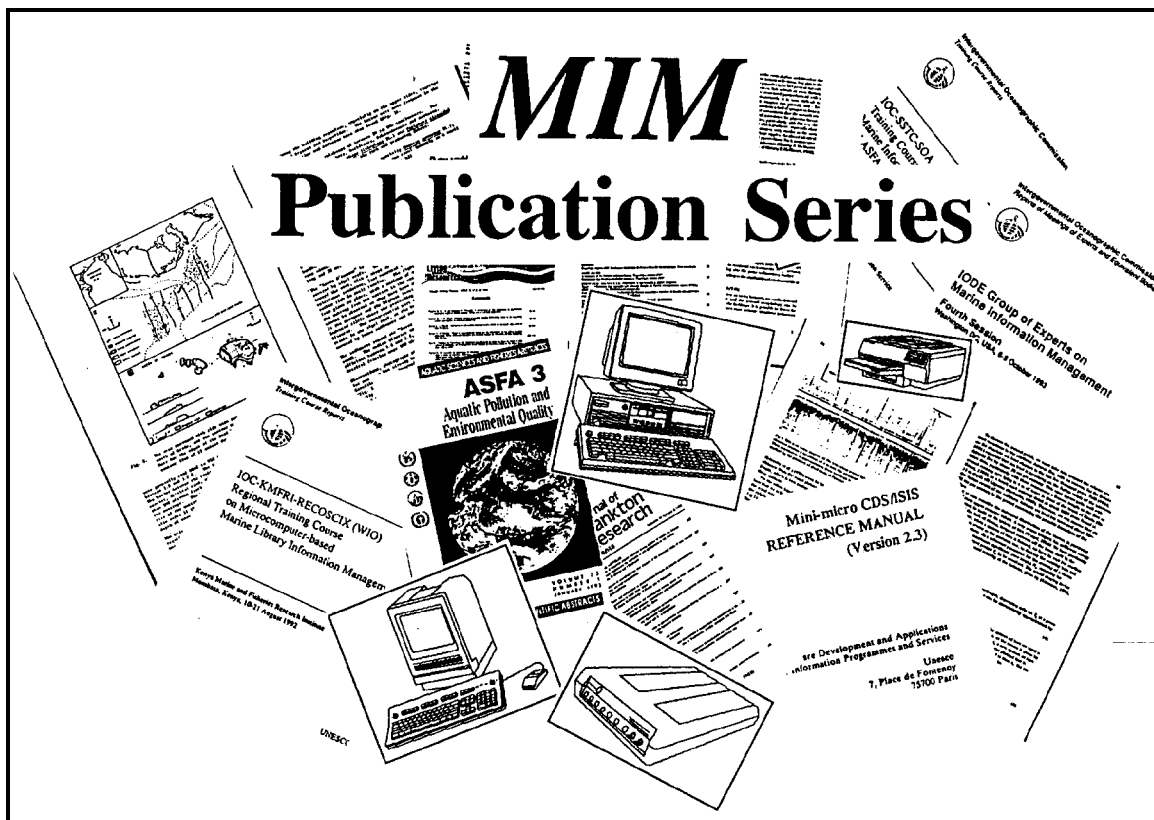


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Information Networking: The Development of National or Regional Scientific Information Exchange



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Abstract

In this manual a complete overview is provided of the procedures to develop national or regional information exchange networks within a developing country framework. Attention is given to types of information which need to be exchanged, identification of network components, the network structure, the role and responsibilities of a dispatch centre and its staff. As an example of an operational network an extensive description is given of the RECOSCIX-WIO project including its history, services and products.

Foreword

This is the second volume in a new series called '**MIM Publication Series**'. The production of this series was agreed upon by the IODE Group of Experts in Marine Information Management (GE-MIM) during its Fourth Session (Washington DC, USA, 6-9 October 1993). There, it was observed that documents currently published as part of the IOC publications series do not reach all members of the target groups of MIM. It was also noted that documents prepared as working documents for the Group's sessions were not fully put to use as they were never distributed beyond the Group members. It was agreed that some working papers merit general distribution. The MIM Publication Series will provide MIM related papers with their proper identity within the IOC publications as separate volumes of IOC Manuals and Guides No. 30. The series may include manuals, selected working papers, strategy papers, working group reports, standards, directories, etc. The publications in this series are reviewed by a committee composed of experts with experience relevant to the topic of the publication.

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1. INTRODUCTION TO INFORMATION EXCHANGE NETWORKS

'Why do we need to exchange information?'

Communication is what got us, humans, where we are today: culture, science and technology are all products of communication, of sharing the experience of others, adding something to it, improving it. Scientific and technological development is impossible without efficient communication between scientists or technologists.

Scientists in the North have a wide range of communication tools at their disposal. These range from personal contacts (participating in scientific conferences) through telephone and fax to accessing on-line databases. Communication tools allow scientists to constantly remain in contact with the advancements of the scientific community. Furthermore, they have access to well-stocked libraries which provide historical as well as current scientific literature.

Scientists in developing countries, facing a multitude of challenges, are also disadvantaged in precisely those tools : telecommunication infrastructure is often poorly developed and funds are extremely limited. This means that scientists in developing countries often find themselves isolated. This implies that the scientists often do not contribute sufficiently to the national development to obtain required recognition..

A first step towards improving this situation is making maximum use of the available human, material and information resources. Furthermore it is essential to work in a regional and/or international framework thereby making optimal use of the existing resources, rather than creating duplication.

It is the purpose of Information Exchange Networks to provide the organizational backbone for access to, exchange and distribution of information within a country or region.

2. DEFINITION OF NATIONAL/REGIONAL INFORMATION REQUIREMENTS

Which information needs to be exchanged?

When we talk about 'exchange' of information then we distinguish between information you *receive* and information you *provide*. In a theoretical network all network components should be able to provide as well as receive information to and from the other components.

The information which needs to be handled by a network can be sub-divided into 3 groups:

- ☞ Printed Scientific Information
- ☞ Factual Information
- ☞ Public Awareness

2.1 PRINTED SCIENTIFIC INFORMATION

'What's been published?'

To be able to compete in the rapidly evolving world of science keeping oneself up to date with the latest developments is essential. To do this one has to have access to a number of front line **scientific journals** or at least **abstracts** of the publications. Various abstracting data products are available in all sorts of scientific, technological and business subject fields. They may be in printed or electronic form, the latter **on-line** (e.g. through DIALOG Information services), on **magnetic tape** or on **compact disk** (CD-ROM). Regrettably, for developing countries these very powerful tools are often unaffordable: the data-bases are rather expensive (e.g. ASFA (Aquatic Sciences and Fisheries Abstracts) costs about US\$ 1,700/year in printed form, US\$ 1,900/year on compact disk ROM, and on-line it costs approximately US\$ 1.00/abstract). This is unfortunate because electronic versions of data-bases allow fast and efficient searching through hundreds of thousands of abstracts. This facility is extremely useful for novice as well as for experienced scientists. On-line searching offers the powerful feature to search several databases simultaneously and even removes duplicates. However, due to the high cost of on-line searching one is not always able to be as thorough as one would want to be. When using a CD-ROM though, it is possible to search using different strategies for as long as necessary at no extra cost. On the other hand, on-line databases are more up-to-date than CD-ROMs which are only updated every three months on average.

