

Personal Information Security as a Global Problem

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ABSTRACT

The article is devoted to the analysis of security problems in the modern world. The authors consider the nature and essence of information, analyze the concept of information security in a wide and narrow sense. It is noted that the practice of implementing information technologies without linking with ensuring information security significantly increases the likelihood of information threats, among which the problem of information inequality, the possibility of manipulation of consciousness, cyber illness, computer crime, information warfare, etc. This means that security measures must be comprehensive and contain not only instrumental and technological measures, but also ideological and cultural measures - educational in nature, providing the appropriate orientation of the individual.

Keywords: information, information security, computer security, information technology, Information Security Doctrine of the Russian Federation, N. Wiener, C. Shannon, J. Schreider, information threats, information inequality, information warfare

I. INTRODUCTION

The informatization of society has given rise to a set of fundamentally new problems that humanity has not encountered throughout the history of its development. We are talking about the problems of ensuring the information security of man, society, the state and the entire biosphere of our planet.

Modern society is characterized by an ever-increasing rate of informatization, is being virtualized, as a result of which a special, informational consciousness is being formed, based on the possibilities to widely use the benefits of the period of scientific and technological transformations unprecedented in the history of mankind. The scale of informatization is increasing, the role of the information sector of the economy is increasing, networks and means of information communication are rapidly developing, the way of life of people is changing in the new information environment, and professional activities are being informatized [1]. Today, there is no doubt that the “digital revolution” is and will have a powerful impact on all spheres of society.

At the same time, it would be a serious mistake to present the prospects for the development of an electronic digital society only in romantic and glowing colors. The globalization of informatization processes

has led to aggravation of many social problems, for example, related to intellectual property. The most important consequence of the information revolution in modern society has also become the actualization of the problem of information security.

Today, many of the most important interests of man, society and the state are largely determined by the state of the information sphere surrounding them. The expansion of the application of information technology, being a factor in the development of the economy and improving the functioning of public and state institutions, at the same time creates new information threats. Opportunities for cross-border circulation of information are increasingly used to achieve geopolitical, military-political contradicting international law, as well as terrorist, extremist, criminal and other unlawful goals contrary to international law to the detriment of international security and strategic stability [2]. At the same time, the practice of implementing information technologies without linking with ensuring information security significantly increases the likelihood of information threats.

The study of these problems began practically only in the last decades of the 20th century, but the results already obtained allow us to say that here we are dealing with a new and multifaceted phenomenon in the

development of society, which, of course, will have very significant consequences for this development.

II. INFORMATION AND INFORMATION SECURITY: NATURE AND ESSENCE

One of the significant methodological problems of ensuring the information security of a person in modern society is the understanding of the nature and essence of information. Scientific, philosophical understanding of this concept is one of the most important tasks of modern knowledge. Information today acts as the main object of study of many sciences. Moreover, the current level of development of scientific knowledge does not yet allow for an accurate and complete definition of this concept, its subject field expands and deepens with the development of our understanding of the world. In addition, the phenomenon of information is a multifaceted phenomenon that manifests its properties differently in different situations.

At the level of everyday consciousness, information is most often interpreted as information, messages transmitted from person to person and informing of some phenomena, events or processes. But such an interpretation does not exhaust the entire content of this concept. So, there is information about the surrounding reality that a person receives through his senses - the temperature of the environment, time of day, terrain, etc. Such information can be obtained directly from the outside world, without the participation of another person. N. Wiener in his work "Cybernetics and Society" defines information as "a designation of content received from the outside world in the process of our adaptation to it and the adaptation of our feelings to it" [3]. In this case, information is determined through the category "content of the external world" and is directly linked to a person, his thinking and the process of adapting a person to the phenomena and events of the external world. In other words, according to Wiener, information outside of human consciousness does not exist. This approach to the concept of information can be characterized as anthropological.

The anthropological principle of the interpretation of the concept of "information" until recently satisfactorily worked in a wide variety of areas of human knowledge. However, due to the widespread adoption of computer technology, its shortcomings are increasingly evident. Firstly, the approach to information as data does not allow to adequately interpret information processes in such objects as computer programs, computer networks, artificial intelligence systems, where the processes of obtaining and transforming information can take place without the stage of understanding them by a person. Secondly, in the framework of the anthropological approach, it is impossible to find an adequate explanation of the genetic information of wildlife. In this regard, there is a

need to expand the subject field of the concept of information, which, along with the exchange of information between man and man, should also include a similar exchange between man and machine, machine and machine, signal exchange in the animal and plant world, transmission of signs from the cell to the cage.

