

Tetiana Zaporozhets*

Genesis of the information space: from information security to cybersecurity in a digital society

Abstract

The article investigates the evolutionary development of the information space and traces the historical stages of growth of information security problems. This distribution is based on the technological evolution of the types of media, which allowed to divide it into several periods. The first period is associated with the invention of writing and the advent of encryption and concealment. The second period is characterized by the emergence of the first technical means of information processing and the ability to store and transmit messages using media such as electrical signals and electromagnetic fields. The third period is determined by the introduction of automated information processing systems and is measured by a period of more than 40 years. The role of the information sphere in modern conditions is substantiated, it is established that the information turns into a national political and strategic resource of the states and acts as a criterion of maturity and development of the political system. The urgency of defining cybersecurity as one of the main components of the security policy of the Ukrainian state is emphasized.

Key words: information space, information protection, cybersecurity, digital technologies, digital society

* PhD of Science in Public Administration, Associate Professor of the Department of Information Policy and Digital Technologies, National Academy of Public Administration, under the President of Ukraine, ORCID 0000-0003-1914-9481.

Information flows permeate all spheres of human life and play an increasingly important role in the globalization of the world community. The development and dissemination of new technologies in almost all spheres of life, on the one hand, is an important factor in global integration, social development and economic growth, on the other hand, being the strongest catalyst for information exchange, these technologies carry many visible and hidden threats. In this regard, the issues of cyber security are extremely important¹. For the first time, the analysis of security not as a physical but as a social phenomenon was conducted by the English philosopher of the XVII century Thomas Hobbes, who pointed out the relationship and interdependence of human security, society and security. Considering security as a social phenomenon, T. Hobbes established its social nature, linked the effectiveness of security with the norms of behavior developed by society².

Thus, historically, information has always been of great importance in people's lives and it has always been given a special place in it, much attention has been paid to the development of means and methods of its protection. Analysis of the process of development of these tools and methods of information protection allows us to divide it into three relatively independent periods. The basis of this distribution is the evolution of the types of media.

The first period is determined by the beginning of the creation of meaningful and independent means and methods of information protection and is associated with the emergence of the possibility of recording information messages on hard media, with the invention of writing. Along with the undeniable advantage of storing and moving data, there is the problem of ensuring the confidentiality of confidential information that already exists separately from the source. Therefore, almost simultaneously with the advent of writing, there were such methods of information protection as encryption and concealment³.

According to a number of experts, cryptography is the same age as the Egyptian pyramids. In the documents of ancient civilizations – India, Egypt,

1 TV. Zaporozhets, *Zahrozy natsionalnii bezpetsi v informatsiinii sferi yak chynnyky destabilizatsii suspilno-politychnoi systemy v umovakh hibrydnoi viiny* / T.V. Zaporozhets // *Vyklyky i zahrozy natsionalnii bezpetsi v umovakh hibrydnoi viiny: materialy kafedr. nauk.-prakt. seminaru* (Kyiv, 27 kvit. 2017 r.) / za red. L.M. Shypilovoi. – Kyiv: NADU, 2017. – p. 43–45, p. 44.

2 T. Hobbs, *Levyafan*, Мysl 2001. – 478 p., p. 124.

3 *Istoriia informatsiino-psykholohichnoho protyborstva*. Pidruchnyk. Skulysh Ye.D. zah. red., avt. Skulysh Ye.D., Zharkov Ya.M., Kompantsev L.F., Ostroukhov V.V., Petryk V.M. K. Nauk.–vydav: Viddil NA SBU. 2012, – 212 p., p. 45.

Mesopotamia – there is information about the systems and methods of compiling encrypted letters. In the ancient religious books of India it is stated that the Buddha himself knew several dozen ways of writing, among which there were permutation codes (according to modern classification). One of the oldest encrypted texts from Mesopotamia is a clay tablet containing a recipe for making varnish in pottery, which ignored some vowels and consonants and used numbers instead of names⁴.

The second period (approximately from the middle of the XIX century) is characterized by the emergence of technical means of information processing and the ability to store and transmit messages using media such as electrical signals and electromagnetic fields (example, telephone, telegraph, radio). There were problems with protection against so-called technical leakage channels (spurious radiation, interference, etc.). There are ways to encrypt messages in real time (in the process of transmission by telephone and telegraph), etc. In addition, this is a period of active development of technical means of intelligence, which greatly increases the opportunities for industrial and state espionage. Huge, ever-increasing losses of enterprises contributed to scientific and technological progress and the creation of improved means and methods of information protection⁵.

The most intensive development of information protection occurs during the period of mass informatization of society (the third period). Therefore, the history of the most intensive development of the problem of information protection is associated with the introduction of automated information processing systems and is measured by a period of more than 40 years. In the 1960s, a large number of open publications on various aspects of information security began to appear in the West. Such attention to this problem, first of all, was caused by the growing financial losses of firms and state organizations from crimes in the computer sphere⁶.