An important point to raise here is that these abstract tools mostly cover journals from the industrialized world. Institutional, national and even regional reports or journals from the developing world are often not included. A vast amount of scientific information is therefore kept from the scientific community. One of the tasks of a scientific information network based in a developing country/region should therefore be to **make available the abstracts of publications not included in the mainstream abstracting databases**. This can be done by building regional bibliographic databases focusing on locally produced publications and grey literature. In a further development this information can then be made available to the publishers of the abstracts.

'How to get access to Scientific publications?'

After you have found out what has been published relevant to your research you also want to read the papers. Subscribing to all journals in e.g. marine sciences is financially impossible, even for the biggest libraries. For developing countries, subscribing to even the core journals may be impossible: the subscriptions

usually have to be paid for in foreign (convertible) currency, whereas the local currencies are mostly non-convertible. The lack of funds in most institutions has in general resulted in the total absence of regular subscriptions to vital journals. Also, when savings in scientific institutions or universities have to be made libraries are usually among the first to suffer financial cuts. The management of scientific institutions does not always appreciate the importance of information. Usually more tangible items like laboratory equipment get priority over books and periodicals. Another priority task for a scientific information network in a developing country/region should therefore be the **establishment of a document delivery system**.

'Getting Textbooks?'

Especially for students and novice scientists textbooks are a vital tool. However, textbooks in specialized fields are extremely expensive (US\$ 50 - US\$ 150) which again makes it impossible for developing countries to acquire the necessary material. The scientific information network should **establish a system for the provision of textbooks or parts thereof**.

Conclusion

As far as printed information (publications, be it serial articles, reports, monographs or whatever) is concerned, scientists can be sub-divided into two groups: the **novice information users** (or student) who needs 'everything' and **advanced information users** who need to keep abreast of scientific developments.

Lack of printed information has serious repercussions on the work and output of both groups: novice scientists are not able to place their scientific topic into historic context (and thus define their specific research topic), whereas the experienced scientists risk duplicating work done by others. This causes additional problems: although their work may be outstanding, it may well be that someone else came to the same conclusions before and published them. Scientists will therefore not be able to publish their findings! Lack of textbooks and publications can also cause shortcomings in training and education which results in low standards of research. This again makes it more difficult for the scientists from developing countries to publish their work.

Lowered academic standards will also make it more difficult for students going 'overseas' for advanced training to obtain high academic degrees. An important point to make here is that an enormous amount of information is actually present in libraries in developing countries. This can have the form of unpublished reports, institutional annual reports, raw data, etc. However, most of this information is not catalogued and is not included in international abstract data-bases. Even if the holding library has catalogued the information it is only accessible in that library. The accessibility of this information is therefore extremely restricted. In most cases the information is never used.

2.2 FACTUAL INFORMATION

It has been observed that in the same region or even in the same country scientists do not know each other and are not aware that colleagues are working on identical or related subjects. It is clear that a higher level of scientific research can be achieved through collaboration.

Furthermore, too often it is seen that when the need for expertise arises developing countries requests outside experts (usually from the North) rather than using national or regional experts who may be better acquainted with the problem than the outside experts. However, at the policy maker or management level no information may be available on local expertise.

It is therefore necessary to exchange information on institutional capabilities. This includes information on infrastructure, equipment, manpower, information services, etc.

Tools to be used for this purpose are a **Directory of Institutions** and a **Directory of Scientists (and technologists)**. It is worth noting that although various organizations are involved in the production of such directories (at the international level) coordination is rarely seen. The result is that the data quality of some of these directories is low. Furthermore, due to the fact that most of these directories are not updated regularly (due to the cost involved) the use of the directories is often disputed. However, the scientists often do not realize the importance of a directory. They don't take the time to fill the questionnaires properly, don't bother to read the manual or simply forget to fill the questionnaire altogether. The librarian can and should play a crucial role in the collection of information for the directories!

'What information should a directory of scientists include?'

It should include logistic as well as scientific information.

- ⇒ **Logistic information:** Name, address, telephone, telex, telefax, job in the institution, educational background.
- ⇒ **Scientific information:** general fields of interest and work, specific fields of research. For general fields of work it is advisable to use standard codes (e.g. ASFIS codes for Marine Research). This enables fast input and retrieval. Of course, increasingly, the development of expert systems which create Thesaurus links and 'interpret' your search make such rather technical searching redundant.

Also for the policy makers it is important to be informed about the scientific and technological capabilities as ignorance will cause duplication of effort; various institutions in one country may work on the same or related topics causing wastage of scarce resources. Donors may fund identical projects in the same country or region without being aware of each other. If this is possible on a national basis what waste can exist on a regional basis!

To avoid this, a **national data-base of scientific and technological capabilities** could enable the policy-makers to better define the country's requirements in scientific and technological research, external funding etc. Financially the receiving countries will be able to manage their scarce financial resources more efficiently. It is positive to note that various developing countries are taking steps towards the establishment of such data-base systems. Librarians or information specialists should take the initiative to develop such systems.

2.3 PUBLIC AWARENESS

During UNCED the importance of Public Awareness of the environment has been clearly identified as a priority. Traditionally the scientists have been used to working in an 'ivory tower'. This is no longer accepted and accordingly, communication between the scientist and policy makers, general public and economic players needs to be improved. It is thus essential to include Public Awareness activities in the list of responsibilities of an information network. This awareness programme will need to be developed on different levels:

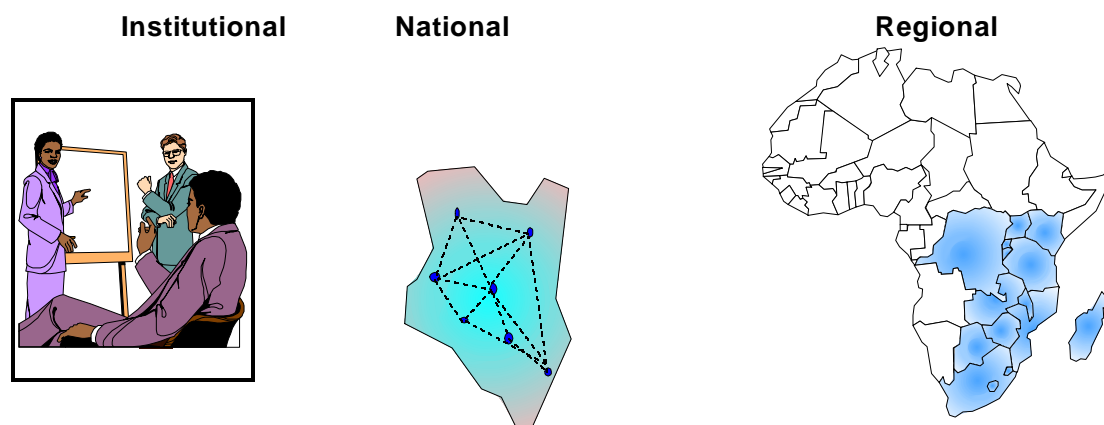
- ☞ keeping policy makers informed on the issues being investigated by scientists
- ☞ informing the general public on the issues being investigated by scientists and drawing attention to their role (e.g. conservation of the coastal environment, water conservation, ...)
- ☞ informing the economic players on the activities and competence of scientists in order to attract funding for applied research

To accomplish these objectives a variety of tools can be applied: brochures, magazines, video productions, radio and television, etc. An important section of the general public is the school: today's children are tomorrow's citizens.