The scientific theory of information begins with the works of C. Shannon, published in the late 40s of the XX century, in which information was understood not as any message, but only those that reduce the uncertainty of the recipient of this message. Moreover, uncertainty exists when one of several options is selected. Shannon understood information as a reflection of one object in another, used to form control actions on the object. This reflection (information model) of an object has its own internal structure, which determines the meaning of the information: the correspondence of a reflection to a specific controlled or investigated object. The objective function of information is characterized by its ability to influence management processes. Shannon's theory substantiated a cybernetic approach to information: the idea of a code and a channel for transmitting information came to the fore, and the amount of information characterizing a given message was determined by the set of all possible messages and their probabilities, regardless of the semantic content. Currently, the development of the cybernetic concept of information takes place in three main directions: - analysis of the information structure of real systems (technical, physical, biological, social, etc.); - development of principles of information reflection; - development of principles for the creation of hardware and software for computer science.

The problems of information theory were discussed in our country. In the early 60s of the twentieth century, Yu.A. Schrader made an attempt to develop methods for determining how the richness of the composition and structurality of the information accumulated in the object affect its reception and processing efficiency for use. This was related to management optimization tasks. This is how the semantic theory of information of Schrader appeared, which differed from the theory of information of Shannon in its initial positions. In Schrader's theory, the emphasis is on the properties of the receiver, which perceives and accumulates information, as well as on the assessment of its semantic meaning. At the same time, the issue of the information transmission channel is being taken to the background. The main idea of the semantic theory of information is that the semantic information perceived by this system can be estimated by the degree of change of its own semantic information contained in the system due to the accumulation of external information [4].

In order to perceive any information from external sources, the receiver system must have a certain minimum supply of knowledge, which Schrader

designated with the term “thesaurus” - a certain initial, threshold internal information. If this threshold information allows, the system is able to expand its thesaurus, extracting more and more extensive information from the outside, up to the maximum available for it, when its internal information is enriched to the optimum,

saturated level. The described scheme can be illustrated by the example of human perception of information. If, for example, the source of external information is a real textbook on the philosophy of science, then the elementary school student will not extract practically any useful information from it (his initial thesaurus is insufficient for this), the senior school student will already extract some information, and the graduate student studying this course will get the maximum.

An analysis of the definitions of the term “information” that are widespread today in the scientific literature shows that, as a rule, they use two main approaches: functional and attributive. Proponents of the functional approach argue that information is only one of the functions of human consciousness, and therefore in principle it cannot exist in inanimate nature. As for the laws of functioning and development of inanimate nature, they are quite satisfactorily described by the corresponding scientific disciplines (physics, chemistry and other sciences), in which the concept of information is practically not used. This point of view is still quite widespread in science today. True, two fundamental questions remain open. The first of them is how to combine the functional concept of information with the main provisions of the general theory of systems. Indeed, as follows from this theory, not only the functioning, but also the very existence of any system as a stable organized structure, involves informational interaction between its elements, i.e. their mutual exchange of information about their condition. Moreover, according to the concept of information-open systems proposed by academician B. B. Kadomtsev, the entire world around us, from atomic structures to galactic formations, is a combination of hierarchical systems of various levels embedded in each other. These systems continuously interact with each other not only at the energy level, but also carry out informational interactions, which are fundamentally necessary for their development. The second question is that even proponents of a functional approach nevertheless admit the existence of information in biological structures that do not have consciousness. For example, in the cells of living organisms and plants. Thus, it is impossible to give any satisfactory answer to both of the fundamental questions posed above within the framework of a functional approach to the determination of information [5].

Proponents of the attributive approach believe that information is an attribute of all objects of both animate and inanimate nature, i.e. their inherent property. This approach, an active supporter of which was, for example, A.D. Ursul, a well-known Soviet researcher of the phenomenon of information, directs the attention of scientists to the study of the informational aspects of the functioning, development and interaction of all natural systems, including objects and systems of inanimate nature [6]. This approach seems more fruitful, since within its framework it is possible to put forward new information hypotheses about the structure and evolution of natural systems. In addition, this approach is fundamentally important for the development of the theoretical foundations of computer science, it allows us to draw analogies and make the necessary generalizations of the results of those studies of information processes and phenomena that are conducted in other scientific disciplines: physics, chemistry, biology, astronomy, earth sciences and others. The analysis of these results creates fundamentally new opportunities for identifying common information patterns in the world around us and, therefore, allows us not only to better understand its laws, but also to use them in the practical activities of people, including, when creating new tools and computer science systems, analysis and synthesis of biological and social processes and structures.

