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SOME PROBLEMS OF MODEL FORMATİON OF İNTELLİGENT DİGİTAL LİBRARY NETWORKS

The article examines the history of digital libraries, organization of the new type of digital library networks, mutual integration with wiki technologies and social networks, and opportunities of creation of this kind of libraries in Azerbaijan are researchs.

Key words: *electronic library, virtual library, Wikipedia, social network, information recourses, Azerbaijan libraries.*

Introduction

Digital libraries are a better form of getting information than the previous methods. Although, the traditional libraries were the main parts of the society, in modern information age, when technology has developed, they don't become perfect, and structural changes are inevitable anyway. A modern computer and network technologies have changed the methods of communication between people and provide an information service through the computer for a user without going to the library. By this method it is possible to get any information from the various servers and parts of the world. In other words, the main duty of these systems is, independently of time and place, to provide the users with the worthy publications and other kinds of materials (for example: microforms, manuscripts and so on) changing them into digital version for distant usage [1].

In the period of the rapid development of information and telecommunication technologies, most people predict the disappearing of traditional libraries in future. One of the various approaches considers the creation of e-information carriers and d-libraries and they formed the development of service functions of traditional libraries as the part of existing libraries. In another approach, the librarians think that new d-libraries by the conversion of a library into e-system will solve the difficult problems have been existed for years, and there won't be any necessity in publishing fund anymore. It would not be appropriate to accept this and the word "library" in d-library term could give a wider meaning, i.e. connecting, structural, the virtual space gathered e-resources. Therefore, the exact definition of d-libraries has not been given yet; however, its meaning is still accepted as the same.

It should be noted that, there is still a demand in historically collected and printed publications, and therefore traditional libraries have to be functioned. Although, the using of digital information is more effective on economical, technical and legal points, many libraries do not link to this process. The creation of d-libraries has increased the development pace of the hybrid libraries, and the latest technical progress has created new opportunities for the formation of independent digital libraries without physical analogue.

The concept of d-library realization requires the understanding of EL conception, many ideologists claim that, it is an entirely new conception, has been developed for the last 10 years. At various times, the specialists predicted a d-library era and this term has become more discussing topic since then.

If we consider that, the application of integrated library systems in traditional libraries get together not only the documents collection and information focuses, but also navigation methods, metadata system (directory), paying of users surveys and provides information on the principles of automated work. Then it could be said that, d-libraries are completely new systems and are able to bring more innovations [2].

Nowadays, d-libraries cannot be considered as any direction, but as an ideology and becomes an integral part of activities in any fields. In modern web environment to use the

information system and to develop it has become the process for the one in the field of science, culture and technology, who exchanges information.

The investigation and analysis of d-libraries formation principles

D-libraries have spread for the last 10 years of the twentieth century and become the subject of widespread research. These processes were considered in the West in 1992-94, and in Russia in 1996-99. However, it was yet observed in the middle of the last century [3]. *The creators of the electronic library:* these issues are not new; many scientists such as Vannevar Bush and J.C.R.Licklider were specially engaged in this direction. In July 1945, when V.Bush was the head of American Scientific Research Agency (ASRA), his article "How we think?" was published in the journal "Monthly Atlantic".

In this paper, the potential opportunities of collection, storage, processing and search of information were presented. Despite of passing more than half a century, many considerations and analytical opinions are still keeping their actuality.

The employee of Massachusetts Institute J.C.R.Licklider in the 60s libraries conducted the research about the future impact of digital computer techniques on the functions of libraries. In his monograph "Libraries in the future" published in 1965, he enclosed the methodology of electronic libraries creation and made definite researches. However, this work hasn't gained its value and this book can be indicated as a main source about d-library [1].