3. IDENTIFICATION OF NETWORK COMPONENTS AND THEIR RESPONSIBILITIES

3.1 WHO DO WE EXCHANGE INFORMATION WITH?

The different levels of exchange of information can be identified as follows:



Institutional : Often the closest link, i.e. scientists within one institution, is forgotten and yet it happens too often that scientists in one institution do not exchange information. This may be because of fear of 'stealing' ideas or simply because there is no well-defined research plan or tradition of meeting in the institution.

National : On a national scale we sometimes find several institutions working on identical or very closely related fields. e.g. fisheries research may be undertaken by a national fisheries institute, under responsibility of the Ministry of Fisheries. Another institution (e.g. University) may be involved in fisheries as well, but under e.g. the Ministry of Education. Yet another under the Ministry of Science and Technology etc. Due to their different 'parents' communication between these institutions and their scientists may be under-developed.

Regional : Relationships between countries play a crucial role in the exchange of information. Despite the fact that two countries may be neighbours geographically, relations may be strained which makes scientific collaboration usually impossible. On the other hand, even when relations are good, communication between scientists from neighbouring countries may simply not exist.

Inter-regional : It is a fact that communication between developing country scientists and 'developed' country scientists are not always well developed. Scientists in the latter often are not aware of the existence of scientific institutions in developing countries. Communication is therefore very limited and is usually the result of individual communication. **One of the major goals of a national or regional information exchange network is therefore to promote the country or region in the entire scientific community - across-the-borders-.**

3.2 WHAT IS THE ROLE OF LIBRARIANS IN EXCHANGE OF INFORMATION

Librarians can and should play a crucial role in information exchange. Scientists are usually (and should be) heavily involved in their research and do not have the time to develop new contacts, maintain existing ones, photocopy and mail documents, etc. Librarians by their profession are information specialists. They should take it upon themselves to develop the links with the outside world and to publicize the scientific endeavours of their institution. The librarian should know all the scientists in his/her institution and be familiar with their research. This will allow the librarian to act as some sort of public relations officer who can easily route requests from in- or outside the institution for contacts.

At the institutional level the librarian's information-related responsibilities can thus be defined as follows:

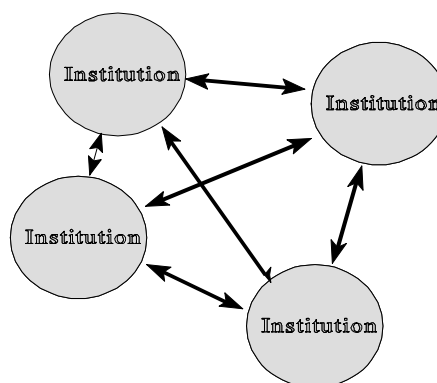
- ⇒ provide a document delivery and duplicate exchange service;
- ⇒ catalog the library holdings and make this information available to in- and outside users (electronically or printed)
- ⇒ distribute information on research activities, internally or externally ;
- ⇒ follow-up outside queries on scientists or their work;
- ⇒ establish links with other libraries and exchange information on the institutions and their scientists;
- ⇒ create institutional information brochures.

These are only a few examples of the important role a librarian can play in the information exchange activities of a scientific institution. However, it is clear that the management of the institution must equally appreciate the professional capabilities of the librarians and give appropriate authority to this staff to develop the above activities.

3.3 STRUCTURE OF AN INFORMATION NETWORK

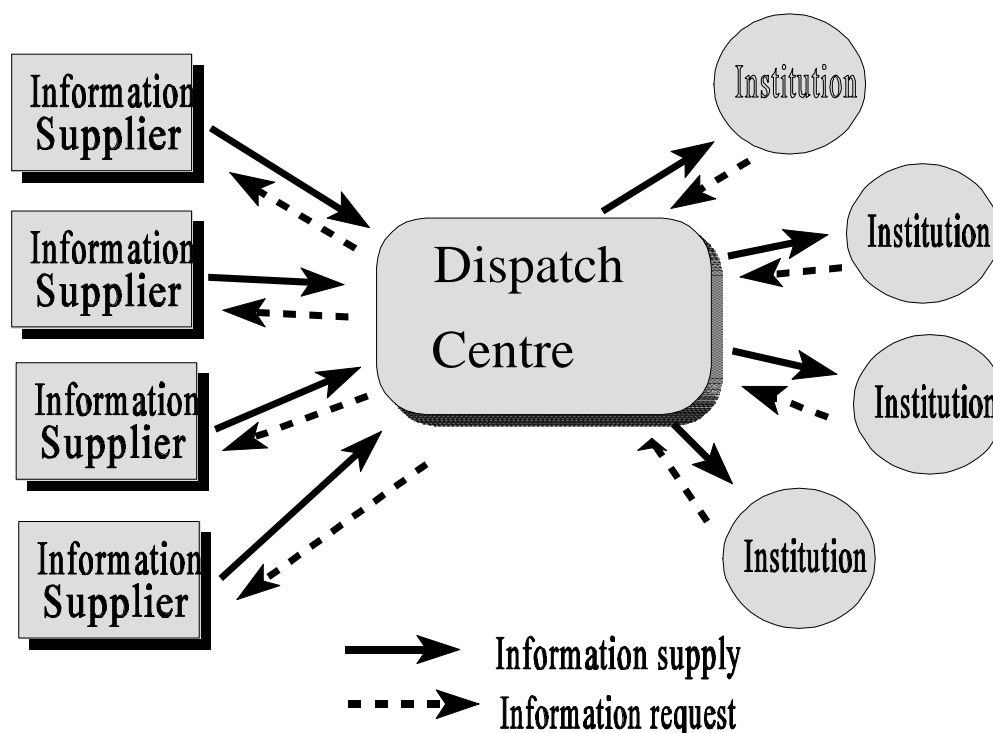
In theory each component of the network should be an information user and information supplier. Links should exist between all components of the network.

In practice and especially during the first phase of development of a network participants will rather be divided into **information suppliers** and **information receivers**. Initially the information users (which can be called the user group) will be located in the developing countries and the information suppliers will be located in developed countries (the group of suppliers can be called the supplier group). In order to be able to coordinate the flow of requests from the user group to the supplier group and back we will then make use of a network manager also called **Dispatch Centre**. This should preferably be an institution in the region of the user group. Furthermore this institution should be involved in research too: that way the network manager will better feel the needs of the network users! One should avoid using isolated network managers located in administrative entities. The role of the dispatch centre is of extreme importance and is discussed later.



