Feature article

Bibliographic database quality improvement: the experience of a Brazilian university's library system

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Abstract

Discusses quality improvement, focusing on the development of the database DEDALUS, in the University of São Paulo, Brazil. Compares all the activities used in that institution with the management theories of quality. Submits that there is a correlation between them.

New Library World
Volume 98 · Number 1134 · 1997 · pp. 98–105
 · ISSN 0307-4803

Introduction

The search for quality improvement is now present in all human activities. This statement is valid not only for those activities relating to productive sectors, but also for the service industries. Although quality management theories originated in manufacturing industries, principally owing to the implementation of Deming's and Juran's ideas in post-World War II Japan (O'Neil, 1994), their use in services has increased in recent years. It is common to find articles in the literature proposing the discussion of quality improvement in airline companies (In Flight, 1994), banks (Bank's, 1994), hotels (Hilton's, 1994; Quality is..., 1994), etc. However, although we can look at the use of quality concepts in a rather broad way, it seems advisable to adapt them for correct use in the service field. This adaptation is necessary if they are to be effective (one example of this view can be found in the article by MacDonald (1994)).

It is possible to see an increasing number of worldwide initiatives referring specifically to the implementation of quality concepts in information and library services. The discussion of the subject is already receiving some prominence in the professional literature on library and information sciences (see, for example, articles by Cundari and Stutz (1995); Foreman (1992); Hertis Information and Research (1993); Jurow and Barnard (1993); Kinnell (1995); Lawes (1993); Milner *et al.* (1994); and Taylor and Wilson (1990), to mention but a few). Even in the professional literature in Portuguese, although smaller in number, we can already find a few articles on the subject (among them, we can mention Belluzzo and Macedo (1993); Caldeira (1994); Rocha and Gomes (1993); and Vergueiro (1995)).

In general, the professional literature focuses on quality in library and information services from the point of view of formal programmes, referring to questions concerning the difficulties that library managers and workers have faced and the eventual benefits they have achieved when attempting to implement quality issues. However, it must be remembered that quality issues in library and information library services are not necessarily related to a formal, established programme. As Whitehall (1992) states, librarians have been worried about the quality of their services for a long time. In a way, the establish-

New Library World
Volume 98 · Number 1134 · 1997 · 98–105

ment of performance standards, the development of use and user studies, as well as collection evaluation and the assessment of information retrieval and databases, etc., can all be seen as different means of assessing the quality of library and information services and subsequently verifying whether or not they are fulfilling their objectives.

It makes sense to believe that the organization of bibliographic databases can be seen as an indicator of the concern regarding quality in a library environment. This statement can be better understood by considering the relationship between the automation of bibliographic databases and the search for rationalization of processes, such as:

- descriptive cataloguing and input of the data into the bases (using records prepared by other institutions);
- information retrieval (by the use of vocabulary control, as well as a faster and more accurate identification of the items); and
- dissemination of database contents (by the exchange of bibliographic data with other institutions and acquisition of by-products).

In order to clarify this relationship between the organization of automated databases and the improvement of quality in information services, this article aims to analyse the implementation process in the development of a bibliographic database of a university library system in Brazil. It is postulated that this relationship can become more evident if all the activities of the implementation process are compared with the proposals of a quality management programme, as defined by the professional literature.

The University of São Paulo, Brazil, and the DEDALUS Bibliographic Database

The University of São Paulo (USP), Brazil, is an outstanding higher education institution created in 1934 and administratively subordinated to the government of the State of São Paulo. It enrols 60,000 students, distributed as follows: 36,000 in undergraduate courses, 22,000 in graduation and 2,000 in extracurricular or community courses. In order to attend to these students' needs, the university has 5,600 faculties, distributed among the various fields of knowledge, and 15,000 support staff. Its main campus, comprising the majority of the colleges and schools, is located in the city of São Paulo, the capital of the State. In addition, the university also has other smaller campuses located in several cities of the State, such as Bauru, Piracicaba, Ribeirão Preto and São Carlos (Universidade de São Paulo, 1994, 1996b). It must be emphasized that the University of São Paulo, at the time of its foundation, established libraries within each college or school. At that time, USP also absorbed some schools with their libraries (such as law, engineering, pharmacy, and dentistry, etc.). The university "does not have a central library. The various institutes and colleges which constitute the university normally have their own academic libraries, being co-ordinated by a central division, the Integrated Library System (SIBi)" (Andrade and Vergueiro, 1996, p. 17). In this sense, each library is hierarchically subordinated to its institution's director. On the other hand, the SIBi also has a technical department (DT/SIBi), which is responsible for co-ordination of the system.

