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Quality and Performance Evaluation of Digital Libraries in Romania

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Abstract

Libraries are an integrant part of the national informational system and strategic institutes ensuring access to any kind of information. In the last decade, in Romania, different actions were undertaken and important resources were been used in order to develop digital libraries that can be accessed by IT & C systems, especially via Internet. Until now, the projects and other development initiatives for digital libraries – especially those financed through budgetary funds – did not focus on the evaluation of satisfaction degree for the on-line library users or

fulfilling their quality needs at a performance level (efficiency, effectiveness and utility) adequate with the on-line library provided service. One of the main contributions of this paper is the identifications of relationships between the importance of digital library evaluation criteria and present evaluation of digital libraries in Romania.

Keywords: digital libraries evaluation, quality evaluation methods, performance management, measurement indicators

1. Introduction

The librarians accept evaluation as a key concept underlying the development and improvement of information services, that can ensure the provision of better products and services. In addition, it can act as a justification of existing services and can lead to an improved understanding of library and information systems. (1)

Electronic environment has produced profound changes in society at all its levels. Under these circumstances, libraries have to answer a series of challenges:

- expansion of the served community and higher expectations from users;
- informatics assimilation in librarianship activities content;
- document types diversification;
- products and services types diversification;
- moving the emphasis from document to information;
- mutations in the document life cycle (construction, processing, communication, use, storage);
- mutations in the content librarianship processes according to the documentary, products and services required (and available);
- the necessity to overcome the space-time barrier in information communication and use.

The intersection between digital and traditional libraries provides fertile territory for adapting traditional library measures for use in the digital environment. The digital libraries process evaluation derived from decision making considered a previous stage to action, when of several alternatives must choose the best option in relation to goals, the available resources and the environment in which it operates. In this context, the objectives of digital libraries evaluation are (2):

- identifying areas of activity which require changes
- making constructive changes and improvement of library activity
- determining the rate of achieving the objectives library

- discovering techniques to increase efficiency
- planning activities and services
- judicious allocation of resources
- reasoning funding requests by the tutelary bodies
- redefining the objectives of the system (if applicable)
- developing a database for future research

The managers have to value qualitatively and quantitatively the resources being managed, as well as to plan services to accommodate functionality improvement derived from research and development. In this context, the services should be managed to address user needs through some formal analytical process (3). Therefore, the evaluation plays a significant part in information systems.

2. Terminological delimitations

Over time, libraries have gone through various stages of their development, from the traditional library to the virtual one, in this context being necessary to explain the used terminology. All these notions refer to organizing and using information content processes (existing or not in an institutional structure). They are overlapping or mutually interdependent one another. Up to a certain point, we can speak about a similar semantic content.

Traditional library or "*classic*" library is focused on printed form (85%), the collections are made up mainly of paper documents and non book materials. The bibliographic information and the collection organization is found in classical library catalogues, on cards, which are framed by the ISBD (International Standard Book Description) rules. The Information dissemination services to users are located in the library and do not use IT equipment. Such libraries are not interested in interlibrary cooperation and do not have a joint strategy for using information and communication resources with similar institutions.

The Automated library has an on line catalogue and the acquisition and dissemination procedures are performed in automated system. Experts consider that the automated library is the library in which different resources can be found both on paper (traditional documents) and digital resources (CD-ROM) and metadata that refer to non-digital media (bibliographic information from an online catalogue).

The *electronic library* is the library where information resources can be found both forms: traditional and electronically as well. Within electronic library, the collection of available documents in electronic format is not mandatory; this collection may supplement or complement the traditional

collection of documents at a certain proportion. Instead, processing, storing and retrieving information and the full range of services for users – on line references, reservation of publications for loan, interlibrary loan, documents delivery, generally serials articles, from other libraries as acquisition of publications and – must be electronic.