This creates the following structure for a typical information network:

This structure gives clear identifiers to the components: Information Supplier, Dispatch Centre and



Information Users. Requests originate at the institution (Information User) level and are sent to the Dispatch Centre which identifies the appropriate Information Supplier to which the request is sent. The Information Supplier sends the requested information to the Dispatch Centre which then transmits it to the institution.

However, the ultimate goal of the network should be to create a network of information users *cum* information suppliers: each participating institution should be able to provide as well as to request information. One will observe that information suppliers will get tired of providing information without much coming back! During the development of the network (users network) emphasis should be put on capacity building at the individual institution level to enable them to provide network services (query handling, document delivery, etc.). Eventually all network components (of the users network and supplier network) will show information paths in both directions and this will create a sustainable network. This is also the only way to make the network financially sustainable: whereas the supplier group may initially charge for copies of publications, as soon as the users group is able to provide copies from their holdings as well, most suppliers will then provide their service on an 'exchange' basis. The initial 'user group' can easily obtain copies of journals through a 'duplicate exchange' system. In return for these journals the 'user group' may send annual reports to the 'supplier group', send copies of a newsletter etc. Although the net financial balance may well be in favour of the initial user group no payment may be required to the 'supplier group'. It is also important to involve national or regional library networks. They can serve as supplier groups and usually have their own network managers.

3.4 THE HUMAN FACTOR

Whenever we talk about communication we should realize we are talking about human communication. Even when we use state-of-the-art communication tools like electronic mail systems which transfer messages at the speed of light to the other end of the globe we should never forget there is a human being at the other end of the globe to read our message! A friendly personal note is more pleasant to get than a standard formal circular message, isn't it? Therefore when requesting a service from a supplier always try to do so as a friend to a friend. It is our experience that it is much better to use personal names than institutional names (e.g. Mrs. Jane KARIBU rather than Library, LMFRU). Psychologically the impact of a personalized letter is so much bigger! Yes but letters can get lost if the person moves away! This is correct but in a well functioning network you should be informed when a colleague is moving! Mailing lists should be updated constantly. This is efficient **management!**

Although they are not in the diagram one group of network components should not be forgotten: **Contacts.** It is extremely important to build up a group of contacts. These may be individual scientists within or outside the network's geographic scope area. They may be involved with scientific fields not directly related to the network's field scope. However their expertise may be required as a gateway to other fields. Secondly these contacts may include individuals in international organizations, donor agencies, governments, etc. Again the human factor should prevail! The word 'lobbying' can come to mind here. Contacts talking about your institution to one of their contacts can result in a tremendous increase in visibility of your institution and network!! Face to face is the most efficient type of communication available and can multiply your contacts in a minimum of time.

3.5 THE NETWORK MANAGER OR DISPATCH CENTRE

In order to organize the flow of information from and to the network it is advisable to have a dispatch centre. The importance of a well-managed dispatch centre cannot be over emphasized: especially in the early phases of the network the dispatch centre will coordinate the establishment of most components of the network. The dispatch centre will be the focal point for enquiries about the user group components or supplier group components for the rest of the world. The image and impression given by the performance of the dispatch centre will make or break the network! As said before the dispatch centre should preferably be a scientific institution in the geographic and scientific region of the user group. The host institution is therefore given a very important responsibility and power. The host institution should always bear in mind that it was given this responsible in trust. Information passed on to the dispatch centre in its function as information carrier and relay station should be treated as confidential information. Abuse or mismanagement at any given time will most certainly immediately destroy the network. It may be difficult for the host institution to put the interest of the group before the interest of the individual (the host institution). However the interest of the group should always prevail as far as the running of the dispatch centre is concerned. Signing of agreements between the network components may be one way to define the boundaries of responsibilities of user group, supplier group and dispatch centre. However in the end it will be the individuals in each component who need to have the sense of responsibility to keep the network running.

'How to select a Dispatch Centre?'

As said before the dispatch centre should be a scientifically active institution. It should be sufficiently large to be able to provide the necessary infrastructure to house and maintain the dispatch centre. Selection criteria for a dispatch centre should include :

- ✓ telecommunication facilities available or obtainable;
- ✓ cost of telecommunication;
- ✓ the centre should preferably be located in a scientific institution active in the main field of the network;

- ✓ basic infrastructure should be provided by the host institutions (i.e. air-conditioned office space, basic office furniture, utilities consumption);
- ✓ trained or semi-trained staff should be provided by the host institution.

'What are the responsibilities of the dispatch centre?'

The responsibilities of the dispatch centre are substantial:

⇒ Information Services	Query Handling Document Delivery
⇒ Data products development	Library Holdings databases Directory of Institutions and Scientists
⇒ Public Awareness	Newsletters, brochures Information distribution Mass communication (video, tv, radio,...)
⇒ Training	Training of Librarians of cooperating institutions Training of dispatch centre

provide the information services : (i) query handling; and (ii) document delivery. Query handling services are provided by the use of in-house available CD-ROM abstracts database(s) or through remote data-base access (e.g. DIALOG). Document delivery is provided through requesting the documents from the holding libraries. Locating a holding library is done through searching in-house information supplier holding data-bases (serial holdings, general library holding data-bases) or by using remote holding data-bases (e.g. LIBAC on Internet). The dispatch centre may also decide to create a holding library data-base for periodicals. this will allow easy tracing of journals. This becomes a very valuable asset when the number of cooperating libraries gets high (over 5). Searching through printed holding lists can be a quite time consuming job!

coordinate and compile network library holdings data-base : this data-base should contain library holdings of the user group libraries and as such solve the problem of 'grey' literature abundantly available in libraries of developing countries.

coordinate the publication of data-products : e.g. directories of scientists and institutions. The dispatch centre will regularly request updates of the data-base from the user group institutions and will publish the products (printed and/or computer searchable).

participate in the scientific and technological capability data-base on a national or regional basis.

publicize the user group institutions and scientists. (this may include producing publications like newsletters, brochures, etc.). Here again we point out that this kind of publications create the 'face' of the project. It is also important however that the entire group of cooperating institutions realize the importance of visibility and actively contribute to newsletters. It happens very often that the dispatch centre ends up writing the newsletter. Not only does this put a heavy load on the dispatch centre but it may also create some sort of distortion in the information : there will be more information on the host than on any other institution in the region. This may create an incorrect image of the region's capabilities! Furthermore it may very well happen that the other institutions start complaining about this over-emphasis on the dispatch centre host institution, forgetting that they have actually caused this distortion themselves! These problems can even cause the collapse of the entire network.

information distribution : information sent to the dispatch centre and relevant to the users will be

distributed by the dispatch centre. Here again the dispatch centre is given a very important responsibility: the dispatch centre should always act as a neutral traffic controller. Control here meaning impartial routing of information and amplification of information. It can be compared with the job of an electronic mail host: they merely route the information but do not change it in any way.

manage a centralized computer system holding all databases created by the users. The computer system will ideally allow remote logon to access the information. The dispatch centre should actively manage the updating of the data-bases. This may involve sending of update sheets to the cooperating institutions, chase the institutions if updates of their sub-system data-bases are not received timely, etc. It may also include some level of quality control of the received information, although this may not always be feasible.

provide training for user institutions staff in information management. It is important that the staff at the dispatch centre keep abreast of advances in information technology and theory. This knowledge should then be shared with the cooperating institutions through individual or group training. Recurrent internships by cooperating library staff at the dispatch centre may be an efficient way of both keeping the librarians updated and keeping good personal contacts.

promote the network and attract new network components (users, suppliers, contacts). This again requires a dynamic approach. When a request for information is received it should be handled promptly and to the point.