One of the most successful projects by Michael Hart is the project "Guttenberg" in 1971 started with a budget of $ 100 million. Initially, such books as the "Declaration of Independence of the United States", "The Constitution", "Bible" became digital. Later in 1973, government documents such as the Bill of Rights, the Constitution of the United States and works "Alice in Wonderlands", "Peter Pen," have been added to the list. However, it was not included as the government program, and then added resources and technical supply were supported by volunteers, and enthusiasts [4]. It was noted that, the project "Guttenberg" contributed positive results to d-library environment. The expanding e-resource, cooperated activities among the experts of various fields can be marked as these results [5].

The purposes of creation of d-libraries

The main purposes on the digitalization of documents or the development of e-versions of collected resources are as follows:
- The organization of materials usage gathered in different funds and collections without taking into account the border and spatial barriers. Text, image and other multimedia resources, as well as rare and less published resources are also included there;
- To expand the scope of information users and manufacturers out of library organizations and companies [6];
- The liquidation of physical and social barriers and the creation of perfect information delivery system in the information adoption;
- The liquidation of time limits on getting information , i.e. to follow the principle of the 24-hour work schedule;
- The provision of very rare and valuable books and printed materials;
- The forming of corporative usage of open or commercial resources virtually situated in the servers or other bodies of library, archive and other information properties [7].

The economic aspects of d-libraries

The most outstanding feature of d-libraries is its economical advantage. Observing the structure of traditional library, we can say that its creation and placement cost significant expenses. On the other hand, the formation of fund, the potential involvement of staff and other

factors can be added as well. J.C.R.Licklider in his book "Libraries in future" predicted the further 30 years of d-libraries positions, considering PC memory 1 bytes for 1 USD.

His conclusion was confirmed in some and the economic advantages of d-libraries have been observed in the recent years. This is connected with the falling of prices of IKT.

The maintenance and dissemination of information can be particularly recorded. In 1987, during the use of project "Mercury" the price of each computer provided with of 10-GB disk memory was 120,000 USD. In 1997, a more powerful computer with the same parameters was 4000 USD. It has been 97% of price fall this year and it is possible to increase for the next 10 years. Yet, it becomes more profitable to create the elements directly in e-for as a traditional form.

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The structure, hardware and software maintenance of d-library networks

The four main aspects are noted in formation of d-libraries:

1. Electronic conversation (security) is cheaper than printed form. A lot of users sometimes face problems while using the different libraries. Many libraries are located in old buildings; this creates environmental and technical difficulties. At present, the development of computer technology and the falling of prices to 97% informs of serious changes. This contributes to the increasing of e-resources volume.

2. Easy use of the personal computer monitors. The storage of information is not the only factor. Due to the low technical capacities, few users have preferred to read from the monitors for the recent years. However, the gained achievements are leaded to minimize the damage to human and focused on comfort provision.

3. Increasing the number of high-speed networks. The decrease of tariff prices and access technologies, the improvement of technical capacities make Internet the perfect example of global network integration. Also the integration of local networks of some offices, institutions can be concerned there.

4. Portable computers, an "e-reader" s and mobile use.
The computers volume as one of the most important application elements of networking technologies in d-libraries has decreased in weight and this has increased the use rate. This provides the use of d-library resources through the notebook, e-reader, and (e-file to read a technical manual) and smart phones any Internet-connected anywhere. The improvement, high-quality and cost effectiveness of displays of technical means increase its use terms [7].

5. One of the necessary conditions for the creation of d-libraries is high-throughput capable hardware.

The use of architecture of intelligent d-library networks

To understand and build the architecture of intelligent d-library networks, first of all, we should observe the world practice. In the modern information century there are d-libraries with various structures, thematic and information sources. However, the main goal is faster, high-quality and based on reliable sources information [8]. One of the d-library networks in recent years "Hath Trust" d-library can be shown as an example."Hath Trust" is a large-scale electronic

