Servers and online bibliographic databases in developing countries: the African reality

PIER LUIGI ROSSI

ORSTOM, France

Abstract: *Significant knowledge has been acquired by ORSTOM documentalists in the field of documentation engineering. This expertise has particularly increased with the development of the online HORIZON database, to which an ORSTOM server gives online access. A transfer of documentation engineering know-how has taken place in partnership with developing countries. At the ORSTOM centre located in Lome, Togo, an online bibliographic database server has been implemented on a workstation that can be accessed through the TOGOPAC network. Available databases are POPTOGO, developed by documentalists at the Demographic Research Unit at the University of Benin, and HORITOGO, developed by documentalists at the ORSTOM centre in Lome. Resources used show that low-cost documentation engineering partnerships are possible and that online access and data acquisition from producing countries is a reality in Africa.*

Keywords: *Online databases, servers, documentation engineering, partnership, Togo, Africa*

1. Introduction

ORSTOM, the French Scientific Research Institute for Development through Cooperation, is a public institution devoted to scientific and technological research which is placed under the joint control of the Ministry of Research and the Ministry of International Cooperation.

It is responsible for conducting finalised basic research to contribute towards the development of regions in the intertropical zone through experimental research aimed at controlling the processes involved in development, and, more precisely, it is concerned with the study of the physical, biological and human environments in these countries.

Research is carried out jointly with scientific institutions in the South, as a result of scientific and technical choices defined in cooperation with French and foreign partners. ORSTOM helps strengthen the scientific capacities of nations in the South, through training and specific scientific support.

The ORSTOM Documentation Department started to computerise its centres in 1986. TEXTO (a software program developed by CHEMDATA in Lyon, France) was selected as documentation software because of its flexibility, its portability (it runs on various operating systems such as MS-DOS or Unix) and the variable formats of the files it can deal with.

The HORIZON bibliographic database was created in order to give access to the ORSTOM scientific production. For this project, a cataloguing and indexing manual was created by

documentalists along with an input sheet, a multidisciplinary indexing vocabulary and a classification scheme.

Documents are analysed and indexed by ORSTOM documentalists for current documents (published after 1986). These operations have been sub-contracted for back holdings (documents published before 1986). Since September 1991, the HORIZON database has been accessible online on one of ORSTOM's servers located in Bondy, near Paris.

Connection is through TRANSPAC, the French data packet transmission network, using the X.25 protocol by calling a Network User Address (NUA) providing access to the ORSTOM computer network (RIO). The database is accessed from a SUN workstation connected to an ETHERNET network. Users get access to the files through an interface for database consultation in assisted or expert mode.

Implementing all these projects has made it possible to acquire a significant know-how in the fields of documentation engineering and of database server design and development. A transfer of this know-how seemed essential within the framework of our Institute's mission of cooperation with scientific partners in developing countries.

2. Partnership in Togo

In April 1991, a technical support mission in the field of information technology and documentation engineering was conducted at the documentation centre of the Demographic Research Unit (URD) located at the University of Benin in Lome, Togo. This mission was designed as a technical contribution to the implementation of the POPTOGO bibliographic database. This database includes all scientific works related to demography in Togo. The database format was designed in cooperation with URD documentalists. Reformatting programs were also defined to retrieve file records in the POPTOGO format from URD, HORIZON, IBISCUS (a database developed by the Ibiscus Association in Paris, France) and POPIN AFRICA (a database developed by UNECA (United Nations Economic Commission for Africa) in Addis Ababa, Ethiopia). This operation, which was conducted in partnership with database documentalists, has demonstrated that the thematic content, i.e. the scientific works related to demography in Togo, and the strictness of the documentation structure of POPTOGO, make it a highly value database for scientific information.

3. The ORSTOM documentation centre in Togo

The ORSTOM documentation centre located in Lome includes approximately 5000 documents covering various fields and 200 scientific reviews. Last year, some 1300 persons used the database. Only one MS-DOS computer was at the disposal of the three documentalists and of the general public to consult stored files.

Since 1990 the Lome centre has been equipped with a SUN workstation connected to TOGOPAC, the national data packet transmission network. This system is used for electronic mail transmissions and scientific calculations.

Owing to the success and the needs of the documentation centre with respect to the scientific community and to the capabilities of available computer equipment, we have proposed to the heads of the ORSTOM centre in Lome and of the Computer Mission department of our Institute that they install the documentation software on the workstation operating under Unix.

A five-user version of TEXTO was installed under Unix in March 1992, enabling the creation of a bibliographic database server. This software is also used to carry out all documentation tasks at the centre and, more particularly, to develop ORSTOM and URD file printout media.

4. The ORSTOM-TOGO server

The partnership agreement between URD and ORSTOM documentalists has resulted in the installation of the POPTOGO database on the ORSTOM server.

POPTOGO includes 1700 references on demography, population and development in Togo. Most of these references were produced by URD documentalists. Thematic subjects in POPOTOGO are handled exhaustively: all published documents (books, articles, etc.) as well as grey literature are covered. Most references in POPTOGO are exclusive with respect to international databases. A comparison carried out on IBISCUS, after retrieving the database file records, has shown that the overlapping rate does not exceed 10%. Over the same period, IBISCUS — for all subjects covered — includes some 600 references related to Togo.