'The Staff'

It should be realized that the running of the dispatch centre of an information network is a full-time job for several people:

- ✓*general manager*
- ✓*scientific manager(s)*
- ✓*technical manager(s)*
- ✓*administrative staff*
- ✓*data-input staff*

This means that a minimum of 5 full-time staff must be made available by the host institutions.

General manager

He/She will be in charge of the dispatch centre and coordinate the network activities. He/She will coordinate the activities of the other staff.

- correspondence : the scientific manager is the focal point for communication with the network. Correspondence should be handled professionally and promptly;
- overall responsible for network publications.

Scientific manager

He/She will be involved in the scientific aspects of the network. Activities will include :

- preparatory handling of information services (query handling, document delivery). i.e. making data-base searches for queries, checking routing of document request to co-operating libraries.
- preparation and checking of data-products;

Technical manager

He/She will be responsible for the smooth operation of the network from a technical point of view. Activities will include:

- Managing the DC data-processing equipment;
- User maintenance of the DC data-processing equipment;

- Assisting in maintenance, procuring and shipping spare parts for co-operating institutions data-processing equipment;
- Developing (technically) data-products;
- Assisting and training data-input staff.

Administrative staff

He/She will take care of all secretarial jobs related to the network operation (correspondence management, time management, mailing, reproduction, accounts, ...).

Data-input staff

He/She/they will be involved in the entering of records for the data-products.

Staff problems

Especially in technical jobs it is quite difficult to find and even more difficult to keep competent staff. In a quickly changing field like information management, education usually lags behind and therefore the most efficient and practical training is obtained 'on the job'. However, due to the usually low government salaries (low compared to private sector) in developing countries government institutions find it difficult to keep staff once they have been trained. A continuous brain drain is the result. There is no easy solution to this problem. The only real solution is to keep on training staff so there is always a 'spare' in case of 'head-hunting'. In the case of regional networks one should attempt to create a secure funding system to employ the dispatch centre staff. External assistance would probably be necessary to do so.

3.6 SETTING AN INFORMATION NETWORK IN A WIDER FRAMEWORK

Communication for the sake of communication is useless: it has been shown repeatedly that communication projects which focus on communication as such fail to survive or even take off because the members had nothing in common to communicate!

The task of being the regional dispatch centre is extremely difficult and in a way dangerous: Indeed, if the national institutions of a regional network do not send actively provide information (e.g. contributions for the regional newsletter), then very soon the project will be identified with the RDC rather than with the region as a whole. It is therefore of vital importance to make the RDC and as a fact the whole information exchange system part of a wider scientific organization. For example, if the information network is emphasizing on hydrology then it should be hosted from within a regional (or national) hydrological scientific organization. This organization should be composed of scientists active in that field. The organization should have its proper management structure (board, fellows, members, ...). The activities, services etc. of the information network can then be framed properly within the organization. This will also provide the network with a clear set of objectives. From the side of the scientific organization this set-up also provides clear advantages: the organization can use the information exchange network as a powerful communication tool and way to reach the world.

3.7 TECHNICAL ASPECTS OF A SCIENTIFIC INFORMATION EXCHANGE NETWORK

In the days of the electronic office it is clear that an information network should make use of technologically advanced methodologies in order to efficiently run the network and get the information where it is needed as soon as possible. What kind of information will we 'transmit'? This is defined by the service:

Query Handling

A **query** is a request for titles or abstracts of publications on a topic described in detail. A search is made in electronic bibliographic data-bases. These data-bases can be available in-house (at the user site) by means of an in-house library holding data-base or by means of a CD-ROM system. However, in most cases the CD-ROM data-base will not be available in-house. Making the search on-line to a system like DIALOG may not be possible technologically or may be too expensive for the institution. Therefore the user will have to request the information from the dispatch centre. There the search will be made on the CD-ROM data-base or from remote data-base system like DIALOG. Preference is given to the CD-ROM system (a typical DIALOG search will cost approximately US\$ 50). The query will in general be sent to the dispatch centre by mail. However if urgent this may also be by telex, fax or e-mail (if available). The latter is of course the best as a high level of automation can be achieved this way.

Level of automation of query requests:

Level 3: in the highest level the user can logon to the dispatch centre computer and do the search. References can be printed on-line or off-line and mailed to the user. Abstracts can be mailed in printed form or on diskettes which is cheaper: a standard 1.2 MB diskette can contain approximately 600 abstracts. This also provides the additional advantage that the records can then be imported into a data-base. There are a number of softwares available e.g. Micro CDS/ISIS of UNESCO. This then allows references to be downloaded into document request records which can be transferred to the dispatch centre.

Level 2 : the query is sent to the dispatch centre by electronic mail using an external electronic mail network (e.g. GreenNet, OMNET, ...). The incoming query is then handled by the dispatch centre. Abstracts are mailed in printed form or on diskettes.

Level 1 : the query is sent to the dispatch centre by mail, telex or fax. The query is handled at the dispatch centre manually. The abstracts are mailed in printed form or on diskettes.

Document delivery

Document requests can be sent to the dispatch centre as :

printed requests: holding bibliographic descriptions (e.g. title, author, journal/monograph, part statement, ...). This 'record' can be sent to the dispatch centre by mail, telex, fax or e-mail.

electronic requests: a request can be sent by electronic mail in an agreed format. This record will then be entered into the central library holding data-base marked 'REQUEST'. At the dispatch centre the holding library will be searched by using various data-bases, either in-house or remote (in-house: serial holding data-base of suppliers, centralized user library holding data-base,...). Remote data-bases include the LIBAC data-base mentioned before.

delivery: documents can be delivered by mail, fax or e-mail. In general air mail will suffice. In some exceptional cases fax or e-mail may be used.

4. RECOSCIX-WIO : AN INFORMATION NETWORK

4.1 PROJECT OBJECTIVES

RECOSCIX-WIO : Regional Co-operation in Scientific Information Exchange in the Western Indian Ocean region

The main objectives of this project are to:

- ☞ provide marine scientists in the Western Indian Ocean region with bibliographical information (abstracts of publications, hard copies of documents, ...);
- ☞ prepare and distribute various data-products relevant to marine sciences of the WIO region (directory of marine scientists, bibliography of WIO marine scientists, ...);
- ☞ promote communication between WIO marine scientists and marine scientists of other parts of the world;
- ☞ publicize marine science of the WIO region in the WIO region and in other parts of the world;
- ☞ provide information equipment, software and training.