repository intended for general usage. In 2008, 25 research libraries, collected to start the project of d-library, which was targeted to create stable, growing, expanding infrastructure providing the storage, management and use of information in collections. The indicator of this perfectly-made project for 2009 was a more than 5 miles, but in 2010 it was 8 miles. "Hath Trust", formed as an alternative to "Google Books" products, according to its structural opportunities is a good example for collection and processing of mass digital products. With the corporative management of partner organizations created by this repository infrastructure, the information content is defined. It should also be noted that, most part this base isn't opened to public and protected by copyright. However, definite resources have been become OA (open access). At present, most content of "Hath Trust" base has been purchased from Google Company on the framework of "Google Books" project. The rapid development of Internet technologies has caused to the creation of different online resources and these servers focus on various technological structures, resources and users. While examining the following technologies it can be concluded that, the integration of these technical innovations to d-libraries may lead to the creation of new generation of intelligent information d-library networks. In this sense, it would be advisable to analyze the technological possibilities of two major global information systems "Wikipedia" and "The Social Network" [10].

Wiki technologies

Another popular online resource is Wikipedia. At the beginning of the XXI century Wiki technology was established. Paying attention to the structure of wiki technologies, we can observe a completely new model for the establishment of d-library networks. In other words, as the distinguishing feature of information systems, the creation of content by the principle of intervention within the defined framework is directly supported by project members and users. As examples, these technologies and free expanded Wikipedia, which was created through Internet by volunteers in many world languages? The main difference of this encyclopedia from the Britannica is its accessibility, i.e. it can be edited by any user in the Internet. The changes done in the articles placed here are divided into a few parts:

- Spelling changes;
- Adding of new information to the article;
- The complete changing of the information;
- The destruction of existing information.

Wikipedia does not serve the stated structures. However, in such countries as Russia, America, Germany, enormous information of this encyclopedia is used to provide information to the authorities.

The usage type of this encyclopedia depends on the category of users. In other words, users can be divided into 3 categories: 1. Anonymous members (not registered); 2. Official members; 3 Administrative groups.

Now, let's cast a glance at problematic aspects of Wikipedia. On opinions of Internet users the biggest problem of Wikipedia is network vandals. These types of users publish false information or destroy the real information. On Wiki-based technologies in 2007, by Larry Sanger, one of the founders of Wikipedia, an alternative online encyclopedia the Citizendium was launched. Like Wikipedia, the Citizendium was a free service and the massive information was created by users. However, the main difference of Citizendium from Wikipedia is that, the author of published articles must be shown and be approved by experts. The main goal of it was to reveal the problems of Wikipedia and to eliminate many problems and misinformation. Larry Sanger confirm in his note: "I was disappointed that, even owning all authorities, the users harm Wikipedia" [10].

Social networks

One of the major themes of modern life is "Social Network". It would be a misunderstanding to consider that, this term was created after the words "computer technology, mobile communication". The noted idea has been investigated for more than 100 years, and social network analysis has been formed as a science and combines sociology, psychology, anthropology, management, computer sciences, and the elements of information technology. The term "social network" was included to "human relations" in 1954, by Manchester sociologist James Barns and was suggested in the book "the classes and communities of Norway church island"[11]. As it is known the popularity of SN has rapidly grown in recent years. Even many librarians and IKT specialists have subscribed to different social networks as Twitter and Facebook; they still don't understand their conception. The most important aspect of this particular form of network is that it connects people with the same interest in different parts of the world regardless of their social status, religion and language, coordinates and creates opportunities for information exchange and cooperative activity. Considering that the printing press was invented and the changes were felt only 150 years ago, therefore, social network has been understood for 15 years. This causes the increasing of intensity usage from these technologies in e-mail, search systems, portals, and other services. It should be noted that, the psychological impact of these networks on individuals and groups is a strong tool on changing positively or negatively [11]. Paying attention to the given ideas, we can see that, the model based on the social network technologies of d-libraries with extra functions is like open wiki d-library systems. The main emphasis here is aimed at the development of users' content. From this point of view the formation of academic user groups creates an environment for collective conducting of information processing, analysis and exchange processes of scientific ideas, achievements. The technological opportunities for the formation of globally and regionally academic, cultural social d-library networks have already been created. As initial steps, many d-libraries are currently integrated to such globally known social networks as "Twitter" and "Facebook". For example, in October of 2009, the California Digital Library joined to one of the global social networks "Twitter" and since then has organized a faster and more efficient information services for its users [12]. Undoubtly, expanding these opportunities, d-libraries can improve technologies for changing into social network.

