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Galushko S. - Postgraduate student of the Educational, Research and Production Center, National University of Civil Protection of Ukraine, Kharkiv.

ORCID: 0009-0005-3169-1478

TYOLOGY OF DIGITAL TECHNOLOGIES AND THEIR SOCIO-POLITICAL AND STATE-LEGAL EFFECTS ON THE SPHERE OF NATIONAL SECURITY

The typology of digital technologies is systematized on the basis of the analyzed scientific developments in this field. The role of such technologies in ensuring the development of the public administration system is defined. It is emphasized that the influence of digital technologies on the sphere of national security must be predicted and regulated in view of the scale of the danger that lies in the use of such technologies. The role of artificial intelligence in the provision of national security is substantiated.

Keywords: *public administration, sphere of national security, digitalization, digitalization technologies, digital transformation, authorities.*

Formulation of the problem. The accelerated development of digital technologies and their introduction into various spheres of social life causes fundamental changes not only of a technological and economic nature, but also in the sphere of public policy and public administration. Changes in the field of communication, collection and use of information, digital interaction of the state with society led to the emergence of new concepts of management and politics: teledemocracy [4], electronic democracy [10; 40], virtual democracy [27], electronic government [9 ; 24; 32], GovTech [16], etc. These concepts have evolved over recent years. However, the scientific community and political actors were not ready for the rapid development of modern digital technologies (for

example, complex mathematical and statistical algorithms, machine learning, neural networks, artificial intelligence, blockchain technology, 5G communication technology, facial recognition technology, big data, etc.).

Analysis of recent research and publications. Publications of such scientists as Ya. Bazylyuk, A. Hrytsenko, M. Denysenko, S. Dombrovska, A. Karsrud, R. Klyut, P. Kolisnichenko, S. Lekar, V. Orlyk, A. Pomaza-Ponomarenko are devoted to consideration of the peculiarities of the formation and implementation of state policy in the sphere of ensuring national security. Pocheptsov G., Thayer A., Chub S. and others.

However, many issues related to the possibilities of implementing in Ukraine the existing best world experience in the formation and implementation of state policy in the field of ensuring national security remain insufficiently researched, and these aspects are related to the use of digital technologies.

Setting objectives. The purpose of the article is to determine the typology of digital technologies and their impact on the sphere of national security.

Presenting main material. The scale and comprehensive nature of the changes taking place in modern society under the influence of digital technologies make it difficult to conceptualize "digitalization" [26]. Within the framework of this study, digitization (digital transformation, digitalization) is perceived as a complex system of three interacting elements, namely:

- 1) infrastructure (hardware) – a complex of technologies that provide computing, telecommunication and network capacities, implementation of digital goods;
- 2) software (soft) – a collection of programs, procedures, digital rules, information processing systems and software documents (including algorithms, cloud computing);
- 3) the process of interaction of technologies and users, people with each other with the help of technologies, as well as the interconnection of technologies and their system functioning.

According to international reports [38], a large number of national governments declare and implement national programs and strategies in the field of digital transformation. At the same time, the quality of digitalization depends on the joint actions

of political institutions and technological companies. An illustration of this statement can be an example of electronic participation in the country's political agenda [21]:

- in countries where freedom of online participation is guaranteed thanks to high-quality technological infrastructure and democratic political institutions, there is a high level of electronic participation (Great Britain, Australia, USA);

- countries with a low level of technological development and low political institutionalization demonstrate low electronic participation (Angola, Egypt, El Salvador);

- in turn, the governments of Asian countries have quite advanced digital technologies, but the participation of citizens in the electronic sphere is low due to specific political and institutional mechanisms.

As a tool of collective processes, digital technologies have influenced traditional public administration practices. Political institutions were forced to carry out reforms (the development of the use of digital technologies is observed in the context of changing processes and mechanisms) and at the same time - to establish new rules and standards for the regulation and control of such technologies. This need was driven by the scale of technology penetration, the degree of involvement of people in the online environment and the growing influence of "digital" on everyday "real" processes.

The opposite approach is manifested in the direct stimulation by political institutions of the development of digital technologies. In other words, the driving force of digitalization is "state policy", which creates not only conditions, but also mechanisms for involving the population in the social and political agenda, using digital technologies as a tool for ensuring the security system (social and national, which from society itself).

The above demonstrates the complex nature of the relationship between political institutions and digital technologies. Despite the fact that the analysis of the nature of the relationship is beyond the scope of this study, it is important to point out that in this case the approaches of technological determinism and identification of socio-political will "collide".