The system is based on a network of **co-operating institutions (CIs)** and **co-operating libraries (CLs)**. Further there is a 'pool' of **contacts** spread throughout the world. To link the different components of the system there is a **Regional Dispatch Centre**. This centre acts as a traffic controller. Requests for information on the region are received at the centre and either acted upon or passed on to relevant scientists in the region. Information received from the outside is dispatched to the co-operating institutions (information is 'amplified').

4.2 THE NETWORK COMPONENTS

The RECOSCIX-WIO network is composed of the essential groups: information users and information suppliers, regional dispatch centre and contacts:

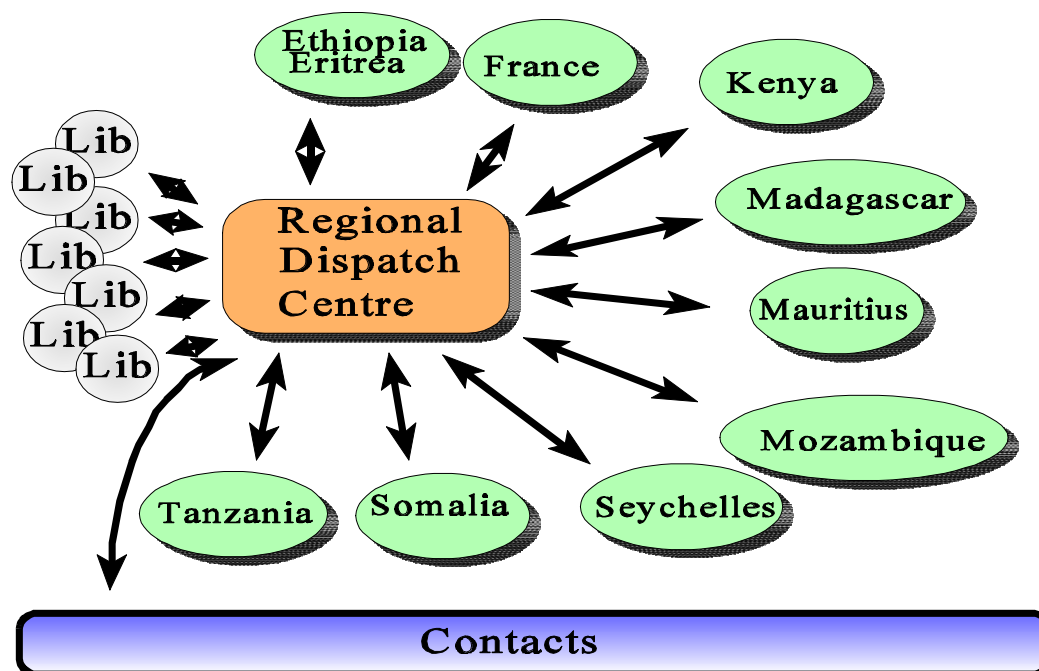
Co-operating institutions: these are marine science institutions in the western indian ocean region. (information users)

Co-operating libraries: these are marine science libraries both within and outside the region. (information suppliers)

Contacts: these can be sub-divided into:

- (i) international organizations (e.g. UNEP, UNESCO, FAO, ...);
- (ii) governments (region, other);
- (iii) scientific institutions (from the region but not co-operating institutions; outside the region);
- (iv) institutions involved in matters related to marine sciences or donors (e.g. NOAA, SAREC, IDRC, ICOD, AAAS, ...);
- (v) any individual or institution interested in the project.

Regional Dispatch Centre : this centre manages the flow of information to and from the region. It also centralizes various data-bases produced by the region. It is currently based at the Kenya Marine and Fisheries Research Institute in Mombasa, Kenya



RECOSCIX-WIO serves the Marine Science community of the member states of the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean (IOCINCWIO). These include France (La Réunion), Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia and Tanzania. We have to point out that Somalia is currently inactive. The project also provides services to Ethiopia and Eritrea. The network currently serves nearly **260 scientists in 43 institutions in 9 countries**. There are approximately **30 cooperating libraries in 10 countries and over 700 contacts in nearly 50 countries**.

4.3 THE SERVICES

The RECOSCIX-WIO project offers various services to its users (co-operating institutions). These are query handling and document delivery.

Query handling

This service involves handling topic queries by the use of local or remote data-bases. One local data-base is available at the RDC: the ASFA (Aquatic Sciences and Fisheries Abstracts) Compact-disk ROM. This system is preferred in view of the fact that it is the cheapest: once the disk is subscribed to it can be used without additional cost for use or time. The ASFA CD-ROM covers the entire field of marine sciences (Living Resources, Non-living resources, Aquaculture, Marine Biotechnology) as from 1978. It holds abstracts of publications, published in over 5000 serials, monographs, conference proceedings, and technical reports. The data-base holds over 400,000 records. The abstracts can be printed on paper or saved on floppy disk. One should however take into consideration that the ASFA CD-ROM is only to be used within the institution which is subscribing to the CD-ROM. The project is therefore considering to provide a copy of the data-base to each participating country.

With regard to coverage it should be realized that no data-base in existence covers its fields completely. In some fields it may cover 80%, in other fields maybe only 10% . Therefore, in those cases where the number of 'hits' (=retrieved abstracts) is low (e.g. 10) we also search on-line data-bases. As a data-base 'server' the DIALOG Information services Inc. (USA) is used. This system holds hundreds of data-bases on any topic imaginable. Data-bases relevant to marine sciences include ASFA (January 1978-), BIOSIS (1969-), Oceanic abstracts (1964-) and Pollution abstracts (1970-). Like the CD-ROM the data-bases provide abstracts which can

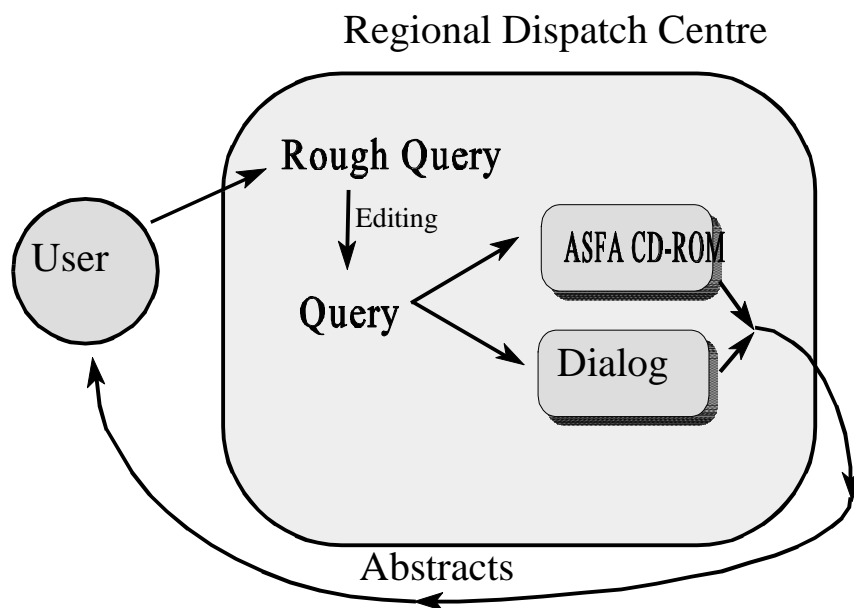
be printed on-line (while you are connected to the data-base you print the abstracts on your printer) or off-line (DIALOG prints the abstracts in the USA and mails them to you. To compensate for the incompleteness of the individual data-bases DIALOG allows simultaneous searching in several data-bases at the same time. Although DIALOG is marvelous to work with it is also expensive. An average search will easily cost US\$ 30.