The Hybrid library is the library in which coexisted both traditional and electronic media, representing an intermediate stage between traditional and digital library. In a hybrid library, printed primary sources coexist with digital ones and the digital sources of metadata are used in parallel with the traditional sources. This library allows remote access to a subset of the library's digital collection (digitized collections) or to the external digital resources (information sources available on Internet).

The *Digital Library* provides to its users, in addition to automated bibliographic databases, collections whose content is digitized as well as computerized services, via on line access. The system administration involves on the one side the digitization of collections content operations, on the other side, cataloguing, storage, distribution, protection and retrieval of information operations.

The *Virtual Library* is – in a manner of speaking – an inexistent library the way we know it, being a computer system which performs the functions of traditional libraries, but without the moral and physical support of it. It provides both information resources and services related to accessing information via the Internet. The essential feature of this library type is that the collections, bibliographic databases and services for users surpassed the physical boundaries of a traditional library.

3. Filed research on national and international level

Romanian specialists in the field of Information Science have been and are involved in research projects at national and international level concerning quality measurement and systems evaluation of online library services. Primarily projects aimed related topics of new information technologies, development of digital information content, integrated databases, application information and communication technologies in various fields and not least the libraries computerization, developing the collective national catalogue, the streamlining information and documents flow. The outcome is to ensure the use of best practices and supporting them by sustainable and appropriate methods to increase the performance of systems and services, provided by a digital library.

One of the research project focused on evaluation of the library activity was PROBIP (Romanian Performance in Public Libraries), project which aimed to streamline activities related to the library. The results consisted of:

- developing and implementing a new approach of statistics reporting in Romanian public libraries;
- categorization of data and statistical information which must be collected by libraries;
- creating specific working tools;
- implementation of performance indicators as management tools for assessing the activity of the library;
- national standards for indicators of resources proposal and recommending these standards to be included in the Law Library;
- adoption of ISO 2789 proposed terminology for library statistics and ISO 11610 for performance indicators as well as its widespread use in the library environment;
- using performance indicators in the evaluation of the library activity, regarding to the request of the library resources, in internal and external comparisons, in management decision making and in planning activity.

On the international level have been undertaken research projects which have contributed to defining performance indicators and / or quality for different types of libraries (traditional, electronic, hybrid digital), to specify the assessment process library and development the tools for library management. We mention the following: EQLIPSE, LibQUAL+™, MIEL2, MINSTREL, DECIMAL, DECIDE, CAMILE, EQUINOX, eVALUEd, DELOS, LibEcon, E-Metrics, Mines etc. (4)

To illustrate just one of them we mention that the EQLIPSE project scope (Evaluation and Quality in Library Performance: System for Europe) was to describe, develop and validate an open system based on information technology to support quality management and performance measurement in all types of libraries. The objectives have been limited to the next:

- researching the stage where there are adequate systems of quality management and performance measurement and their actual and potential application in libraries starting from recent studies in the field and from the experiences of participants;
- specifying a methodology that is conform with relevant international standards including ISO 9000 and ISO 11620 and that should include research results, should provide detailed

guidance on data collection, management systems and other relevant issues;
- providing a prototype system with appropriate tools of quality management and performance measurement that can be integrated into an IT open system library based on client-server architecture.

EQLIPSE prototype was developed over 12 months and was initially tested and evaluated in two libraries of the Consortium, University of Central Lancashire and Dublin City University.

4. Concepts and criteria for evaluating digital libraries, part of Information Management

The evaluation process led to a series of questions about what is considered: concept, context and criteria, which should be applied as part of management information. Thus, the concept evaluated refers to the item under assessment and may be a digital library as an entity or a specific process belonging digital library. The first type of concept includes three kinds of entities:
- a particular digital library
- parts or elements of an operational digital library
- more digital libraries

Regarding the evaluation process, there are some issues as they might refer to:
- representations used in digital libraries (context-based representation for medical literature etc.);
- different instruments (assessment of some links category, methods of image retrieval, digital video search etc.);
- services offered by digital libraries (digital reference service);
- users behaviour related to digital libraries or services provided by them (users preferences in full text database searching etc.).