What was called computer security in the 1970's, data security in the 1980s, and information security in the late 20th century is now considered by many scientists to be cybersecurity, which is ensured by appropriate information security measures from unauthorized access, destruction, modification,

4 Ibidem, p. 48.

5 V. H. Pylypchuk, *Hlobalni vyklyky y zahrozy natsionalnii bezpetsi Ukrainy v informatsiinii sferi* / V. Pylypchuk, O. Dzoban // *Stratehichni priorytety*, №3 (32). – 2014. – p. 127–132, p. 129.

6 *Istoriia...*, p. 59.

disclosure in national information, telecommunications, information and telecommunications systems and networks.

The information sphere in modern conditions is system-creating in the life of society. The political role of information is growing, which is becoming a national political and strategic resource and a criterion for the maturity and development of the political system. Today, in the scientific world, information is rightly considered the political capital of a nation. The country's progressive capacity and political weight, its ability to effectively influence world events largely depend on material and force factors (for example, military and economic power).

Intensive introduction of digital technologies in all spheres of life and activity of modern society has led to the fact that information resources began to be considered as rich in the country as its minerals, production capacity and intellectual potential⁷.

Information innovations, along with technical and managerial ones, not only significantly expand the possibilities of state leadership, but also significantly increase the value of information as a strategic resource. However, the effective use of information resources in the interests of Ukraine, each of its citizens would be impossible without the formation of a comprehensive cybersecurity system in the country. It should be acknowledged that the consequences of the information revolution have not yet been largely determined, and this only increases the interest of forecasts concerning the current challenges and threats in the field of security, determined by rapid technological development⁸.

Thus, in the course of global digitalization, a fundamentally new environment for the confrontation of competing states has emerged – cyberspace. If the world has so far developed to some extent a strategic balance of power in the field of conventional weapons and weapons of mass destruction, the question of parity in cyberspace remains open.

Since 2014, attention to cybersecurity has become one of the unconditional priorities of the security policy of the Ukrainian state. Ensuring an adequate

7 TV. Zaporozhets, *Tsinnisni oriiientyry ta priorytety rozvytku u XXI stolitti* / TV. Zaporozhets // Publichne upravlinnia: tsinnisni oriiientyry, standarty yakosti ta otsinka efektyvnosti: materialy shchorich. Vseukr. nauk.-prakt. konf. za mizhnar. uchastiu (Kyiv, 26 trav. 2017 r.): u 5 ch. \ za zah. red. V.S. Kuibidy, A.P. Savkova, S.V. Zahorodniuka. – Kyiv: NADU, 2017. – Ch. 3: Tsinnisni oriiientyry yevrointehratsiinykh protsesiv. – p. 36–37, p. 37.

8 TV. Zaporozhets, *Informatsiino-komunikatyvni tekhnolohii u zabezpechenni zovnishnopolitychnoi stiikosti Ukrainy* / TV. Zaporozhets // Natsionalna stiikist Ukrainy do zahroz hibraydnoi viiny: materialy kafedr. nauk.-prakt. seminaru (Kyiv, 25 kvitnia 2018 r.) – p. 20–22, p. 21/.

level of cybersecurity goes far beyond the pure security of information and telecommunications systems and the facilities they provide. Cyberattacks affect one of the key aspects of the development and implementation of digital technologies – trust between the participants in the information communication process. The lack of trust between the subjects of cyberspace slows down the intensity of interactions, increases the cost of process security and at the same time – complicates the rapid development of increasingly technological solutions. In this aspect, Ukraine's cybersecurity policy is becoming one of the cornerstones of digital transformations and the development of a modern digital society.

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Geneza przestrzeni informacyjnej: od bezpieczeństwa informacji do cyberbezpieczeństwa w społeczeństwie cyfrowym

Streszczenie

W artykule przeanalizowano ewolucyjny rozwój przestrzeni informacyjnej oraz prześledzono historyczne etapy narastania problemów związanych z bezpieczeństwem informacji. Poszczególne okresy te wyodrębniono na podstawie ewolucji technologicznej różnych rodzajów mediów. Pierwszy okres związany jest z wynalezieniem pisma oraz pojawieniem się technik szyfrowania i ukrywania informacji. Drugi okres charakteryzuje się pojawieniem się pierwszych technicznych sposobów przetwarzania informacji oraz możliwości przechowywania i przekazywania wiadomości za pomocą, takich środków przekazu jak sygnały elektryczne i pola elektromagnetyczne. Trzeci okres trwający

ponad 40 lat odznacza się wprowadzeniem zautomatyzowanych systemów przetwarzania informacji. W artykule ukazana została ponadto rola sfery informacyjnej we współczesnym świecie oraz podkreślono, że informacja staje się narodowym zasobem politycznym i strategicznym państw, funkcjonując jako kryterium dojrzałości i rozwoju systemu politycznego. Zwrócono również uwagę na pilną potrzebę uznania cyberbezpieczeństwa za jeden z głównych elementów polityki bezpieczeństwa państwa ukraińskiego.

Słowa kluczowe: przestrzeń informacyjna, ochrona informacji, cyberbezpieczeństwo, technologie cyfrowe, społeczeństwo cyfrowe