

All technology should be assumed guilty until proven innocent
David Brower Founder of Friends of the Earth

Properties of the Formation of Electronic Libraries

E. I. Kozlova^{a,*}, V. A. Tsvetkova^{b,**}, and O. V. Barysheva^{c,***}

^a*Russian State Library, Moscow, Russia*

^b*Library of Natural Sciences, Russian Academy of Sciences, Moscow, Russia*

^c*Russian National Library, St. Petersburg, Russia*

**e-mail: ekozlova@rsl.ru*

***e-mail: vats08@mail.ru*

****e-mail: diglib@ya.ru*

Received August 25, 2016

Abstract—This paper discusses the electronic-library concept and the need for the national standard GOST R 7.0.96-2016 Electronic Libraries. Main Types. Structure. Technologies of Formation for the library information community. It analyzes the term electronic library and substantiates the definition of an electronic library as a system, which was adopted in the standard. It describes the characteristic properties of an electronic library as a subtype of an information system; the presence of document information and functional capabilities distinguish it from other information systems.

Keywords: electronic library, standard, information system, electronic library services, functions of an electronic library, collection, electronic document, electronic object

DOI: 10.3103/S0147688217010105

INTRODUCTION

The development of various presentation forms of full-text electronic resources has led to the need to unify terminology and classify these objects. The creation of document arrays and their acquisition by libraries and information centers is focused on the expansion of services; however, due to the ambiguous understanding of the form, composition, and structure of documents, incomparable objects occur, which seem to present difficulties in coordinating their further development. Electronic libraries (ELs) should be included among the most widespread forms of library service with sets of electronic documents. Analysis of objects named ELs and their description show that there are different points of view on these objects.

Domestic and foreign ELs of all levels actively use sets of electronic documents in their information work, which are either created in the structure of a traditional library, or lent to service users. Among ELs we can distinguish independent libraries that are formed and maintained by an individual team (staff) and have their own hardware and software facilities, as well as a material technical base. This permits an EL to be considered, on the one hand, as an information system,

and, on the other hand, given the fact that ELs require a certain infrastructure to support the functions of formation, maintenance, and storage of information arrays, they may be considered as a specialized organization.

Sets of electronic documents are usually supported by information systems, have the functional properties of specific systems, and may be called a database, website, portal, electronic library, electronic archive, etc. At the same time, it should be noted that the resources called ELs have different functionalities and may contain different types of documents, which is just what determines the specificity of individual ELs. In the case of ELs, we observe the ambiguity of terminological definitions, which is largely characteristic of the current state of the terminology that defines the basic concepts of electronic information resources [1].

ELECTRONIC LIBRARIES: DEFINITION, FUNCTIONS, AND SERVICES

The year 2016 was a watershed year in the history of domestic electronic libraries: the Federal Law № 342-FL of July 3, 2016 *On Amendments to the Federal Law on Library Work in Terms of the Creation of the National Electronic Library Federal State Information System*

[2], a project of the national standard GOST R 7.0.96-2016 *Electronic Libraries. Main Types. Structure. Technologies of Formation* was developed [3].

The long-term absence of state support for the development of ELs has given rise to numerous initiative libraries and arrays of information resources as part of traditional and university libraries, which has become a challenge to the modern stage of the development of library and information technologies. The ambiguous interpretation of this object has caused a variety of approaches to the order of formation of ELs and support of the subsequent processes of their life-cycle. This is the reason that there was a need to regulate the approaches to the Electronic library concept to create a standard (a normative document).

In our opinion, the work on the standard [3] placed emphasis on two questions:

(1) Is the standard necessary in principle? and (2) what do we actually mean by the term Electronic library?

The need to create the standard can be supported by the following problems in the work of electronic libraries:

- Today, the EL concept is understood by everyone differently. This is a type of “fashion clothing.” An EL can be three digitized books, a huge collections of universal themes and type structure such as a large market fair, and thematic and author’s book collections, which are strictly ordered according to certain principles, etc.

- Some ELs have a perfect search apparatus inherent in the best search engines, while another part of them simply have the search capabilities inherent in the standard software (Word, Acrobat, etc.).

- The principle properties of ELs have not been formed: the specificity of formation, distinctions from an information retrieval system, a database, and an information service, which are not the same things.

- Are quantitative assessments of the volume of an electronic library critical? What is a collection of 10, 100, or 1000 books? Are individual articles, pictures, sound fragments an EL?

