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## Mexico's national biomedical bibliography: a proposal for the setting-up of a computer-based indexing system

CESAR A. MACIAS-CHAPULA

National Health Information and Documentation Centre (CENIDS),  
Rio Mixcoac 36, noveno piso, Col. del Valle,  
Delegacion Benito Juarez, 03100 Mexico, D.F.

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**Abstract.** The planning, design and implementation stages of a computer-based approach to the indexing of the biomedical bibliography in Mexico are described; a proposal for an index to be set up at Mexico's National Health Information and Documentation Centre (CENIDS).

Factors such as (1) Mexico's biomedical information production; (2) local information needs; and (3) establishment of objectives/goals of the indexing system are described as relevant indicators to be considered at the planning stage. General computer and non-computer functions, as well as two possible alternatives to the design stage are proposed. A 'phase approach' implementation is also advised.

Finally, several information management and organization factors are described as the benefits derived from this proposal; transference of national knowledge; current awareness services and international collaboration, among others.

*Keywords:* Mexico; Abstracting and indexing; Automated information retrieval systems; Information services.

### 1. Background

Mexico produces and consumes biomedical information corresponding to its degree of development, sustaining third place amongst Latin American Countries after Brazil and Argentina. However, although rich in resources, Mexico is still poor in the organization and administration of such resources. One shares Rosenberg's opinion that... 'perhaps the most embarrassing aspect of an information flow for a developing country is the rather common situation where a user in a developing country must pay a foreign source for data or information generated in his own country or about his own country' [1]. Indeed, it is only through the international secondary sources of printed information such as Index Medicus, Excerpta Medica, Biological Abstracts, etc, or the equivalent online databases throughout Automated Information Retrieval Systems (AIRS) such as MEDLARS, DIALOG, ORBIT and BRS etc, that Mexican users can have prompt (although expensive) access to biomedical information 'produced in or about' Mexico.

Several studies have shown that most of the Latin American work in science and technology, published in Latin American Journals, is not covered by the international information retrieval systems mentioned above [2, 3]. The U.S. Institute for Scientific Information (ISI), for instance, announced that only 25 serial titles from Latin American Journals were analysed in 1976 (0.1 to 0.4% of the worldwide literature) [4]. This situation has not changed to date, since from 3068 serials indexed worldwide only 13 (0.42%) were from Latin American countries; of which, only 3

(0.09%) were Mexican [5]. In the biomedical field, the 1982 issue of *Index Medicus* analysed a total of 2686 world serial titles, of which only 12 (0.44%) were Mexican [6]. The aetiology of such low coverage of Latin American (or Mexican) scientific literature by secondary sources of information (either manual or automated), have varied from 'lack of seriousness' in the journals as a whole, to 'lack of interest' or 'lower needs' of such literature, as felt by worldwide users of such secondary sources [7]. Whatever the reasons, in practice we find that (a) the biomedical information, as produced in Mexico, is only covered to a minimal degree by international information retrieval systems, since (b) in Mexico, there are over 100 biomedical journal titles being produced and circulated locally; that (c) a considerable amount of Mexican researchers prefer to publish their findings in international journals (covered by secondary sources) with the aim of disseminating such findings to a broader audience of readers; that (d) domestic (Mexican) users demand more nationally-produced biomedical information each day; and finally that (e) such demands, if satisfied, are only after an exhaustive and expensive (in terms of time and effort) manual search.

The purpose of this work is to present a proposal for the setting-up of a computer-based indexing system of all the biomedical information produced in Mexico so as to overcome some of the problems mentioned above, as well as to develop a system capable to collect, analyse, retrieve and transfer (or disseminate) such information amongst both national and international users.

Firstly, a brief background of the National Biomedical Information and Documentation Centre (CENIDS) shall be given, since CENIDS is the Centre where it is proposed such indexing is to be carried out. Secondly, the reasons why a computer-based approach is thought to be necessary, along with the planning, designing and implementation scales of the system shall be described. Finally, the approximate costs and expected benefits shall also be mentioned.

## **2. CENIDS**

CENIDS was established by official decree on 13 November, 1975 [8], as an official department of the Ministry of Health and Welfare (SSA) of Mexico. Its main objective is that of providing adequate and prompt access to world scientific information and documentation as requested by all health workers in the country. To satisfy its users' needs, CENIDS is structured by (a) a telecommunication unit, staffed by six medical practitioners, who perform on-line searches on different AIRS, mainly MEDLARS, *DIALOG* and *BRS*; (b) a document retrieval unit, staffed by two documentalists and three messengers, who perform manual searches and interlibrary loans at national and international levels; and (c) a management unit. A total of 20 staff work at CENIDS, and the Centre performs an average of 20 on-line searches and retrieves 22 documents per working day.