Intelligent processing and analysis of registered data collected in intelligent d-libraries

Intelligent d-library network defines the new organization forms of collecting, formation, systematized usage of registered data and information resources collected on country, region, city, town, village, and other divisions. If we divide this process into 3 parts, the quality of the last usage organizes a high importance. So, one of the fundamental problems of intelligent d-library formation is the existence of intelligent support elements for their users. However, prior to this process, the right selecting and processing of resources plays a crucial role in the intelligent formation of d-library. In 70s of the XX century, with the development of computational techniques and automated systems, the term "information resources" is included in literature. And in 80s, with the development of database conception this term was more widely spread. The information resources after the economical, labor, material and financial resources were considered as the fourth part. The information resources are considered as the formation of registered data of various information reserves and sources for multi-purpose social production and management of people as a result of science and practice activities. The simple and wide explanation of information resources is data. Initially, it is the information obtained by means of information and communication technologies in network. Secondly, it is traditionally and electronically registered, protected and disseminated information. Nowadays, the formation of information resources reflects complex and multiform object and it can be characterized as follows:

- Subject of information;
- The property right for information;
- Access to information: open access and privacy of information;
- Submission forms of information: documents with different formats, metadata, databases and so on.

The creation of ICT has caused the fundamental changes in the formation and usage of information resources. This leads the following opportunities:

- Large-sized compact storage of information;
- Its quick, fast and based on various search sites access;
- The distant use of resources regardless of physical distance;
- The writing of data with various formats to an information carrier;
- The combination of bibliographic and full-text data bases [13].

The changes on this encourage the creation of information systems for more efficient, qualified and systematic formation of information resources. So, information resources create information system. According to the Act of the Republic of Azerbaijan "About information, informatization and information protection", the information system is a regulated content of technical organization of information technolgies and documents, including computer engineering techniques"[14]. As it can be seen, the information resources after formation in information systems changes into registered data and the basic procedures as analysis, processing and presentation of collected data are carried out.

The creation of Internet and the rapid development of ICT have caused the strengthening of information, the expansion of information space and the strictness of issues. The above-mentioned scientific and technical progress is increasing the need for accurate and quality information. Therefore, the processing and analysis processes of all data have a great importance. As it is mentioned, one of the most discussed scientific objects in the XXI century is d-libraries as part of modern information systems. In general, a library means first of all, an excellent, structured, intelligent resource. Digital libraries are a powerful search tool for professionals working in various fields and a conducive environment for information processing, analysis and dissemination procedures. The advantages of collected data files are preparation of content and information mass by ICT professionals and academic specialists, i.e. it was collected by custom synthesis and this has a great importance for the professional user. The creation of such a huge database sets the automated –intelligent formation of information, then its processing and analysis.

The establishment of intelligent d-library network and the predictions on the intelligent processing and analysis of registered data

As it is known, the Azerbaijan Republic has a special place in the global space by its material, cultural and scientific heritage. The transmission of this information collected over the years to future generations, the expansion of our national intelligent power in the world is becoming one of the most important directions. Today, electronic processes infromasiya and correct e-mail (virtual) depends on the conduct of policy. One of the most important forms of this policy is becoming a national model for the creation and development of d-library networks. As it is known, in technological processes the issues of increasing intelligence and it's comfortably management are emphasized. In this regard, on the establishment of d-library networks and its database formation provide us to predict the following:

- When the information is included into database, the procedures of its automatic diagnostics occur and its subject, format, legality is determined. This also can be called "an expert system". This intelligent system has abilities to get information, to make synthesis and analysis processes;