HORITOGO is the other database accessible on the server. This multidisciplinary database (earth sciences, health, oceanography, human sciences, biology) includes all the references held in the ORSTOM documentation centre in Togo along with material produced by the Institute in the country. The documentation centre is one of the largest in the country and its database represents an essential tool in Togo for scientific research in the tropical area.

Both databases are accessed through the TOGOPAC network, using the X.25 protocol, by entering a network user address providing access to the ORSTOM-TOGO server. Once the connection is set up, the content of the two bases is displayed. The user selects one of the databases and consults it in either assisted or expert mode.

The assisted mode is organised as a set of pull-down menus offering four indexes: authors, publication date, subject descriptors and geographical descriptors. For each index, the menu proposes a direct enquiry with a user-selected character string or a search with index content display. After asking the first question, the user can list answers or ask a more precise question with a new request in Boolean logic. This type of search using pull-down menus is comprehensive and highly flexible, so that any user can easily consult the various databases.

In expert mode, users familiar with database consultation can obtain excellent results when looking up the two databases connected to the ORSTOM-TOGO server. The basic index includes all single words from title, subject descriptor, geographical descriptor and abstract fields, as well as phrases from subject and geographical fields. Stopwords have been eliminated.

This type of index, which is conventional on databases accessible on professional servers, was designed by ORSTOM for the documentation software. To access it, the user directly enters a character string without indicating any field label. The index based on the title field includes all single words of document titles; stopwords have again been eliminated. To consult it the user must enter the field label, followed with a character string.

Five other indexes are available for search: author, subject descriptor, geographical descriptor, publication date and classification heading indexes. To consult these, the user enters the label of each field followed with a character string. Boolean operators make it possible to direct the question strategy and apply it either to a single research step or to the sequence of steps necessary for complex questions. The strategy search is stored for the current session and a command is used to view it.

The user can display bibliographic references in various predefined formats. These formats are also used for deferred printing: the users who can consult the server with computers connected to the ETHERNET network can print their documents on the machine they select, while users who consult the file through TOGOPAC receive the documents by mail.

5. Server management

For each of the two databases accessible through the server, there is an image file that includes the comprehensive structure of records in the format of the cataloguing and indexing input sheet.

The database manager adds new records to that file and integrates the modifications required to ensure coherence between the file and the records.

The format of the input sheet and, as a result, the structure of the file are highly comprehensive and organised. For example, the information concerning congresses is split into four fields, theses into three fields and collation into eight fields.

An integrated program is used to construct the file to be consulted with its own format, by reformatting the image format. This program also destroys all indexes in the database and recreates them in accordance with the new status of the image file.

The online format was designed to provide users with the best possible reading of a bibliographic reference. To obtain this result, the program performs a 'breaking down' operation, starting from a format including more than sixty fields and ending with an online format including only five fields (records do not always include an abstract).

Obviously, the image file and the online file have the same numbering and the program defines the various indexes based on the image file before they are associated with the online file. This integrated program provides the database manager with a high-performance tool for easy update of online files.

The program that manages the file search procedure also controls the connection times. It determines the precise connection and log-off times for each session using commands linked with the operating system, registers these values into a general control file and displays them on the user's screen at the end of the session. The database producer has accurate information on users and working times for invoicing purposes.

6. Partnership in the field of documentation engineering

The ORSTOM-TOGO server and the two online databases have been implemented on the ORSTOM centre workstation. This computer is widely used by scientists and documentalists. The installed documentation software is a multitask tool for ORSTOM and URD documentalists.

The installation project was based on existing computer resources, which are maintained and operated by the ORSTOM staff and financed by the Institute. It also required investments in computer systems which were necessary and essential to the development of the ORSTOM documentation centre in Lome. The hardware and software involved were selected to operate a database server for a total cost of approximately FF100 000 (less than $20 000).

It seems essential to share the resources and logistics in order to provide access to information under the same conditions in both developed and developing countries. Just as scientists of the Institute share their laboratories with our partners, documentalists share computer tools and resources with information producers in southern countries.

7. Conclusion

The implementation of a server in Togo shows that it is possible to provide access to and to broadcast information produced by local documentalists in developing countries at a low cost. These developments enable producers of valuable databases which, due to their limited size, cannot be hosted on international servers to provide an online access to their information using advanced technologies.

These solutions seem extremely attractive for the implementation and the operation of national and international documentation networks in developing countries.

In Africa, there is a significant trend towards the creation of databases in varied sectors. At the same time, data packet transmission networks are now fully operational in numerous African countries. Thanks to partnership agreements and technology transfers, online search and access to information from producers is now a reality in African countries.

Pier Luigi Rossi
ORSTOM, Documentation Department
72, route d'Aulnay
93143 Bondy Cedex
France
Tel: +33 1 48 47 31 95
Fax: +33 1 48 47 30 88
E-mail: rossi@orstom.orstom.fr

Bibliography

Aw, S. (1992) Le système d'information agricole du Mali et le réseau RESADOC, *Documentaliste — Science de l'Information*, **29**(2), 95–98.

Bouazza, A. (1986) Resource sharing among libraries in developing countries: the gulf between hope and reality, *International Library Review*, **18**, 373–387.

Diop, A. (1991) Le réseau national de documentation agricole du Burkina Faso, *Documentaliste*, **28**(1), 19–26.