Other concerns are related to the context, which means assessing framework, including approach, orientation, level and objectives. No assessment can cover all these aspects and therefore different approaches were used according to the objectives of evaluations:
- oriented systems approach: involves studies on the performance, effectiveness and / or efficiency of technological components etc.
- oriented human component approach: involves studying the behaviour to provide necessary information like information search and retrieval or achievement in received tasks performance, either predetermined or observed in nature etc.

76

- oriented usability approach: involves assessment by the users of same particular features especially on portals
- ethnographic approach: involves the lifestyles, culture and customs study in digital libraries. It also involves studying the impact of digital libraries on a particular community
- anthropological approach: involves users study or communities and their culture study in relation to a particular digital library
- social approach: involves assessment of the social communities of users within a library
- economic approach: involves costs, benefits, economic value and impact study.

The criteria that has to be applied in the assessment process relates to the chosen standards for estimating entities evaluated and they are used to develop measures. Until this moment, it has not been developed any evaluation criteria for digital libraries. Therefore, evaluators chose their own criteria in the process, the most common being the following:

- *Usability* – a widely used criterion in assessing digital libraries but there is no uniform definition on the degree of coverage in the context of digital library. ISO 9241-11:1998 *Ergonomic requirements for office work with visual display terminals* (VDTs). *Part 11: Guidance on usability*, defines usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". In this context, the design of digital libraries affects how users interact with them, or the availability or unavailability of the current design features suggest or guide users how to use them. The ratings of DL evaluation criteria generated the most important information for users. What we have achieved from this point of view would be: *the content* (of a portal or website) – accessibility, availability, clarity, complexity, comprehension, appropriateness, coverage, quality, accuracy, validity, reliability, authority; *the process* – achieving some activities like searching, browsing, retrieving, evaluating and providing resources, convenience, ease to use, tasks achievement, difficult interpretation, reliability of the results, error rate; *the format* – attractive, consistency, levels representation, messages communication; *general evaluation* – satisfaction, success, relevance, usefulness of results, impact, value, experience quality, barriers, preferences, learning.

- *Characteristics of systems* (because digital libraries are systems, there were used several evaluation criteria in traditional systems): technology performance – response time, processing time, speed, capacity, load; processes/algorithms performance: the relevance of results, similarity, functionality, flexibility, comparison with human performance, error rate, optimization, logical decisions, during retrieval; general system: maintenance, possibility to measure, interoperability, sharing capacity, costs etc.
- *Usability*: is a criterion which involves studies regarding the patterns use, the materials use, usage statistics etc.

5. The evaluation process of digital libraries

The library assessment process generates data and information on various aspects such as resources, activities, services, collections, library budget. Resulting conclusions have value only in an integrative vision, so it can be argued that assessment is a complex form of knowledge of all organizational realities. That is why speaking of performance measurement it is necessary to take into consideration: the level at which measurements performed; the resources required to perform an activity, service, function; the direct results of the resource use, measured in terms of continuity or/and their attributes (quality, availability, accessibility, timeliness etc.); output effect seen in user's perspective; users satisfaction and services and products utilization; manner and extent to which resources, activities, services affect the users community (5).

Changes in current economic and technology environment required the use of a management tool in order to provide, cyclic, a more objective image on the activities of organizations of all types, including non-profit ones. Concerning libraries, the factors that generated it were multiple: budgetary restrictions; increasing costs of documents; the explosion of published information published; increasing the complexity of library services; increased use of new technologies. Libraries becoming larger and more complex, what determines the need for objective and standardized data to base management decisions. (6)

The evaluation derives from the decision making considered as pre-action stage, when of several alternative ways must choose the best option in relation to goals, available resources and the environment in which it operates. In this context the objectives are:
- identifying areas of activity requiring changes
- making constructive changes and improvement of the library activity

78

- determining the objectives degree of achievement
- pointing out the causes of failures
- discovering the techniques to increase efficiency
- planning activities and services
- argument funding requests to tutelary body
- redefining the objectives of the system (if necessary)
- forming a basis for future research