Queries are sent by the scientists on a query request form to the Regional Dispatch Centre. They indicate whether the abstracts are to be printed or saved on a diskette. In view of the cost RECOSCIX encourages the co-operating institutions in requesting the abstracts on diskette. Sending a diskette within the WIO region (from Kenya) costs about US\$ 2.00 (80 grams). One diskette (e.g. 5.25", 1.2 MB can carry approximately 750 abstracts). Sending these 750 abstracts on paper would cost over US\$ 20.00 (approx. 2800 grams) or ten times as much.

Another advantage of sending the abstracts in electronic form is that the ASCII (text) file can be used with any word-processing package. Re-formatting can then be done by the user. Even searching within the file can be done by the user by means of the SEARCH function available in most word processing packages.

Of course none of the abstracts sets should ever be used for commercial purposes because of copyright protection.

Figure : routing of query requests



Document delivery

Identifying suitable and affordable document suppliers is a very important activity. Although it is quite easy to find commercial document suppliers (e.g. British Library) their rates are quite high (over US\$ 10 per unit of 10 pages). On the other hand, they can get you virtually everything that has ever been published. However, we feel that using commercial document suppliers is not really financially sustainable. In the case of RECOSCIX it was attempted, successfully, to locate other sources.

By contacting librarians of marine institutions with which the project was brought into contact through UNESCO a network of about 8 cooperating libraries was created within 6 months after the start of the project. Documents supplied by these libraries cost between US\$ 1 and US\$ 6 per publication. A few libraries even provide documents free of charge!

A major breakthrough however was the participation in an international librarian meeting of IAMSLIC (International Association of Aquatic and Marine Science Libraries and Information Centers) in October 1990. This association groups librarians specializing in aquatic sciences. A presentation made during this meeting resulted in an as good as immediate expansion of the supplier group with 10 libraries! Furthermore the project was able to get donations of journals which were no longer being used: in many libraries in industrialized countries libraries suffer lack of space. They therefore put their historic holdings (e.g. 1910 to 1989) on microfiche. The original 'paper' journals are then disposed off. In this way over 25 different titles (over 700 kgs!!) were obtained. Furthermore the good personal contacts made during the meeting have put a face on RECOSCIX which is very important (see 'The Human Factor'). Also face-to-face publicity by these librarians has generated additional contacts and has even attracted funding (e.g. the transport charges of the Canadian journal donations were paid for by ICOD of Canada).

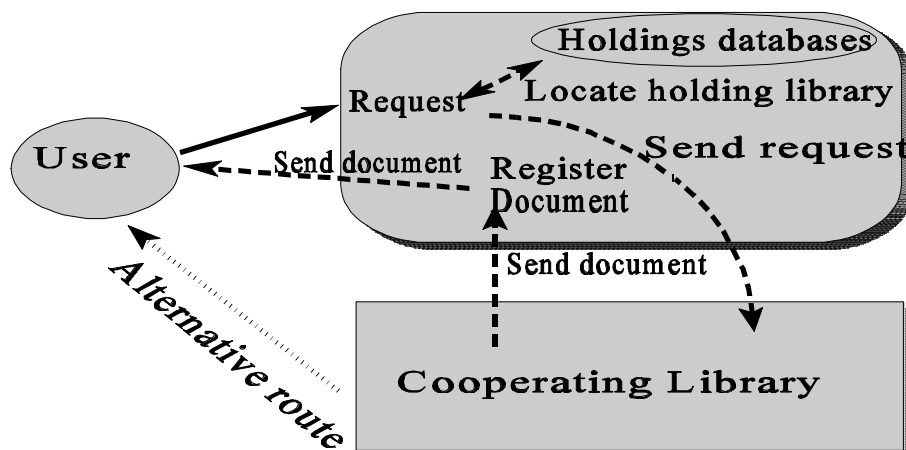
Through the network of co-operating libraries photocopies of publications can be obtained. In 1993, the project had 24 co-operating libraries outside the region : 2 in Belgium, 2 in Canada, 1 in Fiji, 2 in France, 1 in India, 1 in The Netherlands, 2 in Philippines, 1 in United Kingdom, 3 in the United States of America. Added to this we have various United Nations specialized agencies providing their documents as well (UNESCO, IOC, UNEP, FAO, IAEA, ...).

Routing of document requests

There are three types of documents:

- (i) **books** (monograph) : these are ordered centrally through the library of the 'Limburgs Universitair Centrum', Diepenbeek, Belgium).
- (ii) **serials** (including conference proceedings) : these are articles from journals. They can be obtained from the co-operating libraries. At the Regional Dispatch Centre a data-base of library holdings for the major co-operating libraries has been created in Micro CDS/ISIS. This data-base allows quick searching for journal titles to determine their location.
It has been attempted to get journal articles directly from the authors. However, this has - in general - not been very successful. In view of the fact that many publishers nowadays charge authors for reprints of their publication authors tend to be rather selective in their replies. In those where they do send reprints they usually - to save money - send them by surface mail which takes up to 6 months to get here.
- (iii) **reports** : these are documents published by organizations or institutions. They are requested directly from the author(s), institution or organization.

Figure : routing of document requests



The requesters specify on the document request form whether they want to receive the document by (a) air mail; or (b) express carrier mail; or (c) by fax. The requests can be sent by the requester to the RDC by air mail, fax or e-mail. In practice most requests are sent by air mail. In some cases - where a document is required very urgently - they are sent by fax. The RDC sends out the requests to the cooperating library by the fastest and cheapest means (e.g. e-mail).

Depending on the specifications noted by the requester on the document request form the co-operating library will send the document by air-mail, express carrier (e.g. DHL, Federal Express, ...) or fax. In case of air-mail the document is first sent to the Regional Dispatch center where a photocopy is made. The 'original' is kept at the RDC and catalogued into the RDC acquisitions data-base. The photocopy is subsequently sent to the requester by air mail. In the case where 'express carrier' was required, the request is sent from the RDC to the library by fax or e-mail, and the document is sent directly from the library to the requester. Another copy is sent to the RDC for the acquisition data-base by air mail. In the last case where fax was specified the request is sent to the co-operating library by fax or e-mail and the document is faxed to the requester. A copy is sent to the RDC by air mail. For air mail requests the average delivery time is 30 days. This is when all routing was done by air mail. For express carrier the delivery time is approximately 3 days. For fax delivered documents the delivery time can be a few hours to one day. Obviously the cost of the different routings is quite different: sending documents by express carrier or fax easily runs into tens of dollars!