- When the information in current database is not found, sending query to corporative network, the determination of the initial server search according to query subject is happened. The correct search of information is the factors of speed and quality. For example: If there is not enough information about the citrus plants in the northern districts of our republic, the system determines in which districts one can find needed information. It can be called as an IEILS(Intelligent Inter-d-libraries Subscription);
- The logic operators on information search
- By the assistance of these operators the system predicts what will happen in your next search. During each search process a memory system for a user that as a result it creates the user's profile. The inductive and deductive logic operators are used for the acquisition of new knowledges.The process of translation of foreign resources automatically into Azerbaijani language (the main purpose of creating this operation is to eliminate the language barrier for the users with 1935 to 1970 date of birth);
- Biometric features: isometric opportunities: the voice authorization and the variety of opportunities as private account or credit. For example: the organization of users group, different exhibitions, forums and online conferences (on social network example);
- The system testing the users' knowledge and requests. The collection of each user's private registration data as a result of this process;
- When users send a query to intelligent system, the usage opportunities of of demanded information must be defined and its beneficiaries and hazardarous features have to be analyzed. When information if useful for the user, it is leaded to appropriate data. Otherwise, it must be directed to the proper sources related to a request.
- On creating each user's profile, according to administrative divisions the cultural and scientific profile of regions is created. In this case, more information is formed according to the political, social and geographical position of the   district [15].

The application perspectives of collected results

As for our republic, in the last 5 years some progress has been in scientific and practical development of d-libraries. Various scientific, media establishments have established virtual libraries on their print and e-resources databases. For example: Haydar Aliyev Heritage D-library, Music World, History.az, Guttenberg-az, Azeribooks, Kitab-az, Kitabkhana-org; Libraries of republic level: The National Library named after M.F.Akhundov, The President Library, The Republic Youth Library named after J.Jabbarli, The Children Library named after F.Kocharli; D-libraries established on the base of university libraries: D-library of Baku State University, Information Resource Complex-Azerbaijan University of Languages, The Library of Khazar University, The Library of Qafqaz University and so on. Although these established d-libraries locally meet certain modern technical rules, globally during the integration to information space they don't match the standards, in the process of digitalization of resources, in corporately directions there are still shortcomings.

Now, let's observe the application opportunities according to predicted ideas. Conditionally, each region in the first stage forms its own resources, i.e. formation of information resources, creation of bibliographic descriptions (metadata), preparation of full-text documentation, analyses of program and technical supported problems and so on.

In the later stages the implementation of information exchange with other environmental and remote regions, the process of network establishment and generally, creation of e-contacts can be planned. This database can be presented as a web portal owning advanced search, navigation and etc. elements. The main goal is any resident of the region regardless of age, category, social status, education able to use this information. It is known that, different nations live in the territory of Azerbaijan and this requires the creation of multi-lingual interface. In the

next stages, the effectiveness of glossary and thesaurus system, one the main search field of fore coming d-library is highlighted. Technically modern d-library must support Z39.50 protocol, MARC, XML, MODS, Dublin Core formats. We can see a few main issues here [16].

- The formation, analyze and storage of resources for collection of mentioned information;
- The creation of various tables, VB and metadata;
- The creation of easily managed and intelligent interface;
- The registration process of d-library users (the appropriate subject of users and systematization must be taken into consideration);
- The creation of virtual groups and social networks in the scope of d-libraries;
- The statistics of information of d-library attendance, user's activity, request of any type of information in the region and so on.

The technical and practical solution to these problems creates conditions to studying of social, scientific and cultural positions and investigating the ways of the formation of the correct information environment. The need of which kind of information, the ways of its submission, the analysis of harmful information, the search of accurate sources on query theme, the law issues are for come. It can be seen in examples.

Example 1. The cotton-growing is the major job direction in lowlands and it is necessary to know which measures must be done to meet the population's information needs. Kind of data formation and so on;

Example 2. It is necessary for the users of western regions to apply IDL DB for getting accurate data, in the case of information lack about the Caspian Sea;

Example 3. The revealing of the plagiarism issues during the information use.