6. Requirements of an evaluation system for digital libraries

To establish requirements for a system evaluation of digital libraries must be very clear, finding answers to the next questions: when can begin the evaluation of a digital library, when it is completed, which are the limits of evaluation, what include it or what it excludes. In this context, the evaluation means setting performance system functioning in relation to some targets and the evaluation is made to find answers related to (7):
- *effectiveness*: How well does operate the system in accordance with the objectives for which it was created?
- *efficiency*: At what cost (costs can be financial or may involve time or effort)?
- a combination of both (cost efficiency)

As we have shown, digital libraries are related to traditional libraries, as the common features refer to the same functions and their assessment up to a certain point. As we speak about the information distribution and access on it, the focus moves for digital libraries on the information technology. The new approaches about electronic resources of digital data, in any environment, must be considered:
- the technical capabilities for creating, searching and use of information;
- methods for selecting and retrieving information in relation to users requirements;
- professional staff;
- collection of digital resources;
- availability for a distinct community;
- security, policy, legal issues, licensing, costs, integration, cooperation with other libraries or services;
- management.

An evaluation of a digital library, either in research or in practice, can make a selection of these elements, clearly specifying which elements are evaluated, what is included and what is excluded. Thus, we cannot talk about an evaluation of a digital library, but on the evaluation of elements of its construction.

7. Defining indicators

The performance evaluation of digital library is a primary function of the decision making process and involves defining a system of performance indicators for input and output analysis of the system – as a condition for any system to deal with information management. Moreover, defining the performance indicators of the activities is an important step in quantifying the quality of the analyzed system and involves defining criteria for the assessment and also defining the obligatory referential in terms of conditions and factors which influence the quality of digital information.

Defining performance indicators for digital library reveals the following qualitative and quantitative aspects:

- user satisfaction;
- economic efficiency, respectively to use rationally resources;
- the number of real users in relation to the number of potential users;
- the acceptance of provided services by users;
- speed of system response in providing information relating to products and services offered by the digital library;
- effectiveness;
- framing the waiting times values in the appropriate values from the user's point of view;
- accuracy degree of delivery products and services;
- the level of accuracy;
- the actual costs to achieve the objectives (cost/ package, services);
- productivity at the operator level.

The system of indicators can vary from one type to another structure but it always defines the relationship between resources that enter the library (inputs) and what library made using these resources (outputs).

Concerning the quality we should note that this is not an indicator of performance or add additional property, but belongs to all as a consequence of intrinsec properties of the basic components of the solution. Optimal allocation of all categories of resources (human, technical, financial) based on both the library needs and the opportunities of society at that time require quantification quality of digital libraries activities at the system level. (8)

At the international level there were made efforts to develop standards, which define indicators for services based on the use of information technology provided by libraries such as:

- ISO / AWI TR 19934 – Information and documentation – Statistics for the use of electronic library services

- ISO TR 20983: 2003 – Information and documentation – Performance indicators for electronic library services. The purpose of this standard is to disseminate knowledge about the practice of electronic services evaluation provided by libraries. For specific indicators of library electronic services is seeking to identify similarities with the services indicators from traditional libraries.
- ANSI / NISO Z39. 7: 2004 – Information Services and Use: Metrics & statistics for libraries and information providers. This standard is intended primarily for library managers and those who collect data from libraries.