The SIBi was created in 1981 with the objective of "creating conditions for the systemic provision of the USP's libraries, in order to give support to the development of teaching and research" (Pasquarelli *et al.*, 1988, p.60). It has the responsibility of developing policies and co-ordinating all the information activities for the University, generating co-operative programmes, promoting the rationalization of services and defining common procedures for all libraries.

Aiming to centralize the bibliographic information or, rather, gather together all records related to the collections of the several libraries and also those from the institutions' intellectual production, enabling its retrieval and indicating its physical location, the DT/SIBi, together with the Centre of Electronic Computing of the University of São Paulo (CCE), developed the USP's bibliographic databank – DEDALUS. The effective beginning of this databank was during 1985, using batch processing. The data were stored in a mainframe computer (UNISYS A15) located at the CCE, integrated to the USP's main databank, in which all other data of interest for the university were also stored, e.g. students' names, addresses, grades, etc.

In the beginning, the storage of data was in-batch. Each individual library transcribed its records into formal sheets and sent them to SIBi's technical department (DT/SIBi) to be registered into the base. From 1991 on, as a

New Library World
Volume 98 · Number 1134 · 1997 · 98–105

result of the modernization of some technology resources available at the University of São Paulo, it was possible to enhance storage procedures, using online input of data by each library. For that purpose, special training of staff and logistic support was provided by the DT/SIBi to all SIBi libraries.

At present (November 1996), the DEDALUS databank has 1,370,451 records, available online through remote stations, connected to the CCE's central computer. All libraries in the several campuses have remote stations for the storage of data and searching in the DEDALUS. The academic teaching and researching departments also have remote stations. Faculties, as well as interested people outside the university, can access DEDALUS using their personal computers, by modem, as it has been available on the Internet since 1993.

DEDALUS was structured in five modules:

(1) *Monographs and special materials*: books, booklets, events, monographic series, and special materials (maps, slides, films, etc.), a total of 1,108,334 items;
(2) *Production*: technical-scientific and artistic bibliographic production of USP's faculties and researchers since 1985. It now totals almost 157,000 items;
(3) *Serials*: technical-scientific journals, events (if considered as serials), with 68,185 titles;
(4) *Theses*: dissertations and theses presented to USP since 1934, with 36,732 items;
(5) *Other bases*: at the moment, only the base UNIVÍDEO (comprising the collection of films and videos) is available.

Each record contains information regarding: authorship(s), title, edition, location, publisher and publication date, notes, collection (that is, journals), subject, physical support, type of acquisition, library(ies) which own the title, number of the record, ISSN or ISBN identification and call number.

Procedures towards quality

It is interesting to see that in the last three years the SIBi has committed itself to the use of methods and tools characteristic of quality management, such as the standardization of data by the AACR2's rules, the development of procedures manuals, staff training and preliminary measures for the adoption of the MARC format, etc. At the beginning of 1994, the work plan, proposed by the technical department, established goals to be attained through the years 1994-1997, concentrating its efforts on the definition of actions and the attraction of external resources necessary to accomplish its objectives. In this plan, the prioritization of quality improvement in all services provided is stated in a clear and unequivocal manner, stipulating the aim for "better qualifying both intermediary and end-service of the libraries of the USP's library integrated system" (Universidade de São Paulo, 1994, p. 1).

The plan covers several fields, such as collection automation, maintenance and updating, preservation and conservation, services evaluation and the publicity of the system, as well as the acquisition of external resources.

With regard to the automation of the system and, specifically, USP's databank – DEDALUS – many measures were taken aiming at the improvement of quality:

(1) acquisition of a new software;
(2) retrospective conversion of data;
(3) review of the subject heading list;
(4) access to online catalogues for co-operative cataloguing.

The measures taken with regard to these four items are detailed in the following paragraphs.

Acquisition of new software

After the analysis made by the DT/SIBi, it was concluded that one of DEDALUS's most salient quality-compromising factors in the information retrieval process was the system used for it. In spite of the fact that it has been able to work in a reasonably satisfactory way during the initial stages, its regular use, as well as the advent of new technologies, has demonstrated that there are still several deficiencies. Among them, the following can be outlined:

- it does not provide a complete set of Boolean operatives;
- it is structured as a modular, non-integrated system, making it compulsory for users to search in separated bases;
- its hardware/software is limited and not adequate for future expansion (Krzyzanowski *et al.*, 1996a, p. 6);
- it does not have an adequate format for data exchange; and,
- it reveals problems in information retrieval, causing low recall and accuracy in the search.