In modern research, it is also customary to distinguish between internal (structural) information - as a characteristic of the organization of any system - and external information - as a means of organizing the system. Structural information is inherent in all objects of animate and inanimate nature of natural and artificial origin and arises as a result of selection, fixation and fixing in the system in the form of certain structural changes in its positive experience of interaction with the external environment. External information is information as a means of organizing any system, what is defined as relative, operational information, closely related to reflection. If changes occur in one object that reflects the effects of another object, then the first object becomes a carrier of information about the second object [7].

The diversity and multidimensionality of the concept of “information” allows us to characterize it as a general scientific category, as a universal substance. One of the most general definitions of the concept of “information”, formulated 50 years ago, belongs to V.M. Glushkov: “Information, in its most general sense, is a measure of the heterogeneity of the distribution of matter and energy in space and time, a measure of the changes that accompany all the processes taking place in the world” [8]. Complementing this definition from the standpoint of the modern level of development of science, K.K. Colin interprets the concept of information as follows:

“Information in the broad sense of this term is an objective property of reality, which is manifested in the heterogeneity (asymmetry) of the distribution of matter and energy in space and time, in the unevenness of all processes occurring in the world of living and inanimate nature, as well as in human society and consciousness” [9].

The main properties of information usually include the following: ideality, continuity, inexhaustibility, mass, transformability, versatility, the ability to compress and transport at high speed, quality (adequacy and reliability), completeness, accessibility, relevance, etc.

As is clear from the foregoing, information is a complex, multifaceted comprehensive phenomenon, its individual sides, faces are the subject of research of very many sciences, which, existing independently, develop in inextricable unity, complementing and enriching each other. All this indicates that the concept of information is ambiguous, and the variety of its interpretations reflects the very complex nature of the real world, making it difficult to work out solutions to the problem of ensuring information security of an individual in the modern world.

Security in its broadest sense is a state of security against threats to key values and interests. In determining security, the emphasis is often on security — the availability of funds and organizational measures, institutions, arrangements with partners, etc. But the whole complex of ensuring security is determined by the nature and scale of the threats, therefore the concept of “security” implies threats and protection against them.

Depending on the object being threatened and requiring protection, we can talk about “human security” in its individual quality, “security of a group of people” (for example, ethnic or religious groups), “public safety”, “national security” of states, “regional security” or “collective security” of groups of states that make up any region or union, finally, about “international security”, or “global security” in total world community. By the functional type of threats and means of protection against them, security can be military, economic, political, environmental, cultural, informational, etc.

The phenomenon of security at all stages of the development of the human community has never lost its actual practical significance, having not only different forms of manifestation, but also different contents and meaning. At the same time, the transition from one phase of the development of society to another represents a certain systemic restructuring. And the transition to a new system level (in the field of public relations, in the field of life, in the field of world

outlook) is directly related to the development of new systemic properties of safe development.

Traditionally, there are two most general approaches to the study of security problems and practices to ensure it. The first - narrow or practical - is associated with the study of specific problems and the development of technologies for conducting effective operations to protect the reference object or ensure its safety. From these positions, it is necessary to create a model for describing threats, including both traditional and non-traditional (new) threats, and develop a technology for ensuring security on its basis. It is also necessary to compare the effectiveness of various tools and technologies to achieve the goal of security [10].

The second approach - broad or academic - is to study security problems in a broad socio-political context and taking into account the functioning of public institutions. This approach is most useful for creating a comprehensive perception of information security problems.

Information is an asset that, like other assets of an organization, has value and therefore needs to be protected appropriately. Information security is usually understood as the state of security of the information environment of a society, ensuring its formation, use and development in the interests of citizens, organizations, and the state.