At the national level, there are several issues on this area which are to be solved. Thus, to have maximum impact, standards must be understood and applied at the national level. But there are some obstacles: the cost of data collection and their analysis is larger than some institutions can afford; the topics are considered "difficult" therefore not well understood; advanced experiences moving slowly (between countries and between sectors or areas); the measuring activity of indicators in the electronic environment is difficult, although it will be an absolute key in using statistics and performance indicators in the future; the structures that are designed to solve these problems are weak nationally. (9)

Standards will continue to strengthen in areas related to Information Science, such as RFID technology, which was quickly adopted by libraries. Thus, it will develop more and more information exchange standards for the emergence of new ways to work with Web 2.0 technology. But we are less certain that those standards will be adopted globally because the library environments vary so much. However, there will be an increasingly growing interest on this issue because managers will have to rely on evidence in their decision-making. (10)

8. Integrated approaches to library evaluation

Increasingly more, recently has been brought to attention that the library is oriented to the integrating of performance measuring methods with quality management methods, applied to the information management. The application of library approaches and instruments for performance and quality management clearly has many advantages. According to the literature of the field, various integrated approaches can be applied in library management. For the purposes and objectives of this paper, we selected the Balanced Scorecard approach, presented below. In the early '90s, Robert S. Kaplan and David P. Norton in a research project have proposed a new strategic management tool, called the Balanced Scorecard (BSC), practiced

in 12 organizations in various sectors. Developed originally for organizations based on profit, BSC has been adapted successfully for many government and non-profit organizations worldwide. BSC is based on a few key indicators that allow:

- organization strategy elaboration focused on continuing customer expectations and continuous creation of value based on the organization's intangible assets (know-how, knowledge, experience, brand etc.);
- translation (translation) of the concrete and consistent operational action strategy through monitoring to ensure implementation of this strategy.

BSC functionality results from the interaction of its components: Prospects (describing the organization's strategy and performance management); Objectives (desired outcomes); Measures (metrics or indicators): quantifiable statements about the performance of the organization; Goals (expected performance levels; the planned values of the measures so that can be assessed the progress towards goals); Initiatives (processes or activities to change a situation in order to achieve one or more objectives).

Thus, the BSC can be described as a set of quantifiable measures, carefully selected, derived from the organization's strategy. These measures are a tool used by managers to communicate employees and external co-interested party (stakeholders) the results and the essential performance indicators by which the organization carries out its mission and strategic objectives. (11)

At the level of a digital library, BSC is used for strategic management and to improve its performance and communicating the value offered to the community and stakeholders. Proposed strategies will translate what customers want in what libraries must supply regarding: process innovation, introducing new services and / or introducing new ways of delivering services.

9. Conclusions

Digital libraries in recent years have witnessed an important development because the use of ICT systems, the process evaluation becoming indispensable since it generates data and information on various aspects such as resources, activities, services, collections and their budget. (12)

Resulting conclusions have value only in an integrative vision, so it can be argued that assessment is a complex form of knowledge of all organizational realities. By creating a "culture of evaluation", it is sure that

library and library services are continuously evaluated to enable a clear understanding of weaknesses in service delivery and open the way for possible improvements. Summary, the objectives of such an approach would allow a library manager to quickly and easily evaluate the quality of service provided in different functional areas, during various periods of time, by monitoring the quantitative performance indicators and targets; to allow data of these quantitative measurements are based on to be easily inserted and loaded into the system; to allow relevant data to be obtained from external systems through both client-server network links and by digital media; to allow the documents and quality management procedures to be created, modified, approved and disseminated; to allow useful links to be established between such documents; to create a culture of excellence in providing library services; to help libraries to understand better the user perceptions of library service quality; to systematically collect and interpret the library-user feedback; to provide libraries information on assessments carried out in the same type of institutions in order to compare experiences; to identify best practices in library services; to develop analytical skills of employees to interpret and act on data. (13)

Evaluating of digital library services has a valuable role to play in supporting information management, service development, reporting, marketing and advocacy. Also, it can demonstrate the value of digital library services and their contribution to institutional goals. (14)

One of the main contributions of this paper is the identifications of relationships between the importance of digital library evaluation criteria and present evaluation of digital libraries in Romania. Also this paper aims to demonstrate the potential roles of multiple, iterative evaluation strategies in the development and refinement of digital libraries; details the methodologies that focus on how the services meet the needs of users; and encourages further discussion of the uses of these multiple evaluation approaches in assessing digital libraries.

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