New Library World
Volume 98 · Number 1134 · 1997 · 98–105

The decision towards the acquisition of more adequate software for the objectives of the system was taken considering the above mentioned points. Once the decision was taken, the process of resource provision, software selection and acquisition was organized.

The search for the necessary resources to guarantee the acquisition of the new software made the SIBi formulate a specific project, named "Project for the USP's integrated library system automation enhancement", subsequently presented to the Foundation for the Support of Research of the State of São Paulo (FAPESP), the institution in charge of the financing of projects for research and teaching. After judgment, the project was approved by FAPESP, receiving economic resources in a convenient amount for the stipulated objectives.

From the very beginning, it became clear that the selection of an automated system, particularly when considering the characteristics of an institution as big as the University of São Paulo, is not a simple activity, demanding the organization of a long, detailed evaluation process regarding the existing responsibilities at both national and international levels (Krzyzanowski *et al.*, 1996b).

A Committee for the Selection and Accompanying of the Implementation of the Software/Hardware for the USP's Integrated Library System was created by the central administration of the university, for accomplishing the tasks involved in those activities. It comprised representatives of the SIBi's supervising council, librarians from the DT/SIBi management, CCE systems analysts and external consultants suggested by FAPESP.

The committee's tasks were carried out with the participation of eight sub-groups of USP's professionals: librarians from the several colleges and schools, systems analysts, lecturers in the field of automation and administrative personnel from the central administration of the university. Those groups had the objective of "establishing criteria for the analysis of the proposals of software suppliers, regarding pre-determined basic characteristics of the project which are detailed in the 'request for proposal'" (Krzyzanowski *et al.*, 1996a).

As a result of the work of these groups, the following basic criteria were established:

- software qualification;
- company qualification; and,
- cost of the software.

Based on these criteria, the selection of the product most adequate for SIBi's needs was made, or rather, the selection of a software with integrated functions, which could make possible the management of all the collections and services of the USP's several libraries, integrating all data, from selection and acquisition of materials to lending and local use. It was also considered necessary for the software to be configured in MARC format, having several options of idioms for its use (OPAC), with a client/server architecture, UNIX operational system compatible with USPNET and interconnected with other networks and information systems.

After a detailed assessment process, which even included the visit of some members of the committee to the headquarters of those companies considered as possible alternatives for the acquisition, the decision was taken in favour of the software known as Aleph, produced by Ex-Libris Ltd, a company from Israel.

Business negotiations were successfully concluded on 5 July 1996, and the new system is expected to be fully operational by 1997. With regard to the hardware, special care was taken to acquire it after choosing the software, in order to fulfil all the new systems requirements, updating and making possible the uniformity of all computer machines used in the libraries.

Retrospective conversion

Converting such a large amount of data (1,370,451 items) to a computer environment in the traditional manner is not viable. It is undoubtedly a very costly enterprise, particularly when considering all the professionals' working hours required, from the clerical workers who feed the data into the databank to the librarians who undertake the final checking of the records, in order to have guarantees that they are correctly introduced into the system. The experience, including that relating to the initial conversion from the manual system to the first bibliographic automated system of the University of São Paulo, DEDALUS, has fully demonstrated that carrying out the traditional conversion system is extremely unsatisfactory and costly to institutions.

Regarding the SIBi's new automated system, the problem was not in introducing into the computer all the data available in the catalogue cards, but in converting from an

New Library World
Volume 98 · Number 1134 · 1997 · 98–105

automated system already in use, DEDALUS, to another automated one. It seemed at the beginning, that the conversion could be accomplished in a very quick, simple manner. However, in the case of the University of São Paulo, there were several elements which made that process much more difficult than was originally expected.

In order to understand better what these elements represented, it is necessary to remember that the format used in databases is an important qualifying element.When speaking of automation, the terms compatibilization and standardization are often used. Nowadays, the phrase is "information transmission through computer networks". Formats and standard language – codes, symbols, words – make communication possible in this technological society.

In Brazil there are two formats:

(1) CALCO – computer read cataloguing, developed by the Getulio Vargas Foundation and used in the database BIBLIODATA; and

(2) IBICT – bibliographic and catalographic Exchange, developed by the Brazilian Institute for Information in Science and Technology, in partnership with other Brazilian institutions.