The Centre is located in Mexico City and owns two branches at the North and South of the City. Thirteen Regional Biomedical Information and Documentation Centres (CRIDS) located throughout the country were created by CENIDS.

It is important to mention that CENIDS functions as the MEDLARS (Medical Literature Analysis and Retrieval System) foreign centre in Mexico. Indeed, in order to access MEDLARS, on 30 June 1976 the SSA in Mexico signed a 'quid-pro-quo' agreement with the U.S. National Library of Medicine (NLM), through which CENIDS could pay NLM with indexing services. Thus, CENIDS has offered the MEDLARS services in Mexico through direct on-line access to the NLM computer

in Bethesda, MD; has provided I.D. codes to institutional users; given initial and advanced training courses and performed Selective Dissemination of Information (SDI) profiles for end users.

It is interesting to mention that since Mexico lacks an indexing institution of its own, CENIDS has to pay a foreign (U.S.) commercial company for the indexing of the biomedical literature produced in Mexico and included by MEDLARS.

On this basis, although only 11 Mexican journals are indexed by MEDLARS, Mexico pays the above-mentioned 'quid-pro-quo' agreement with NLM at increasing expense each year. This constitutes one of the main reasons for this proposal. The proposal is for a governmental, National Biomedical Information and Documentation Centre such as CENIDS, to take over the task of carrying out the indexing of the National Biomedical Bibliography; not only to overcome the existing situation regarding the 'payment' of the NLM quid-pro-quo agreement, but also to benefit from the advantages derived from such a system, as discussed further on in this work.

### 3. Indexing

Why an automated system? The main reasons for a computer-based approach are the following:

- (a) Indexing needs to be performed under NLM's Medical Subject Headings (MeSH) thesaurus regulations, so that some of the indexed material can be sent to NLM as a means of 'payment', according to the agreement mentioned above.
- (b) Indexing needs also to be compatible with other international institutions for exchanges, i.e., transfer of biomedical information. A good example is BIREME (Latin American Biomedical Information Centre), at Sao Paulo, Brazil, for the production of its Index Medicus Latino Americano (IMLA) [9].
- (c) The provision of prompt, on-line access to the national biomedical information production to satisfy information needs efficiently; i.e., provide a better service at lesser or no greater cost.
- (d) To produce rapid and updated computer output microforms (COM) in order to establish an efficient, SDI and current awareness service to intermediaries (libraries, information brokers, etc) and final users.

#### 3.1. The planning stage

Before any computer system is installed or used in a library (or Information Centre), a formal study should be undertaken to ascertain the feasibility of the new system [10]. This implies the setting-up of a working team which would carry out such a study. For this proposal, such a team would involve the following staff:

- (a) From CENIDS: the director and two search analysts/indexers;
- (b) from SSA's Informatic Unit: the head of the unit and two computer specialists;
- (c) from the Science and Technology National Council (CONACYT): the director of SECOBI (on-line databases services), one search analyst and one member of the ISDS office in Mexico.

Thus, the team would be composed of nine persons with different backgrounds on: (a) medicine and biomedical information production in Mexico; (b) biomedical information collection and analysis; (c) computer-based information storage and retrieval; (d) legal aspects of national scientific information handling; and (e) biomedical information transfer, utilization and dissemination. Some of the first steps in the planning of the system as carried out by this working team, would be the following:

- (a) Analysis of the existing situation in terms of Mexico's biomedical information production: (a) what is being produced? (No. of books, journals, etc., per subject, state, or associated groups); (b) why is it being produced? (on-demand, publicity, dissemination of new findings, news of associations, etc.); (c) how is it being produced? (printed, AV, COM, in-house reports, conference proceeding, etc.); (d) where is it being produced? (government, private, academic sector; geographical location; abroad, etc); (e) when is it being produced? (every year, quarterly, bimonthly, etc.); (f) what is the rate of obsolete/new material—and its respective causes—; and finally, (g) who are the people responsible for this production? (doctors, nurses, dentists, researchers, associations, etc.).
- (b) Establishment of the information needs of the real/potential user community; (a) if SSA users; are the priorities directed towards family planning? public health? delivery of health care to rural communities? infant/newborn mortality? (b) if researcher users, is it basic/clinical research?; is it statistical data (vital statistics for instance)? is it information on drugs or poisons? (c) do they demand on-line/off-line information? (d) National/International? (e) English/Spanish? etc.
- (c) Establishment of the objectives/goals of the system, which would be: (a) to satisfy the information needs of users as described under point (b), above; (b) to own a system which at a national level, is capable of efficiently collecting analysing, processing, storage, retrieval and dissemination of biomedical information produced nationally; and thus (c) to participate at an international scale with the transference of our nationally produced information by the exchange of such information with international organizations (BIREME and NLM, for example).