Most countries strive to form a unified policy in the field of digitalization, adopting

strategies, national programs and other comprehensive documents that cover all socially significant spheres of life.

A temporary trend is observed - most reports on digitization, electronic government, etc. have been published for more than a decade (for example, the UN e-governance index - since 2003). However, before that, state regulation of the sphere was chaotic, local or partial in nature. Perhaps this is explained by the fact that states react to changes after the fact. In fact, the inclusion and active manifestation of socio-political will occurs only after the use of digital technologies has either reached a significant scale or demonstrated significant results.

Socio-political will is not always accompanied by formal consolidation in the form of a document (due to bureaucratic costs, complexities and specifics of adopting and issuing a regulatory act, political risks associated with the formalization of innovative or not entirely popular decisions, etc.). In view of this, it is possible to define a debatable thesis about the phenomenon of "socio-political permission" regarding the use of digital technologies: the implementation of point digitization programs will be supported by a local government decision. That is, the application of digital technologies can take place without the knowledge of socio-political actors/institutions of a strategic level (that is, without the involvement of public representatives, citizen associations, etc.). In this context, attempts to practice "technological determinism" primarily occur at the stage of agreement. Thus, "socio-political permission" (or "new public management") as an act of expressing political will at the level of society is a priori (albeit indirectly) present in the practical implementation of the digitalization strategy, manifesting itself locally.

Unfortunately, there are not only cases when in countries with a low level of use of digital technologies, stimulation of the development of digitalization "from above" can be traced. An explanation for this phenomenon may be that countries with less experience in the use of digital technologies (at the level of development, commercialization, etc.) are more oriented towards foreign experience. Therefore, these countries carry out digitalization "from top to bottom", but it is the social and political will that stimulates the upward development of digitalization in the country. In turn, in countries with a higher

level of technology application, we can observe elements of public-private partnerships, in which development is not directly stimulated, but is supported by governments that respond to social demand. In such cases, technology companies are the driver of change and, in fact, cause the transformation under consideration in the first stages [2–4; 30; 36]. However, this does not indicate the dominance of "technological determinism". Analysis of literature and political practices clearly indicates that any technological innovations are accompanied by political decisions.

This leads us to consider the mechanism of interaction between politics (in a broad sense) and digital technologies according to the principle of operation of gear wheels, in which the nature of the connection is not based on actual coercion and direct stimulation, but on a kind of traction force, where the force applied to one gear wheel rotates the second. However, applying force to one gear should be sufficient to start the other. The development of the digital technology market, with proper effectiveness, begins to "pull" the political power in the direction of transformation and modernization. Conversely, strong political institutionalization can lead to the development of the innovation market, in particular digital technologies.

Thus, we can conclude that the digitalization phenomenon is a political process that directly depends on the quality and functioning of institutions.

The improvement of digital technologies and their implementation in various spheres of social life are formally anchored in the strategies and policies of "digitalization" both at the national and international levels [38]. Since 1971 in the academic environment, a discussion of the social consequences of the "digitalization of society" began [40] in the context of consideration of computer, computational and digital capabilities in humanitarian studies [ibid.]. Since then, a broad research field has been formed, in which more and more attention is paid to the processes of transformation/transformation of the structure of digital technologies. their formation, as well as influence on the modern world.

Research points to the new digital media and communications system as a way to explain and understand most aspects of contemporary social and political life. The

scientist Castells [11] considers digitization as one of the defining characteristics of the modern age. Scientist Van Dijk pointed out that for the first time in history we have a single communication infrastructure that connects all activities in society [41]. Such a communication system is fully characterized by "new media", which rapidly and radically change traditional/habitual social and political processes.

The reformatting of the social, economic and political spheres goes beyond the national policies of states. Scientist S. Sassen pointed out as early as 1998 that the growth of globalization and the expansion of economies beyond national borders took place with the help of digitalization [33]. Digitalization and globalization of the economy change the traditional idea of national sovereignty, correct the idea of "materiality", that is, digitalization creates an environment that imitates or combines various spheres of activity, as a result of which such a digital environment is considered as a "generalized environment" that combines "different forms of information" [6, p. 26]. The growth of digital technologies and new media "caused a revision of what the digital environment is, because the computer can reproduce or simulate all other known media" [20, p. 217].