The development of devices and mobile technologies is occurring at such an unprecedented speed that the number of ELs is growing faster than the number of electronic books. Today’s pupils operate with clouds and the names of sharing services. Searching in a catalog is called googling. Books can be shared through bluetooth or using direct napster. This area is not connected with the exchange of scientific information, and apparently, the standard is not necessary for it.

From the standpoint of libraries, the standard is of course necessary. We must know how to work with information in the electronic space. It is necessary to know how to transform an inhomogeneous flow into a library that erases all boundaries, does not depend on

language, age, and nationality, and enables the organized information service of science, education, culture, and society as a whole.

We are used to think that “our” readers are those who have a library card with a photo. It is no secret that the number of such readers decreases every year. How many people will become our readers in the future depends on what the quality of electronic libraries will be. First of all, a standard is needed by libraries, especially by the National Electronic Library (NEL), since it is this library that has the potential to become the largest and truly national library remaining distributed by its architecture. Perhaps the standard should be developed simultaneously with the documents of the NEL. The appropriateness of the approach will be shown by practice.

Apparently, a clearer understanding of the term electronic library is to be given within the development of the standard. First of all, this is necessary for all libraries that independently form or borrow ELs. The unity of the approach is achieved by the same understanding. We must speak the same language, let it be the language of the standard. It should be understood that the term computer library appeared in 1959 and came to be used when the technology of library processes began to include computers, that is, when library processes started to be automated [4]. This concept did not and does not have any relationship to ELs, but it was introduced in order to distinguish software resources from traditional library resources. Much later electronic libraries appeared, which were created by librarians for document collections that could be read only on a computer. The situation with full-text databases is still approximately the same. The understanding of the digital nature of electronic information came gradually, and here we were strongly helped by the widespread use of scanners. Librarians saw the conversion of a paper book into an electronic book (file) with their own eyes. First, these files were stored on shelves like books, but there were other carriers. While they occupy less and less physical space, libraries occupy our thoughts more and more today. The terms digital library and virtual library, which are synonyms of the concept electronic library, can be found in foreign sources. Since there are no international and national standards on ELs, the authors of the project studied foreign materials, in particular, the reference model of the DELOS digital library, which was prepared within the DI.org European Project devoted to developing the common approach to the methodology of development and interaction of digital libraries [5]. To analyze the term electronic library, no less than 100 different definitions were considered. Their systematization showed the following.

A. The concept of an electronic library is the brainchild of the **library** world. This is a sort of challenge to information resources, such full-text databases, but those that were formed by librarians themselves. This

point of view has given rise to definitions; we present two of them:

(1) **An electronic library** is a managed collection of information together with relevant services; moreover, information is stored in digital formats and is accessible on the network [6, p. 10].

(2) **An electronic library** is an ordered collection of various electronic documents (including books and journals), which are provided with navigation and search tools. This may be a website, where various texts are gradually accumulated (most often, literary texts, but also scientific and any other texts until the software) and media files, each of which is self-sufficient and can be claimed by the reader at any moment. Electronic libraries may be universal, tending to the widest choice of material (such as the Library of Maxim Moshkov or lib.rus.ec), and specialized (such as the Fundamental Electronic Library or Network Literature Project, which is aimed at collecting the authors and types of texts that most brightly declare themselves on the Internet) [7].

B. An electronic library requires navigation and search tools, the capabilities for systematization of component objects, i.e., the elements that are immanent to classical information retrieval systems and services. Thus, there appear technical and technological definitions of electronic libraries:

(1) An electronic library is **an information service**, in which all information resources are in the machine-readable form, and all functions of acquisition, storage, protection, and giving access to resources are provided through the use of digital technologies [8].

(2) The National Electronic Library (NEL) is a **library information system** designed to organize, store, and use electronic documents, which are united by a common ideology of structuring and access [1, 9].

(3) An electronic library is **an information system** that enables the reliable storage and efficient use of various collections of electronic documents, which are located in the system itself, as well as being available through telecommunication networks [10].

(4) An electronic library is a **database** that contains digital information objects in various formats, provides direct access to the user community, and has additional features:

- An electronic library is a universal tool of access (for example, a catalog) that allows one to search for and obtain information in the entire database.
- It has organized technical procedures by which library specialists add objects to the database or remove them according to a clear and understandable policy of formation of funds [11].
- It is considered as one of the most efficient ways to preserve the national cultural heritage from the standpoint of organization and use of information [11].