Stages (a) and (b) above can be carried out by gathering data through questionnaires, personal interviews or visits to the different sources of information. Stage (c) can be gained after careful analysis and discussion—as performed by the working team—of the collected data from points (a) and (b).

### 3.2. Design

Since one of the objectives is to 'exchange' information processed and stored, in a form compatible with NLM's indexing standards, it is recommended that NLM's software package for indexing under Medical Subject Headings (MeSH) regulations be acquired. To do this, a visit should be paid to NLM by some staff of the working team (hopefully the director and one computer expert), so that an exhaustive understanding of the legal, technical and administrative procedures can be gained to acquire the software package or means to join NLM's indexing system.

It is expected to use one of the SSA's mainframe computers; therefore, a careful technical assessment of the availability, compatibility and flexibility of the equipment needs to be performed.

*3.2.1. Computer functions:* The system is expected to carry out the following main functions, amongst others: (a) Modules for indexing production; (b) MeSH type vocabulary control, hence allowing 'explosion' of terms, 'weight' of terms and 'subheadings' application; (c) Free-text word searching capabilities; (d) interactive, on-line searching through boolean operators and commands, to search for specific terms or combination of terms; (e) current awareness services through SDI performance and capabilities of sorting by author, title and source; (f) availability of several printed on-line/off-line formats to satisfy end-user needs; and finally (g) production of on-line, printed and COM indexes.

*3.2.2. Alternatives:* Two possible alternatives to the chosen design would be (1) to contact potential suppliers of equipment or services, providing them with an invitation to tender (ITT), where costs of capital items, continuing services, supplies and training, documentation, licence fees, etc., should be compared for each tender [11]; and (2), if no existing software or service were suitable or commercially available in Mexico, then the software would be written by CENIDS, SSA and CONACYT staff.

However, special attention and the study of previous experiences with some software packages like ASSASSIN [10, 12], CAIRS [10, 13] and STAIRS [10, 12] as used by biomedical/pharmaceutical institutions of other countries for similar purposes, should be taken into account.

*3.2.3. Non-computer functions:* The infrastructure of the system will be expected to carry out the following mainly non-computer functions: (a) to establish a mechanism through which all the biomedical information as produced (in any media) in Mexico, be reached by CENIDS; that is, to ascertain the maximum collection of information. This can be done via CONACYT/ISDS offices, through an official decree or any other legal directive; (b) to perform the training of staff at CENIDS (although previous indexing training at NLM would be required), so that the analysis and indexing (i.e., processing tasks) of the information collected can be undertaken accordingly; (c) to elaborate the forms used, information recorded, workload, information storage, etc.; and (d) to establish a communication and dissemination service between producers and users of information; amongst biomedical libraries and national and international information centres.

### *3.3. Implementation*

Before the full implementation of the system be carried out, a test with real data should be undertaken, especially if alternatives 1 (acquisition of a software package through ITT) or 2 (in-house design of software) were taken. It will be necessary to finalize the non-computer procedures which will include details of what checking is to be done of reported errors, what the stand-by procedures are when the system fails, what accounting procedures are necessary, and an operating handbook can then

be prepared giving detailed instructions of both computer and manual procedures [10].

Next comes the real-life running of the implementation stage, of which a 'phase approach' [10] may be chosen and, hopefully, planned well in advance. Thus, the total system is divided into sections and each section is installed individually and proved to work satisfactorily before another section is installed (see Table 1).

*3.3.1. Maintenance and development:* This is the final aspect of the implementation stage. Arrangements for maintenance and acquisition of enhanced versions of NLM's software package (or specific vendor if alternative 1 is taken) need to be taken into consideration when signing the respective agreement. If alternative 2 is taken, then a flexible system design and good/complete documentation is very important to achieve proper maintenance and development, especially if dealing with absence, resignation or moving away of the staff involved in the design. According to Lancaster [14], it is probably a good idea to evaluate the system after it has been running for about a year.

#### *3.4. Staffing and time scales*

One member of CENIDS will have to be chosen for conducting the control of the analysis, design, implementation and running of the system. He will be responsible for describing on a chart all the tasks to be performed during all stages. He will also be the link person with NLM computer/indexing staff or with the supplier.