The influence of digital technologies is manifested at four main levels of existence of the socio-political and social system:

1. Infrastructural convergence [41], as the basis of all socio-political processes and technologies, where "any network can be used to transmit all kinds of digital signals" [35, p. 1320]. This means that one medium - cables or radio waves - can provide services that were previously provided by other means [31, p. 29]. Direct infrastructural changes made it possible to form new concepts of management and policy making: "Tele-Democracy" (Tele-Democracy) in the 1960s [12], "Electronic Democracy" (E-democracy) and "Virtual Democracy" (Virtual Democracy) [27], "electronic government" (E-government) [9; 24; 32], GovTech, etc.

2. Convergence of the device as a combination of several multimedia devices into one whole [35, p. 1320]. In this case, we are talking about the emergence of new universal devices and technologies (for example, a modern smartphone replaces many devices: phone, computer, camera, audio recorder, calendar, calculator, notebook, etc.). This

directly affects the formation of new ways and methods of sending policies and implementing public administration.

3. Convergence in services [41]. A vivid example can be the idea of a "superservice" Action on the example of a website and application of public services, where various functions of providing public services, as well as control and supervisory and fiscal functions of the state are concentrated in one digital space. The further development of the field of digital services leads to the "blurring" of state-society relations: the "mutually unambiguous relations that existed between the environment and its use" are changing [31, p. 23]. In other words, not only can a single device now perform multiple functions, but "a service that was previously provided by any medium, be it broadcast, press or telephony, can now be provided in several different physical ways" [ibid].

4. Market convergence, expressed in the consolidation (mixing/merging) of the "computing, telecommunications, media and information sectors" [14]. There is also a blurring of the boundaries between infrastructure and services, software and media content [35, p. 1321]. As a result, both the expansion of e-business – companies that enter several digital markets and/or sectors, thus forming new institutional paradigms (so-called BigTech companies – Facebook, Google, Amazon, etc.) – and fundamental changes in the existence of states (case electoral process of 2016 in the USA, which has a great influence on the internal politics of the state) and models of international relations (China–United States trade war 2018-2020).

Thus, digitalization is positioned as a stabilizing-destabilizing force in the social and state-political spheres.

Radical shifts are observed in the sphere of creation and production of culture and knowledge, which form the basis of social security. Scientist Y. Benkler claims that "equal" and "social" production thanks to digitalization can be formed for the first time on a global scale [7]. Thanks to the rapidly decreasing costs of production and distribution of digital information, collective production is beginning to supplant other market mechanisms for the production of knowledge and culture. Creating and distributing any

kind of content, from movies shot on a mobile phone to political commentary, has become extremely simple and accessible to almost the entire population of the world. Scholar Y. Benkler argues that these new non-market and cooperative ways of working constitute an economic value that increasingly competes with the value of nation-states and bureaucracies of the past [ibid.]. In other words, all new digital forms of culture and knowledge production are taking place, bypassing the formal structures of state administration.

Similar consequences of digitalization can be traced in the processes of political participation. Y. Bimber and his colleagues from the University of California established how political activity is changing in the information environment [8]: the choice of methods and opportunities for political participation has significantly expanded, the incentives and forms of state-society interaction have changed. Many forms of interaction are based on the use of digital data and sophisticated analytics. Scientist D. Karpf indicates the use of digital analytics as a form of "passive democratic feedback" [23]. Public organizations (as in D. Karpf's research), companies (as in the Cambridge Analytica case) and states are building new forms of interaction based on "trace data" and new analysis technologies [ibid.]. In this case, digital technologies are used to track and evaluate what is important to society, organizations, and political actors.

Even more widely, D. Karpf shows how the very structures, processes and forms of interaction have changed, taking into account the information capabilities of digital media [ibid.]. Moreover, the cases of "Los indignados" in Spain and "Occupy Wall Street" in the United States of America demonstrate how digital technologies facilitate the formation of leaderless collective action and centralization instead of formal leadership and organizational structures. The very structure of communication is changing, combining public and individual expression. Thus, the role and place of official organizations and official government agencies is shifting, and their positions are being taken by new communication structures. Strictly speaking, personalized narratives are being replaced by collective action with the decentralization of thought through digital technologies.

