

**INFORMATION ENGINEERING AS THE SUBJECT OF TEACHING**

*The article contains the description of modern library activities, such as the information engineering, and describes the following ten characteristics: 1. the information theory; 2. the classification of information; 3. the information environment and space; 4. the information modeling; 5. the information services; 6. the information market; 7. the information resources; 8. the information retrieval systems; 9. the information threats and wars; 10. the information security and protection.*

In the 70s, when the author of this article was studying the librarianship, the library practice adapted technical innovations that had to be got acquainted with after the graduation. The scientific and technical progress was at pick in the 80s. The computerization of information processes and the further globalization processes pointed to the incompetence of library graduates in the prediction of library and information processes.

The introduction lack of prospects of library and information activities is felt in the theoretical and practical training of students. The prospect was dictated by the scientific and technical progress (according to the modern terms that is computerization and digitization), including the socio-economic culture. Library professionals did not have time for innovations, they adapted to new requirements, dictating by the implement of new technologies. At the time, when the library scientists began to call the classical concept "librarianship" in a new way – "library and information activities", it was necessary to have the complex subjects for the formation of qualified librarians who should support the activities of the "information engineer" both in form and in fact.

In the twentieth century, the problem of the information engineering was discussed in the professional press and attracted the attention of specialists in different fields of activities. However, we do not have a comprehensive academic research and a clear definition of the basic concept until now.

Some experts understand the information engineering as the field of information technology and communication systems. Other experts consider the information engineering as an approach to the development of information systems and their design. You can get the bachelor degree in "Information Engineering" at the University of Chi Dzian in the People's Republic of China. Introduction of the training program gives reasons to believe that here it is being discussed about the engineering of information and communication tools, and the priority is given to the development of information and technology tools.

We understand the information engineering in a wider sense.

The word "engineer" is of Arabian origin: "Muhandis" means "a person who knows the geometry". It is used in all Muslim countries in this sense. In Latin, the word "engineer" means "the ability, ingenuity". In ancient times, the engineer was the man who drove the war machines. In the sixteenth century, the Dutch began to call the engineers those, who involved in the construction of bridges and roads. Since the eighteenth century, the concept has begun to be used in Russia.

In the twentieth century, engineering began to differentiate quickly. Now, an engineer is called the person who is highly qualified and performs a specific (not only technical) responsibilities in various fields. There are 5 basic principles that were underlain in the engineering activities:

1. To define the purpose.
2. To develop the information about materials (or products) in order to achieve the goal.
3. To develop the information about tools in order to achieve the goal.
4. To model and standardize in order to achieve the goal.
5. To manage and control the processes in order to achieve the goal. [2]

These classical principles have been implemented in the library activities since the ancient times and they got more vivid expression in the modern information society.

In our opinion, the information engineering should be understood as a set of interrelated components:

1. The information theory.
2. The classification of information.
3. The information environment and space.
4. The information modeling.
5. The information service.
6. The information market (free and paid services).
7. The information resources.
8. The information retrieval systems.
9. The information threats and wars.

#### 10. The information security and protection.

Then there is the possibility of system understanding of information activities of libraries, which is implemented on the basis of modern technological tools. So, let's consider the theoretical background of this view on library activities.

##### **1. The information theory has changed from mathematical theory into social one.**

Among the researchers of the information theory, the book "Introduction to the information theory (source coding)", published by V.D. Kolesnik and G.Sh. Poltirevyi in 1980, attracts our attention [3]. The researchers believe that the problem of the information theory became an independent research object in the works of American mathematician and engineer Claude Shannon in 1948. Shannon created a mathematical information theory, which was based on a theorem, and it played an important role in the development of cybernetics in the 1960s and 1970s.

Great services in the development of the theoretical information concept belong to the Russian scientist I. I. Yuzvishin, the creator of the great scientific theory, which is called the information science. The information theory in the context of information engineering is reflected in the book "Fundamentals of the information science" published by I.I. Yuzvishin in 2000 [4].

##### **2. People have been making the information classification since the ancient times.**

A lot of acknowledged scientists tried to develop their own classifications, to group objects by fields, to create a logical system, and thus to learn the universe, the logic existence, etc. Documentary sources record the hundreds of such examples, which are typical for the last 2,000 years of human history. The evolution of classification theories was carried out in various ways: from the applied thesauruses to the theoretically based glossaries of basic sciences and conversely, from the glossaries of basic sciences to the separate thesauruses. Despite this, the problem of scientific and logical explanation remains the relevant topic of discussion in the developed classification systems nowadays.

##### **3. The information environment and space are global in nature.**

Today, there are no territories and states, remaining outside the global information processes. The experience shows that you can not isolate from the global information processes, and you should actively participate in them.

Experts give the greater role to the media in forming of the information environment, note that if the press affects the information environment at a particular time, in the result of this systematic press (media reports), libraries will have a continuous impact force. From this point of view, the information engineering should examine and evaluate the factor of "information hunger", learn the information environment and information impacts on consumers.

##### **4. People have been making the information modeling for a long time.**

It is important to determine the information elements that are relevant to the information security of professionals and other categories of information users. We are confronted with complex information models in the medieval eastern poetry, in the European philosophical school, and in encyclopedias. The bibliographic description and bibliographic services are perfect models that have been successfully applied in the library activities. S. Kramer, in his study "The story begins in Sumer" [5], identified the oldest library catalog with the specific search features that focused on the reader needs of that time. Thus, the information modeling is required in many areas of library operations. A complex model of information should be created in order to convert the uncertain reader's demand (consumer) into particular (articulated) query. Library statistics plays an important role in creating a social-psychological model of the reader, identifying the consumer demand, the information modeling which is necessary for the formation of new library and information products, forecasting the needs of readers, etc.