Two members of CENIDS's staff will need to be sent to NLM for a period of three months to take a course in NLM's indexing techniques. After their return to Mexico, these professionals will give a three month indexing course to CENIDS' six professional members (all having a BS in medicine, biology or dentistry), who in turn will start indexing the allocated information. Continuing education courses on new indexing techniques are to be planned and carried out through seminars, workshops and NLM's indexing technical bulletin. It is expected that all eight indexing staff members perform their usual activities in CENIDS, such as running on-line searches through external AIRS; SDI's, document retrieval, etc. All these tasks will need to be allocated properly by the manager director of CENIDS, so that both the services provided to the end users, and the indexing tasks, be carried out efficiently.

No extra staff will be needed for the collection of documents; efficient liaison between CENIDS and CONACYT/ISDS office is expected, so that all the information needed be adequately received by CENIDS under official agreement. Once the information is completely analysed and indexed it should be returned to CONACYT/ISDS office immediately. It is not CENIDS's intention to function as a national depository at this stage. It is thought, however, that after one year of work and offered services, changes can be performed if the original document-retrieval mechanism shows some difficulties.

The hiring of the following staff by CENIDS will be necessary in order to fulfill all the tasks mentioned: (a) one information scientist/manager; (b) two medical librarians; (c) three clerks/typists; and (d) two messengers. All the extra staff will be available through the SSA (parent organization owning the mainframe computers) or through CONACYT/SECABI.

Table 1. Planning, design and implementation time scales of the proposed indexing system.

Tasks/date (month/year)	1985		1986										1987										1988														
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10		
<b>Planning</b>																																					
Set-up of the working team	****																																				
Anaylsis/diagnosis of the existing situation	*****																																				
Establishment of information needs and objectives	*****																																				
Visit to NLM;																																					
Check-up compatibility of equipment	***																																				
<b>Design</b>																																					
Data collection design																																					
Design forms to be used	*****																																				
Liaison producers/users; national/international	*****																																				
Indexing training at NLM	*****																																				
Indexing training at CENIDS	*****																																				
<b>Implementation</b>																																					
Initial test	*****																																				
Non-computer details (reported error, handbooks, flowcharts, etc)	*****																																				
'Phase approach' implementation	.....*****																																				
Maintenance	*****																																				
Monitoring statistics	*****																																				
Evaluation	***																																				

Note: If alternative 1 or 2 is chosen, then changes to the design and implementation time scales will be needed.

Lease/private lines can be obtained from Mexico's Communication and Transport Secretariat, TELEPAC network for on-line access; and the database, COM, SDI profiles, printed indexes, etc., can then be offered to interested national or international parties.

Table 1 shows the time scales for the planning, design and implementation of the system.

#### 4. Cost

It would be impossible to provide exact costs of the system since its set-up is subject to many variables and 'availabilities of'; however, an attempt will be made to state the approximate costs. The following is the estimate that would need to be added to CENIDS's budget for each corresponding fiscal year:

(a) Human Resources	£50 000
(b) Technical Equipment (maintenance included)	£35 000
(c) Travel Expenses	£10 000
(d) Other (paper, handbooks, mail, phone calls, etc).	£5 000
Approximate total	£100 000

#### 5. Benefits

Some of the main benefits to be gained by the set-up of the system, would be the following:

- (a) Prompt and efficient access to the Mexican Biomedical Bibliography.
- (b) Transference of biomedical information through national and international users.
- (c) Controlled, ordered access to Mexican biomedical information.
- (d) Knowledge of 'trends' in the production of Mexican biomedical information.
- (e) Current awareness services to the user population.
- (f) True quid-pro-quo agreement with NLM for the payment for MEDLARS; i.e., savings in CENIDS' budget.
- (g) Domestic production of indexing; i.e., opening of new jobs to professionals in Mexico.
- (h) Participation with BIREME for the inclusion of the Mexican biomedical bibliography in the Index Medicus Latino Americano, thus transferring 'scientific knowledge' throughout the region.
- (i) Complementing on-line searches when run against other systems/vendors found with lack of Mexican literature coverage.
- (j) Development and improvement in the editing of printed Mexican books/journals, after its knowledge and analysis.
- (k) Capture of the health literature being published abroad by Mexican authors and finally,
- (l) Development of an 'information consciousness' amongst both Mexican producers and users of biomedical information, so as to establish a feedback in the life cycle of the indexing system.



After the implementation of the system, the monitoring of statistics and yearly evaluations for further research and development will need to be carried out. This will lead to improvement of services and hopefully to a better satisfying of the information needs of the user community.

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