Digital technologies and new media have also opened up new forms of cross-border politics, expanded the political field for more organizations and private individuals (with limited political resources), increased the scale of action and information, and changed local, national, and international political institutions. These phenomena were demonstrated in the study of S. Sassen, who, arguing for changes in the configurations of "territory, power and rights" [33], emphasizes the importance of separating digitalization from the Internet. For example, in the field of finance, global change is occurring not only because of the Internet, but also because of the rise of "dedicated private digital networks", which have played a role in increasing the influence of global capital, including by allowing non-state market forces to increase financial influence over national governments and influence the formation of politicians. S. Sassen's position shows that the digital and non-digital spheres are interconnected [ibid.]. Digital communication is shaped by diverse social, political, economic, and cultural forces and contexts. Global digital communities have reconfigured aspects of territory, power and rights, but they are deeply involved in non-media forces and rooted at local levels. Scholar S. Sassen shows how "spatio-temporal orders" have been digitally reworked [ibid.], including against rationalization, standardization, and bureaucratization.

It is widely believed that the social and institutional infrastructure is changing under the influence of communication networks [41], while digital networks cause enormous changes in the logic and structures of global social organization. Scientists argue that the growing digitization of social organization has led to a "network society." Although there is much debate as to what constitutes the unit of a networked society – networks [11], individuals [41] or "networked groups" – there is a consensus that social structures and global digital infrastructure are directly linked. In other words, the penetration of digital technologies into the social and political structure is so strong that technology is identified with society, and society cannot be understood or imagined without its technological tools [11].

It should be noted that this issue is at the intersection of interdisciplinarity. We cannot claim that the entire complexity of the transformation, as well as its effects, can

be covered and delineated within the framework of social and political science. After all, questions go far beyond the boundaries of one scientific direction, and most often appear in a symbiosis of sciences and directions, starting from the obvious manifestation in behavioral economics (at the junction of psychology, cognitive science and economics) and ending with complex approaches of semiotics [13] and the theory of evolutionism.

Thus, in recent years, areas of cognitive science have appeared, focusing on the research of distributed mind, distributed conscience, distributed language, as well as distributed subjectness [ibid.]. Scales and forms of transformation make it possible to observe the segmentation of objects and subjects: traditional approaches, computerized elements, combined elements with connected interfaces, as well as phenomena (or manifestations) of artificial intelligence systems (belonging to "strong" systems with the potential to develop to the level of awareness). Of course, such subject fields exist and significantly saturate the discussion about the transformation and effects of digitalization. However, for the purposes of this study (and in order not to blur the focus), we will not invade this space, but will focus exclusively on the institutional manifestation of the political.

The technological aspect is also considered in the subject field of Science and Technology Studies (STS). In addition, the relationship of artificial intelligence technology with power and security can be subordinated to the conceptual approaches of STS [28–29]. Since 2021, the movement to apply two such concepts to the analysis of dynamics, processes, practices and non-traditional political actors in governance has intensified. Technology research can also be subordinated to the subject area of Diffusion of Innovation (DOI). For example, a specific digital technology can be seen as a vehicle for innovation (in 2022, the analysis of the technological advantages of artificial intelligence technologies is combined with sustainable economic innovation as a driving force for their effective implementation). This significantly expands the understanding of the role and place of technology, including in the field of security. A separate important direction is technology acceptance (Technology acceptance/adoption model - TAM), which focuses on the study of public perception and adoption of technological models

and decisions. This approach makes it possible to model user "acceptability" in terms of behavioral intention to use technology-based products. We are aware of the importance of these areas, that is why the sections with the conceptualization of digital technologies and the technologies of artificial intelligence were partially based on the research of STS and TAM. However, we strive not to blur the subject field of research, clearly focusing within the framework of political science and security studies.

Thus, for the purposes of this study, the conceptualization of digitalization is applied ontologically as the adoption, use, and implementation of digital technologies in various spheres of business and state functioning, outlining the relevant vectors of digital policy and public administration. At the same time, we consider it appropriate to distinguish between the terms "digitization" and "digitalization", considering digital technologies as an independent type/type of technologies. At the same time, digitalization covers not only technological achievements, but also institutional changes such as quality standards, Internet and data security, financial and legal frameworks, as well as scientific, innovative and human capital [22].

Moreover, many countries either declare or seriously support policies aimed at the digital transformation of the economy and the socio-political sphere [5]. As a rule, the policy of digital transformation in the country takes the form of a national strategy [17] or national program. Almost every strategy or program has a plan to become a leader in the digital transformation program in 5-10 years (Ukraine is no exception). Thus, the global competition of countries in the field of digitization is taking shape.