Conclusion

The given proposals and forecasts can be seen short in writing, by providing time, technical and human resources, is possible to observe a long-term project map. We can apply it not in fragmented form, but as a digital library of whole Azerbaijan. These efforts in the field of d-libraries in our republic except the scientific and technical progress, is the description of historical way of Azerbaijan biography for information provision of future generation. In this way, it can be marked as the formation of the beginning of National Digital memory.

Reference

1. Arms W.Y. Digital Libraries, MIT Press, Cambridge, MIT Press, 2000, 287 p.
2. Designing and Building Integrated Digital Library Systems, Guidelines / By Bente Dahl Rathje, Margaret McGrory, Carol Pollitt, Paivi Voutilainen under the auspices of the IFLA Libraries for the Blind Section The Hague, IFLA Headquarters, 2005, 67 p. (IFLA Professional Reports : 90)
3. Schrieberg Y.L. The history of d-libraries, http://www.elibconsult.ru/page.jsp?pk=node_1254227059000
4. The history and philosophy of Guttenberg project, http://www.intmedia.ru/ edu/pg.htm
5. Ilyin Y. Web libraries and copyright: will be the war?, http://www.membrana.ru/particle/1620 (in Russian)
6. Shiri A. Digital library research: current developments and trends, http://eprints.rclis.org/bitstream/10760/4905/1/ASLRcolumn.pdf
7. Lesk M. Understanding digital libraries / Morgan Kaupman Publishers, 2005, 413 p.
8. http://www.oclc.org
9. Hoskins K. Collective repository Hath Trust as the safer and distributor of world book culture // Hoskins Kevin, Jeremy York, http://www.hathitrust.org/documents/ HathiTrust-Rumyantsev-201003.pdf

10. Aliguliyev R.M., Alekberova I.Y. Wikipedia: Virtual encyclopedia, Baku, Information Technologies, 2010, 184 p. (in Azeri)
11. Aliguliyev R.M., Imamverdiyev Y., Abdullayeva F., Social networks, Baku, Information Technologies, 2010. 286 p. (in Azeri)
12. Starr J. California digital library in Twitter-Land // Computers in libraries, http://www.ebsco.com
13. Feodorov V.V. The information resource of society: problems of formation and usage//Scient. And techn.libr, 2002, № 6, pp.16-24. (in Russian)
14. Act of the Republic of Azerbaijan "About information, informatization and information protection, http://www.az.president.az/documents/laws (in Azeri)
15. Osipov Q.S. Getting knowledge by intelligent systems: Bases of theory and technology, M., Nauka, Physmathlit, 1997, 112 p. (in Russian)
16. Heath B.P., McArthur D.J., McClelland M.K., Vetter R.J. Metadata lessons from the iLumina Digital Library / Communication of the ACM, july 2005, vol.48, No.7.

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İntellektual eklektron kitabxana şəbəkələri modelinin yaradılmasının bəzi məsələləri

Məqalədə elektron kitabxanaların yaranma tarixi, yeni tipli intellektual elektron kitabxana şəbəkərlərinin formalaşdırılması prinsipləri, viki-texnologiyalar və sosial şəbəkələrlə qarşılıqlı inteqrasiyası tədqiq və təhlil edilmiş, ölkəmizdə bu tipli elektron kitabxanaların yaradılması imkanları araşdırılmışdır.

Açar sözlər: *elektron kitabxana, virtual kitabxana, Vikipediya, sosial şəbəkə, informasiya resursları, Azərbaycan kitabxanaları.*

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Некоторые вопросы создания архитектуры интеллектуальных электронных библиотечных сетей

В статье изучаются история электронных библиотек, организация нового типа цифровых библиотечных сетей и их взаимная интеграция с технологиями вики и социальными сетями, исследуемые возможности создания таких библиотек в Азербайджане.

Ключевые слова: *электронная библиотека, виртуальная библиотека, Википедия, социальные сети, информационные ресурсы, азербайджанские библиотеки.*