III. ENSURING INFORMATION SECURITY IN MODERN RUSSIA

Awareness of the relationship between the state of the information environment of society and the possibilities of achieving the most important goals and interests of a person, state and society has occurred recently, almost in the last decades. Nevertheless, many states of the world, including Russia, have already developed and adopted their national doctrines in the field of information security, which are the basis of their state policy in this area. In addition, back in 1998, on the initiative of Russia, the preparation of a draft international concept on information security began. The solution to this important problem will certainly require the coordination of efforts of various countries of the world community.

One of the first Russian laws on information security should be considered the Federal Law "On Information, Information Technologies and the Protection of Information" dated July 27, 2006. It gives basic definitions, outlines areas in which legislation should be developed in this area, regulates relations arising from: 1) the exercise of the right to search, receive, transmit, produce and disseminate information; 2) the application of information technology; 3) ensuring the protection of information. Also in law definitions of the basic concepts in the field of

information security are presented. So, information technologies are defined as processes, methods for searching, collecting, storing, processing, providing, disseminating information and methods for implementing such processes and methods; information system - as a set of information contained in databases and the information technology and technical means providing it; information holder - as a person who independently created information or obtained, on the basis of a law or an agreement, the right to allow or restrict access to information determined by any criteria, etc. [11]

The set of official views on the goals, objectives, principles and main directions of ensuring the information security of the Russian Federation are presented in the National Security Strategy of the Russian Federation (2015) and the Doctrine of Information Security of the Russian Federation (2016).

The National Security Strategy of the Russian Federation considers information security as an integral component of Russia's national security, since "The increasing confrontation in the global information space is increasingly influenced by the desire of some countries to use information and communication technologies to achieve their geopolitical goals, including by manipulating public consciousness and falsifying history New forms of illegal activity appear, in particular with the use of information, communication and high technologies" [12].

In the Doctrine of Information Security of the Russian Federation, information security is defined as "a state of protection of an individual, society and the state from internal and external information threats, which ensures the realization of constitutional rights and freedoms of man and citizen, worthy quality and standard of living of citizens, sovereignty, territorial integrity and sustainable social -economic development of the Russian Federation, defense and security of the state" [13].

Based on the analysis of the provisions contained in these documents, the following vital interests in the information sphere can be distinguished:

- for the individual: respect for the human rights to search, receive and transmit information; realization of the rights of citizens to privacy, information protection; protection of intellectual property rights;
- for society: ensuring the interests of the individual in the information sphere; building an information society; prevention of manipulation of the mass consciousness; priority development of modern information technologies;
- for the state: protection of state information systems and state information resources;

protection of a single information space of the country [14].

IV. MAIN PROBLEMS OF ENSURING THE INFORMATION SECURITY OF PERSONALITY IN THE MODERN WORLD

Many problems of ensuring information security are common to all the inhabitants of our planet, that is, they represent global problems. One of them is the danger of deformation of the traditional cultures of society under the influence of the global process of informatization, which stimulates more distribution in the world of mass culture. As a result of this, spiritual values characteristic of traditional cultures are already being destroyed in many countries of the world, and new values of a consumer society are being planted instead. This process is extremely dangerous for the future of all civilization.

Another problem that the Russian scientist K. Colin speaks of in his research is related to the need to ensure the energy-informational security of the planet's biosphere in the conditions of rapidly increasing tension of energy and informational fields of anthropogenic nature [15]. Today it has already been experimentally established that these fields can have devastating effects on the gene pool of the biosphere, as well as on the development processes of living organisms and plants. However, the permissible level of this effect to humans is still unknown and the necessary studies in this area have not yet been conducted.

In the information society, people are waiting for other new threats and dangers that we are already facing today. One of them is the problem of information inequality, i.e. the problem of ensuring real equality of opportunity in using modern technologies. Moreover, the origins of this problem are rooted not only in economic, instrumental and technological factors related to the certain complexity of ensuring access for all users to the information resources of society, but also in personal psychological factors: linguistic personality culture, education, information competence, and finally, the person's motivation to constant knowledge and learning new things. If the person himself does not want to be an active member of the information society, then no technique will help him.

Another serious danger to humans in the information society is that the development of global networks of information communication creates wide opportunities for influencing and manipulating the public consciousness. Modern researchers comprehensively study this problem, analyze various technologies of manipulating consciousness, from rather innocuous, at first glance, such as, for example, the concept of substitution technology, the technology of permutation of accents, the technology of

ironization, degeneration, desymbolization, etc., to technologies of overt information aggression and information war [16].