DEDALUS, in its original conception, did not use any of these formats, making data exchange with other bases virtually impossible.

It has been made necessary to look for other alternatives for retrospective conversion of data in such a situation. In order to achieve such an objective, making both the qualifying of the data already in DEDALUS possible, as well as access for worldwide use, the online retrospective conversion to USMARC format of the records in DEDALUS was started. As a result of a project submitted to the W. Mellon Foundation, it was possible to obtain the economic resources necessary for that conversion, which will be made by the OCLC RETROCON and FULLMARC services of the Online Computer Library Center (OCLC), in Ohio, USA.

In order to make this work possible, a magnetic copy of all the base was prepared. The analysts of the DT/SIBi converted the data to the format ISO 2709, to allow the exchange of information to the MARC format. After this phase, the magnetic copy was sent to OCLC for the definitive conversion and, consequently, these data will be available in MARC format when the new software is installed.

Subject list

Initially, a subject list was developed by the librarians in each learning and research unit, having the support of experts in their respective fields. This list, with around 8,000 entries referring to the characteristics of the libraries' collections, originated from the "Classification of Knowledge Fields" from the Council for the Scientific and Technological Development, current in 1983 (Pasquarelli *et al.*, 1989).

It was soon discovered that such a vocabulary had limited specificity, bringing difficulties to the indexing of the documents, low recall and low precision in data retrieval. This induced the DT/SIBi to create a working group, composed of librarians from the several learning and researching units, which had the objective of developing an appropriate terminology for the use of the University of São Paulo, as well as being directed to their clientele's interests.

This working group, as its first duty, was responsible for the development of a documentary language, by researching:

- the terminology;
- the hierarchical structure of the vocabulary;
- the semantic structure of the terms; and
- the terms' definitions and scope notes.

For achieving these objectives, the group received the support of experts from the several knowledge fields of the university. The result was a list of descriptors composed from the terminologies and elements of the experts' language, as well as from the user's language elements, or rather, the natural language.

This list of descriptors is being revised by the group itself, with the help of a faculty from the Department of Librarianship and Documentation of the School of Communications and Arts of the University of São Paulo, which is an expert in documentary language. This review will eliminate duplications, make the standardization and the analysis of precedence, term by term, of the proposed thematic structure.

The result of this work, together with the adoption of policies and indexing procedures for the material in the base, is expected to eliminate or greatly reduce the problems for

the definition of the searching strategy and consequent information retrieval.

Access to online catalogues for co-operative cataloguing

For a long time, librarians all around the world have been worried about the rationalization of all the activities with regard to the cataloguing of their collections. The isolated work of thousands of cataloguers, individually undertaking the descriptive cataloguing of the very same titles, has been condemned over and over as a waste of time, money and professionals' abilities.

It was in this framework, aiming to provide satisfactory solutions to this problem, that several initiatives of co-operative cataloguing have appeared in many different parts of the world. They resulted in the implementation of huge bibliographic databanks, which have become available to all information professionals of one specific region, country or group of countries. This collaborative work, initially developed in rather a manual way, has lately been developed by computer networks, in a much more effective manner, destroying all the barriers for the implementation of their proposals.

By co-operative cataloguing, each library stops working alone. Instead of cataloguing each one of the items for its collection, it will search for their bibliographic records in the database to which it is associated, using them for the cataloguing of its materials. If the items are not in the base at that time, the library will introduce the new items, which will then be shared by all the other associated libraries (each item is catalogued only once).

At present, using software developed for that purpose, the operation is made online, in real time, giving one added element in favour of the electronic revolution in the activities of information provision. Logically, this has made the standardization of procedures on an international level compulsory: the data exchange and the ease of access must be based in the adoption of rules of communication between computers, as, for example, the Internet's TCP/IP protocol and the ANSI/NISO's Z.39.50, which permit bibliographic information, full-text versions, images, networked multimedia, etc. retrieval.

On the international level, co-operative cataloguing is already a very common practice. Institutions like Online Computer Library Center (OCLC), Research Libraries Information Network (RLIN), Washington Library Network (WLN), in the USA, and the University of Toronto Library Network (UTLAS) in Canada, already have a commendable tradition in this field. In Brazil, however, this practice, notwithstanding the existence of propositions of co-operative cataloguing like the already mentioned BIBLIODATA, cannot be considered as a broadly followed rule.