##### **5. Libraries are the most ancient institutions of information services.**

Library as a social institution appeared in response to the growing cultural needs of the society and still is probably the only information organization, meeting the requirements of flexibility and reliability. At all times, performing its information mission, libraries were under the care of the state, served for the progressive development of society and fulfilled humanistic, educational function. Some experts believe that the library should serve its users without focusing the attention on the content of the disseminated information. We believe that the library service should be open and accessible to all members of society. But it eliminates the propaganda of false, inhumane information by the library and spreading misinformation.

The priority interests of the state, national interests and universal values should be considered in the activities of each library. And that requires a highly skilled library professionals. The information service in the context of the information engineering must be reliable, disinterested and affordable.

##### **6. Market nature of the information clearly manifested itself in the twentieth century.**

Today, the commercial value of information is one of the important factors. The experience of recent years shows that Dan Brown, having received the world readership fame in a year time (we all know how that happened), has a larger amount of his books than F.M. Dostoevsky, being promoted for many years. Obviously, if active players operate on the information market (not just the consulting firms and commercial companies), market mechanisms will work, and social information that forms the true values become a full member of the market. But in spite of this, the price of information is conditional, subjective, changeable over time and space. Staying faithful to the basic provisions of information science, it is necessary to ascertain that the information is invaluable, plays a crucial role in the creation, formation, development and protection of society.

#### **7. Experts called the information resources as the noosphere.**

Most of the information mass is collected, systematized and stored in the library holdings. Alternatives of library collections still does not exist. The main carriers of information resources and documentary information are widely commented in the trade literature. If you add the resources of social media, it will open a wider view.

#### **8. Information retrieval systems have come through a long historical path of development before the use of modern sophisticated technological tools.**

S. Kramer in his book [5] points out that the catalog began to be compiled in libraries in the era of the ancient Sumerian culture (5000 years ago). Electronic library retrieval systems, forming lately, are different from the classic card and printed directories and files for quick and multiple searches, practicality, and some other parameters. But traditional directories, being the primary source of electronic information retrieval, have retained their value.

#### **9. Malware in condition of opposition are turning into the information struggle.**

Information weapons are born in this struggle. Researchers give a definition of information weapons as technology, acting on the information system, its media and mentality of the enemy. The transformation of information struggle into the information war was common in the last century.

Malware took place at all times. But the impact force of these threats increased nowadays. The processes of information processing, information protection against misinformation, false and manipulative information are inherent in both classical and modern libraries. The modern librarian has information about the geopolitical, geo-economic and geo-culturological processes and actively participates in the development of information fund. In this regard, librarians as information engineers need to avoid the information effects and become the elements of information struggle.

Librarians act as a group of “anti-diversionists” in the modern library and information processes. Carrying out the collection, processing, and data protection, librarians can and should take expert advice to the relevant disciplines, so as to avoid all sorts of misinformation.

#### **10. The information security and data protection generate each other.**

Different methods were used for the information security in various times.

In the III-V centuries Christian sects hid the Gospels of Christ in order to protect it, and in the XIII century French scientist R. Bacon used the seven types of cryptographic writing [2].

In the VII century, the first verses of the Quran, a thousand Hafiz-Quran (memorized) learnt by heart in order to preserve and protect them.

Today, the information security is more broadly understood as the national security, the state and individual security. Some authors limit the information security by the scope of software and security of electronic resources. This is one point of the case. On the other hand, the legal provision of information security and its protection is an equally important factor. The proverb “What we defend, that we possess” becomes more and more urgent.

Thus, librarianship of XXI century was mastering the concept of information engineering, should allow its use in the library practice. The study of the information sources, the development of models of information services and retrieval systems, the protection against information threats and attacks contribute to giving greater importance to the modern concept of “library”. All components of the information engineering are implemented in the library activities. We believe that there is a need for a broader study of these components [10].

In conclusion, we can give the following definition of the concept “information engineering”. It is a complex activity in order to create various information processes, design techniques and application, and plan the implementation of information services [2].

In conditions of the increasing role of economic factors in society, the development of the information market, the study of complex problems of information offer and demand, organizations of information services and protection against information threats and impacts gain the particular topicality.

Their interpretation in the context of the “information engineering” provides consistency and conceptuality of produced theoretical, methodological and organizational decisions.

The introduction of the concept of information engineering in the learning process for students and practitioners will provide with actualization and modernization of the educational process in the context of the contemporary global information society in the field of library management.

1. *Halafov A.A. Vvedenije v bibliotekovedenije / Halafov A.A.-Baku, 2003. - 350 s.*
2. *Kazimi P.F. Informacionnaja injenerija / Kazimi P.F.- Baku, 2011. - 230 s.*
3. *Kolesnik V.D. Vvedenije v teoriju informacii / Kolesnik V.D., Poltyrev H.S. - Leningrad, 1980. - 180 s.*
4. *Jusvishyn I.I. Osnovy informaciologii/ Jusvishyn I.I. - Moskva, 2000. - 517 s.*
5. *Kramer S. Istorija nachinajetsja w Shumere / Kramer S. - Baku, 2009. – 230 s.*
6. *Rustamov A. Informatika / Rustamov A. - Baku, 2000. – 400 s.*
7. *Alijev T. Ekonomika informacii / Alijev T.- Baku, 2000. – 310 s.*
8. *Grinberg T.E. Politicheskije tehnologii / Grinberg T.E..- Moskva, 2009.- 317 s.*
9. *Rustamov A. Nositeli documentnoj informacii/ Rustamov A., Mamedov M.E. - Baku, 2000. – Baku, 2010. – 300 s.*
10. *Halafov A.A. Komputerizacija bibliotechnoj raboty/ Halafov A.A., Kurbanov A. - Baku, 2010. – 260 s.*