C. An electronic library also has definitions focused on its membership in some organization, for example:

An electronic library (Digital Library, DL) is **an organization** including a virtual one that fully collects, manages, and durably stores diverse digital content (data, multimedia, and metadata) and provides its users with services that are oriented to the community, are high quality, and fulfill some need. This is a finite “system,” which is perceived by users themselves as an electronic library [13, 14].

On the basis of our study we can conclude that an EL is a new stage in the development of information services, a new stage in the development of what we call an information-retrieval system (IRS), and information service.

An electronic library is characterized as follows:

- a collection of documents selected by certain criteria or rules;
- rules for systematization of documents (objects);
- storage or providing access to content (full texts or other audiovisual materials); if access to them is not provided, it is an electronic catalog or bibliographic database;
- a search device.

Consequently, there are three views on the electronic-library concept: a collection of documents, an information system, and an organization. The terms and definitions that are established by the present standard are intended for libraries of all types and kinds, archival services, and STI agencies. They are essential in developing regulatory and technical documents, as well as for organizing practical activities in the field of formation of electronic libraries. The standard adopts the definition of an electronic library as a system: **an electronic library** is an information system designed to organize and store an ordered fund of electronic objects, as well as to provide access to them using unified navigation and search tools [3].

The legislatively approved concept [2] of a national electronic library as “a federal state information system that is a collection of documents and information in electronic form, which are selected according to the methods for selection of objects of the National Electronic Library (below, the objects of the National Electronic Library) approved by the Government of the Russian Federation (below, the selection methods) to which access is provided to the users of the National Electronic Library, inclusively, with the use of the Internet information and communication network” confirms the correctness of the definition that is adopted in the standard and defines the field of development of electronic libraries as information systems.

In fact, the standard considers one type of EL, which is similar to the classic library that has a fund, a catalog based on metadata, user registration and content management modules, and means of preservation

and access. Remote-access electronic resources, to which libraries subscribe, are added to the library fund according to the accounting rules, which gives reason to consider hyperlinks to external objects as a fund element of the EL. The condition for inclusion of a hyperlink in the EL is providing access to content in the remote-access mode and preparation of metadata for this content.

Along with the classic type of an EL, electronic libraries exist that are based on other principles. This division is not yet relevant to the library community. Nevertheless, we must be ready to modify the standard, including cloud or synthetic libraries in it. A synthetic library means a system that does not have fixed components and supports the creation of new content (including interactive content) with the possibility of automatic data processing, integration with existing repositories (e.g., cloud repositories), use of remote control, management, and interaction with heterogeneous software and hardware tools.

Along with the basic definition of a standardization object, the project of the standard introduces the terms that characterize ELs: an object, collection, content, fund of an electronic library, as well as defines the concepts such as architecture, functionality, and policy. It is urgent to discuss these issues in the library community. In particular, the participants of the working group on the development of the standard ask the question of why did the word "object" appear in the GOST instead of the understandable term "document"? We understand an object of an electronic library as any identifiable storage unit that includes an electronic document. Particular attention should be paid to the term "operator of an electronic library," which, according to the Russian legislation [15], is an element of the organizational structure. The fact that there is an operator does not permit one to consider the presence of a specialized organization for the support of an electronic library and indicates the connection with a physical or juridical person who carries out activities on its operation rather than membership in the organization.

The policy of an electronic library is a relatively new concept, which means a set of rules and principles that regulate the activities of a particular library. It is presented by regulatory documents: the concept, provisions about electronic libraries, and other normative documents.

The standardization of the structure, main types, and technology of formation implies a typical electronic library, regardless of its membership, themes, types of documents, and other specific parameters.

When an electronic library was defined as a subtype of an information system, it was necessary to identify its characteristic features that distinguish it from other information systems. The most significant characteristics of this type of information systems include the presence of document information, as well as its long

storage and use. The characteristics of storage and use are described through functionality and services.

The basic functional capabilities (services) that must be provided by ELs should include the following:

- formation of a fund (registration, processing, exclusion of objects);
- storage and updating of data;
- navigation in the system, search and retrieval of information;
- data protection and information security;
- system management.

The functions of the EL are fully consistent with the information service functions and possibly are even wider. This the next step in the development of library information services. What has happened is now called "convergence"; the tasks and services of library and information services have joined. Apparently, the distribution of functions should be based on who generates electronic resources, who finances this necessary and costly process, and at what structures the supporting financial flows are targeted.