An example: A requester requests a document of 10 pages (5 x A4 sheets) long. He/She wants it by (i) air mail:

requester-RDC : at requester's charge
 RDC - library : (document request form by air mail): US\$ 0.40
 library-RDC : (document by air mail) : US\$ 1.5
 RDC-requester : (document by air mail) : US\$ 1.80
Total mailing cost : US\$ 3.70

(ii) express carrier

requester-RDC : at requester's charge
 RDC - library : US\$ 0.40
 library-req. : US\$ 20.00
 library-RDC : US\$ 1.50 (copy for RDC)
Total mailing cost : US\$ 21.90

(iii) fax

requester-RDC : at requester's charge

RDC - library : US\$ 3.03

library-req. : US\$ 10.00

library-RDC : US\$ 1.50 (copy for RDC)

Total mailing cost : US\$ 14.53

It is clear that sending a document by express carrier or fax is much more expensive than by air mail. Note that in this example sending by express carrier is more expensive than fax. However, if the document has many pages with a maximum weight of 500 grams then express carrier will be cheaper than fax.

In some cases the document is a chapter from a book or an article from a journal or another document (e.g. PhD thesis) which is not available from any of the co-operating libraries. In that case we can make use of either the Interlibrary Exchange Service operating in Belgium (through the Limburgs Universitair Centrum) or of the British Library (BLLD). However these two alternatives are very expensive. E.g. a document by the ILE or the BLLD may well cost over US\$ 50 ! We therefore try to avoid using these facilities if possible.

Response by the co-operating libraries

In all cases the response of the co-operating libraries is as good as immediate: the request is handled on the day of reception. Of course the service is not free. Most libraries require payment for the service charging 'at cost' i.e. photocopying + mailing. The price varies between US\$ 1/ unit of 10 pages and US\$ 6/ 10 pages with an average of US\$ 4.00 per document. Some libraries provide documents free of charge.

4.4 THE PRODUCTS

WIODIR Western Indian Ocean Directory of Marine Scientists

This data-base holds information on all marine scientists of the co-operating institutions in the region. The data-base covers practical information (address, telephone, telefax,...) as well as scientific information. The scientific information (fields of interest) are described in two fields: one in codes and one in words. The codes used are the 4-digit subject categories of the Aquatic Sciences and Fisheries Information System (ASFIS). This coding system allows quick searching for topics. The second field describing the topics of interest is used to give more details. E.g. a researcher may be working on the effects of mercury as a pollutant on oysters. One would then search for the subject category 1504 and detail on 'oysters'.

How to get the information for the directory?

To get information for the directory we used a questionnaire. However we tried to keep the following points in mind:

- ☞ **people do not like questionnaires;**
- ☞ **if there are too many questions then people don't fill in the questionnaire;**
- ☞ **if you don't provide a detailed manual then the replies will often not be to the point.**

Therefore a small questionnaire was created including a manual with examples of replies. Furthermore the questionnaire was pre-filled with available information. Indeed, when someone reads information on himself which is wrong then corrections will easily be made. Our approach paid off: about 80% of the questionnaires were returned within 2 months. Quality of the information supplied was in general quite good.

The directory is being updated every 6 months: a print-out of the current information is being sent to the co-operating institutions with a request to update. When the print-out with updated information is

received at the RDC it is updated in the computer.

UNESCO's CDS/ISIS software is used for the directory. Although the project initially used its own structure, the database is now being converted to comply with the Standard Directory structure for Marine Science Institutions and Scientists which is fully described in Volume 3 of this series. A user-friendly interface was also prepared to make the database easy to search. In its machine-readable version the database is supplied on 1 diskette with an automatic install feature which loads the CDS/ISIS software as well as the database and interface onto your PC.

WIOPUB Western Indian Ocean Publications data-base

This data-base holds abstracts of all publications written by the scientists included in the WIODIR directory. To accomplish this requests were sent to all scientists of the region included in the WIODIR directory whereby they were asked to send a copy of each of their publications. Surprisingly, in many cases it turned out that the scientists often didn't even have copies of their own publications! It was then necessary to get copies from the cooperating libraries outside (!) the region. Bibliographic references, where possible including the abstracts, were then entered into the WIOPUB database which is also available in machine-readable format. The structure being used is the ASFISIS structure which has been developed (and recently revised) for the input centres of ASFA.

WIOLIB Western Indian Ocean Libraries data-base

It can be quite difficult for scientists from developing countries to publish their research findings in international journals. However, some material has been published, mostly in local (national) or regional journals, reports, conference proceedings etc. Unfortunately some of this material is not entered into the international data-bases such as ASFA and most of it is lost to the scientific community: they are usually stored in a library storage box never to be seen again.

It is therefore one of RECOSCIX-WIO's objectives to revive this material by creating a regional library holdings data-base with emphasis on the so-called 'grey' literature. To achieve this goal each co-operating institution (or at least one institution per co-operating country) will receive a personal computer, the Micro CDS/ISIS software and appropriate data-base structure. The ASFISIS structure has been chosen again as the database structure.

SERIAL Serial holdings database

This data-base holds the serial holdings of all co-operating libraries. Indeed with over 15 co-operating libraries checking the availability in printed serial holding lists is a rather tedious job! So another Micro CDS/ISIS data-base was created for the purpose of facilitated searching for serials. the data-base holds the relevant information like Serial title (full title and abbreviation), volumes, numbers and years available, remarks and location. As entering all this information into the computer manually would have kept us busy for years to come, we requested all libraries to send us their holdings on diskette (if they had their holdings in that form). Several of the larger libraries have done so. Through using FANGORN records were entered into the SERIAL data-base. It should be added that in most cases the holdings were kept in a word-processing file which can be considered as unstructured. This of course caused quite some problems in the translation and required considerable editing afterwards. Several small batch programs had to be written to put some structure into the unstructured WP files.

Although the data-base is mainly intended for in-house the project intends to make it available to outside users as well.

The Newsletter 'WINDOW'

Good results can be obtained through the 'Human factor'. An information exchange network should be dynamic: constantly new contacts should be made. It is through these contacts that communication will be promoted between the user group and the rest the world. But how to keep the contacts informed about the project's activities, the user group, its needs, etc.? An important tool for this is a newsletter. In the case of RECOSCIX the newsletter is called WINDOW which stands for 'Western Indian Ocean Waters'. An important point to raise here is visibility. The impact of a project will to a certain degree depend on its visibility. Visibility to the users, to the suppliers, to the contacts and last but certainly not least to policy-makers. Visibility is obtained through publicity, through publications like the newsletter, brochures, press releases, etc.

The newsletter covers :

- ✎ project activities
- ✎ focus on regional institutions
- ✎ research projects and activities in the region;
- ✎ training opportunities in/outside the region;
- ✎ meeting agenda, etc. etc.

Who gets WINDOW?

WINDOW is currently mailed to over 1000 addresses:

- (i) all scientists of all co-operating institutions
- (ii) all co-operating libraries
- (iii) individuals and institutions in over 50 countries around the world

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