Today, it sounds like a truism to state that any proposal for the quality improvement of bibliographic databases cannot ignore co-operative cataloguing. The acknowledgement of this fact induced the University of São Paulo to sign an agreement with OCLC in June 1996, aiming to access the co-operative cataloguing service of that institution and enjoy the benefits of co-operation. This was a new initiative in the country – the University of São Paulo is the first Brazilian institution to sign an agreement with OCLC – and has the objective of improving the quality of cataloguing services and the data introduced into the base, making the maximization of the processing time of the 38 libraries in the system possible. By this agreement, the University of São Paulo will use OCLC Prism's services for cataloguing its materials and will contribute with the cataloguing of new titles to OCLC's union catalogue, the Online Union Catalog (OLUC).

The choice of OCLC was due to the fact that it is the largest library network service in the world and it can provide services for bibliographic research, reference and retrospective conversion, making access to information possible at a lower cost.

Staff training

The SIBi has a total of 741 professionals working in the several libraries, comprising 285 librarians, 235 medium level and 221 basic level clerical professionals.

Since the beginning of DEDALUS's activities, the SIBi has been increasingly concerned about staff training. All librarians who work directly with the bases have been trained towards searching, registering, changing and updating the several modules (monographs and special materials, serials, theses, production and other bases). Those professionals have become developing elements in their working units.

New Library World
Volume 98 · Number 1134 · 1997 · 98–105

Among the goals proposed in the 1994-1997 work plan there are items related to the support of the organization, by the SIBi's libraries, in the elaboration of courses, conferences and workshops for DEDALUS's users, or rather, training for using the databank.

In regard to the training towards the use of the new technologies, the training of 46 librarians for searching in OCLC's database, interlibrary lending and the importing/editing of the records for the local databases started in March 1996 (Universidade de São Paulo, 1996a).

The acknowledgement of the staff's limitations, as well as the attention given to staff's training and improvement, contribute to guaranteeing success in the implementation of any service. Remembering that a process of change such as the one which is in course in the University of São Paulo depends on team work by a motivated and well prepared staff, training becomes an element of quality, as "it is not enough for the information service to recruit well prepared human resources for their functions. The implementation of new technologies and the advance of knowledge require that people continually have the opportunity to learn new ideas and new abilities" (Belluzzo and Macedo, 1993).

Conclusion

There is no doubt that the SIBi's libraries now constitute part of a great co-operative enterprise which, by computer networks, will make their collections accessible worldwide. This enterprise fulfils the needs of quality improvement of stored information. Each day, the perception that it is impossible to work isolatedly, not planning or considering all activities from the point of view of quality, becomes clearer and clearer.

Regarding the USP's databank, DEDALUS, great steps were taken in direction, making the analogy to the Deming cycle (P-D-C-A) possible:

- Plan
  - 1994-1997 work plan
  - project for the automation enhancement of the USP's integrated library system
- Do
  - acquisition of the new software ALEPH
  - acquisition and installation of the compatible hardware
  - agreement with OCLC for retrospective conversion and online cataloguing
- Check
  - review of USP's subject list
  - analysis and conversion of the DEDALUS data
- Act
  - implementation of the software
  - staff training

In a way, the history of DEDALUS can demonstrate the changes in the concept of quality used in the system, going from a concern towards production control to, later, direct attention towards the project of the product, to the raw material (record) and to the working teams. Another phase, demonstrating the evolution towards a greater concern about the in-house client of the information services can be also demonstrated, as well as verified, by the acquisition of new software, the conversion and formatting of the data, the review of the subject list and the access to online catalogues.

It is perhaps unquestionable, then, that the SIBi, in what concerns its bibliographic database, has showed, since its beginning, a commendable concern about several of the characteristic elements of a formal proposal for the improvement of quality. This way, the analysis of the activities in that field highlights measures with the objective of guaranteeing the database extension, the level of completeness of the data, staff training, procedure control, the constant assessment of performance and the comparison with the stated goals and documentation. It is also interesting to emphasize that the commitment of co-operative work adopted for the selection of the new software has been frequently used for quality improvement.

However, it is necessary to say that, for a significant change in terms of quality improvement, the external customer – students, researchers, faculties, etc. – must be one of the factors to be taken into consideration by those responsible for the project. There seems to be a reason to believe that the necessary level of attention to the external client has yet to be implemented in the proposal analysed in this article, as mechanisms for obtaining clients' opinions are still to be developed. On the other hand, there is nothing in the proposal that can be used as an indicator that this cannot happen in the future.

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