A fundamentally new danger to the individual in the information society is the so-called cyber disease. These include the psychological dependence of people on the media of communication - from television to the Internet, as well as from computer games. One of the extreme forms of manifestation of such dependence is the virtualization of consciousness, when a person becomes unable to distinguish between objective reality and virtual. This is facilitated by the fact that such a psychological phenomenon as the virtualization of society is increasingly manifesting in the information society, when real physical objects, processes and phenomena are replaced by their virtual images, which are very similar to the displays of objective reality, but are not. Social communication is also virtualized, communication in the network replaces real, live communication, and the anonymity of such network communication makes it possible to replace the true essence of the person who communicates in the network with a certain invented surrogate, which can lead to loss of personal identity.

The formation of the information society opens up wide opportunities for the development of information crime, which can be directed both against the individual and against society and the state. This includes the so-called computer crimes, aimed mainly at unauthorized access to databases of automated information systems of state authorities, financial organizations, industrial corporations. In these systems, in the process of informatization of society, a large amount of confidential information is accumulated not only about the activities of the relevant organizations, but also personal data about individuals, their addresses, phone numbers, property, income, etc. This information is of significant interest to various types of criminal groups, many of which resort to the services of specialists in the field of information technology.

The concentration of information in automated data banks that provide remote access for users is one of the important directions in the process of informatization of society, since it is the concentration of information in space and time that significantly increases the efficiency of its use. However, at the same time, the risks associated with the possibility of unauthorized access to this information, as well as its theft and intentional distortion, also increase.

A special place among the threats of the information society is occupied by the information war, the methods and means of which are already quite well developed in both theoretical and applied aspects. Information wars are already today a very common and effective way of confrontation in the fields of politics, economics, and culture. It can be predicted that in the future, with the

development of the means and institutions of the information society, information wars will become even more widespread both locally and globally. The object of malicious information impact during such information wars is a person.

Thus, the information society seems to be very vulnerable to destructive information influences, which significantly actualizes the problem of ensuring information security and confirms its global nature.

V. COMPUTER SECURITY: CONCEPT AND ESSENCE

At present, the term "computer security", or "information security" in the narrow sense, is also very widely used. In reality, a computer is exposed to only a few risks if it is not connected to other computers over the network. Recently, the percentage of use of computer networks (especially the Internet) has grown significantly, so today the term "computer security" is used to describe problems associated with the network use of computers and their resources.

Computer security systems protect information from a wide range of threats in order to ensure confidence in business continuity, minimize damage, maximize return on investment, and realize potential business opportunities. Regardless of the form of expression of information, the means of its distribution or storage, it should always be adequately protected.

Computer security is a protection mechanism that provides:

- confidentiality: access to information only of authorized users;
- integrity: reliability and completeness of information and methods of its processing;
- accessibility: access to information and related assets of authorized users as necessary.

Other important components that computer security professionals pay great attention to are access control and strict compliance. Access control implies not only the fact that the user has access only to available resources and services, but also the fact that he has the right to access the resources that he legitimately expects. As for the strict fulfillment of obligations, this implies the impossibility of refusing to users that he sent a message and vice versa. Significant problems related to ensuring computer security are also the fight against computer crime (attempts to prevent, detect attacks) and confidentiality (anonymity) in cyberspace.

VI. CONCLUSION

The above analysis of the main features of the new information reality shows that the changes taking place

in the information sphere of society today not only entail radical changes in the socio-economic structure of society and the organization of social production, but also change the processes of personality formation and life.

Information security issues that are relevant with the development of information and communication technologies go beyond the traditional issues of information security and affect absolutely all areas of life. To solve global problems of ensuring information security, humanity will need to form a new system of legal relations in the information sphere of society, a new information culture and information ethics. However, the most important thing is to realize the essence and relevance of these problems, the need for their speedy solution by civilized methods.

We need to understand that information crime, information aggression, and information warfare are no longer metaphors for futurologists, but scientific terms that indicate very specific new phenomena in the life of our society that we will have to deal with.

In this regard, it is obvious that measures to ensure information security should be comprehensive and contain not so much instrumental and technological measures as measures of an ideological and cultural-educational nature aimed at appropriate orientation of a person [17]. The new information environment aims at the formation of certain philosophical and axiological priorities, in accordance with which the value characteristics of the information society change and reproduce.

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