So, the analysis carried out demonstrates the effects of the development of digitalization, which are associated with significant transformations of both the socio-political nature and the economic, as well as the public and private sectors. Considering digitalization as a socio-political process provides ample opportunities for analyzing its effects. In this context, we emphasize that the process itself is not purely technological. The nature of digitization is more complex and related to modern and newly created institutions (legal, social, political, etc.). We agree with scientists V. Bashtannyk, O. Bashtannyk, S. Dombrovska, R. Lukysha, and others, that under this consideration, the

"institutional matrix" proposed by North most accurately covers the scope and content of the digitalization phenomenon.

The definition of technologies with a variety of technological solutions comes from the following: 1) identification of specific technical problems; 2) systems; 3) technological processes of practical implementation, because technology includes knowledge and skills about these three constituent elements [34]. The creation, processing and transmission of digital data defines the technical problem of the field of digital technologies [23]. Thus, digital technologies are knowledge, skills, technological and technical solutions for the creation, processing, transmission and use of digital data, as well as systems and procedures for their practical implementation [15].

The scale, multifacetedness and diversity of digital technologies make it difficult to assess the entire process of digital transformation deployment in the same way. Digital technologies include the following elements: creation of a digital solution and new information/data, processing and analysis of data using digital technology, transfer of data and information, application of digital technology and the results of its use.

The interaction of digital technologies is realized in three forms:

- 1) social – the population is the recipient as well as the transmitter of information;
- 2) physical - physical devices (machines, tools, other technologies) broadcast, transfer information and data;
- 3) digital (virtual) – software, services, etc. [1].

The following classes of modern digital technologies [15] are distinguished:

- communication technologies (connectivity) – all digital technologies, the functionality of which is intended for sending and receiving digital data (5g communication technology, Bluetooth, etc.);
- storage technologies – digital technologies for data storage, where the technology itself does not make changes to the data (databases, cloud technologies, etc.);
- analytics technologies – technologies for analyzing and evaluating information (detection of dependencies and regularities) available in the form of digital data (machine learning, neural networks, etc.);

– manufacturing technologies (fabrication) – digital technologies that create a physically measurable result based on digital data (additive manufacturing – 3D printing);

– visualization technologies (visualisation) – technologies of visual presentation of digital data (augmented reality technologies);

- interactive technologies (interactivity) - digital technologies that are suitable for both the creation and use of digital data, where the functional orientation depends on a specific application case (a tablet computer can be used by people both for entering data/information, for creating digital data, as well as for displaying data on the device). This class is an intersection of visualization technologies and interface technologies;

- human to machine (H2M) interface technologies - communication technologies between humans and the digital world to create digital data based on information that is initially available to people (for example, the brain-computer interface computer" that creates digital data based on information that is in the human brain);

– sensing technologies – digital technologies that generate digital data based on physical geometry or physical movements. Using this technological class, it is possible to measure both the geometry of the object (for example, length or width), and physical (mechanical) movements (for example, the speed of movement or displacement). Digital data are carriers of measured information and are available as output data of digital technology (a 3D scanner that can transform the geometry of physical objects into a digital 3D model).

Modern studies [19; 28–29] show that the digitalization of public management processes developed evolutionarily and demonstrates a rather complex structure, borrowing the positive experience of digitalization of management processes from the private sector. The analysis of such an evolutionary process is possible thanks to the study of: 1) the availability of digital technologies; 2) implementation of digital technologies; 3) institutionalization of digital management methods, definition of key technologies, their role and significance, as well as formulation of the significance of technological interactions in a single concept.

For the purposes of this study, the typology and selection of the main

(conventionally common and key) types of digital technologies are based on two documents: 1) the report of the European Parliamentary Research Service "Ten technologies that can change our lives: political consequences and policy implementation" [18]; 2) reports on the digital economy" of the UN [37]. On the basis of which the following types of digital technologies were selected:

- big data (Big Data);
- Artificial Intelligence (Artificial Intelligence);
- Internet of Things (Internet of Things);
- Automation and robotics (Automation & Robotics);
- 3D printing (3D Printing);
- Virtual Currency and Blockchain (Virtual Currency and Blockchain);
- Cloud Computing (Cloud Computing);
- New generation communication technology – 5G.

Conclusions. It is obvious that the considered typology of digital technologies reflects the complexity and specificity of digital technologies. This work involves taking into account the most flexible approach that allows freedom in empirical analysis. Of course, discussions about the conceptualization of technologies, as well as their typology, can come into conflict. However, the theoretical analysis presented in the work allows us to confidently state that: 1) digitalization is a political process (despite the importance of the technological component); 2) institutions play a significant role in the implementation process (their quality, adaptability, etc.); 3) the digitalization process itself is directly related and depends on the use of specific types of digital technologies.

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