The services of the electronic library are subdivided into services for the creation and management of the fund and for the user service. The main services of the EL include: ensuring wider availability of documents for which the provision to readers is complicated or limited (rare books, photo albums, manuscripts, theses, archives, etc.); organizing funds of documents/publications that exist only in electronic form, their cataloging and providing access to them; and full-text and advanced searching over all of the materials of an EL. Additional services include built-in or built-on services: applications for the creation of new objects, provision of tools for research/development work, provision of communication processes, and integration with other information systems.

The service tasks of electronic libraries are implemented in the entire available information space: providing different types of searches (lexical and character attribute search) as well as allowing one to search according to the values of two and more characteristics simultaneously; consistent and selective viewing of the content of an information object and its structure: providing the multi-window mode of work; supporting the hyperlink apparatus; logging a user session with the ability to switch to any of the previous states of the system; the ability of the user of to set the system (defining a certain window layout, font sizes, etc.).

The architecture, content, structure, technology of formation, storage, organization of access to electronic libraries are almost identical to the similar elements of information services.

CONCLUSIONS

The development of a standard is an important step in defining the concept of an electronic library for the

information and library community. An electronic library is a subtype of an information system that must provide access to document information as well as have the function of its long-term storage and use. Despite the fact the project of the standard considers one type of electronic library that is close to the understanding of the classical library, the introduced characteristics establish a uniform basis for the further development of this field in the terminological and methodological aspects.

REFERENCES

1. Kolkova, N.I. and Skipor, I.L., A terminosystem of the subject area “electronic information resources:” A view from the positions of theory and practice, *Nauchn Tekh. Bibl.*, 2016, no.7, pp. 24–41.
2. Federal Law No. 342-FZ from July 3, 2016 On Amendments to the Federal Law On Librarianship regarding the creation of the federal state information system National Electronic Library, *Ross. Gaz.*, July 8, 2016. <http://www.rg.ru/2016/07/08/elbibl-dok.htm>. Cited August 4, 2016.
3. *Project GOST (State Standard) R 7.0.96-2016: SIBID. Electronic Libraries. Basic Types. Structure. Technology of Formation.* http://www.rsl.ru/datadocs/doc_7667va.pdf. Cited August 14, 2016.
4. COBOL: Initial specifications for a Common Business Oriented Language, 1960. http://bitsavers.informatik.uni-stuttgart.de/pdf/codasyl/COBOL_Report_Apr60.pdf. Cited August 15, 2016.
5. DL.org: Digital Library Interoperability, Best Practices and Modeling Foundations: 7 Core Concepts. <http://www.dl.org.eu/index.php/outcomes/digital-library-manifesto/7-core-concepts>. Cited August 16, 2016.
6. Arms, W.Y., *Electronic Libraries*, MIT Press, 2000.
7. Wikipedia: The Free Encyclopedia. <https://ru.wikipedia.org/wiki>. Cited May 10, 2016.
8. Network Resources of the Internet in Education and Digital Libraries. <http://www.e-lib.kemtip.ru/uploads/02/biblmm005.pdf>. Cited August 10, 2016.
9. National Electronic Library. The draft concept, in *Rossiiskaya gosudarstvennaya biblioteka* (Russian State Library), Maistrovich, T.V., Ed., St. Petersburg, 2003. <http://www.rsl.ru/pub.asp?13.htm>. Cited June 14, 2016.
10. Antopol'skii, A.B., *Lingvisticheskoe obespechenie elektronnykh bibliotek* (Linguistic Support of Electronic Libraries), Moscow: NTTs “Informregistr,” 2003, pp. 30–31.
11. Pontapleva, E.S., Electronic libraries as an integral part of the worldwide information society. <http://rlst.org.by/izdania/ib210/886/html>. Cited August 15, 2016.
12. Gornyi, E. and Vigurskii, K., Development of electronic libraries: World and Russian experience, problems, and prospects, in *Internet i rossiiskoe obshchestvo* (Internet and Russian Society), Semenov, I., Ed., Moscow: Gendal'f, 2002, <http://www.ifap.ru/library/book004.pdf>.
13. Electronic library as part of a single information space (based on the article by L.B. Kochetova). <http://www.elibconsult.ru/conceht>. Cited August 14, 2016.
14. Zemskov, A.I. and Shraiberg, Ya.L., *Elektronnye biblioteki: Uchebnik dlya vuzov* (Electronic Libraries: A Textbook for Universities), Moscow: Liberiya, 2003.
15. Federal Law FZ-No.149-FZ from July 27, 2006 On Information, Information Technologies, and Information Protection. <http://kremlin.ru/acts/bank/24157>. Cited August 16, 2016.

Translated by L. Solovyova