ELECTRONIC JURISDICTION, METAVERSE, ARTIFICIAL INTELLIGENCE, DIGITAL PERSONALITY, DIGITAL AVATAR, NEURAL NETWORKS: THEORY, PRACTICE, PERSPECTIVE

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ABSTRACT

Scientific and technological revolution 4.0 (The Fourth Industrial Revolution) has created a huge window of opportunity for a variety of creative technologies. At the same time it launched the emergence and development of modern social relations in the electronic space - the metaverse. In fact, today all the prerequisites for the scientific and technological revolution 5.0 and social revolution 5.0, which radically changes the role of human in the social structure, while changing the social structure, creating new social groups, social institutions, electronic ecosystems and metaverse.

Modern social relations in the electronic space are multi-vector and can be divided according to the variety of objects, subjects and characteristics of the relationship between them, namely: the subjective and object basis of identification of social relations. Thus, the subjective basis for the identification of social relations is the social communities of people, and the object one is information and communication technologies and its products. Legal science is a social science, as it performs gnoseological and heuristic functions that determine the direction of scientific research and scientific predictions, studying the relations between people, groups of people, people and state institutions. The results of research are practical improvement of legislation on a scientific basis, development of draft normative legal acts, scientific examinations, etc.

However, the current practice indicates that modern laws are created very slowly, without necessary and sufficient detaliztion of terms and basic concepts.

It is difficult to overestimate the correctness, accuracy and consistency with the current legislation of definitions of legal terms. Unfortunately, the current legislation is unable to regulate public relations, which are rapidly evolving in the electronic space using digital technologies, artificial intelligence, Internet of Things (IoT), digital identity, digital avatars and other technologies, especially those that may restrict human rights and freedom. In fact, along with the creation of new social relations in the metaverse, it is necessary to create an electronic jurisdiction - the scope of application of opportunities by the subject of competence or the sphere to which the right applies.

The author's definitions "metaverse (cyberspace)", "electronic avatar", "electronic personality", "electronic jurisdiction", "cybercrime", "kidnapping of electronic avatar or electronic personality", "artificial intelligence" and "neural networks" are proposed in the article.

Six postulates of the main directions of development of social relations with the use of technologies of the metaverse, artificial intelligence, artificial neural networks, robotic systems, medical and military lost products and devices are formed.

Proposals for the creation of a comprehensive electronic jurisdiction, conceptual and categorical apparatus, definition of subjects and objects, rights, duties and responsibilities in the metaverse and in the use of artificial intelligence technologies, artificial neural networks, robots, etc. are provided.

Articulation of issue. Humanity enters a new era, an era of digitalization and the metaverse. Public relations are rapidly transforming, new subjects and objects are arise, the interaction between them is transferred from the real to the virtual world. The issue of regulation of social relations in the metavers has not been comprehensively considered, so it requires a fundamental elaboration.

The purpose of the article is to investigate and analyze the key directions of development of modern social relations using an information and communication technologies of the new generation and the risks of its application without a proper legal regulation. Formulate the main postulates of the scientific, technological and social revolution 5.0. Provide proposals for the creation of a conceptual and categorical apparatus of e-jurisdiction, to propose the main directions of the development of law in the era of electronic transformation of society.

Results of analysis of scientific publications. The subject of research in the sphere of artificial intelligence is diverse not only in the branch of technical sciences but also among legal scholars. Research in the field of law is both one-time and systemic. One-time research is the first step towards updating deeper and fundamental research on the application of artificial intelligence technologies in management decision-making systems, modeling cyber threats, differentiating intellectual property rights, forming modern labor relations, building Ukrainian e-justice and notaries, forming modern civil, administrative and criminal dealings, etc.

These directions were studied by scientists Androschuk G.O., Belyakov K.I., Braichevsky S.M., Busol O.Y., Bugera O.I., Grinchak N.A., Gbur Z.V., Gorodisky I.M., Gutsu S.F., Efremov M.F., Vitlinsky V.V., Voinoiva S.A., Jalilova V.R., Kirilyuk A.V., Kosilova O.I., Kostenko O.V., Kryvytskyi Y.V., Matviychuk A.V., Martsenko N.S., Michurin E.O., Pozova D.D., Samoilenko M.Y., Strelnyk V.V., Solodovnikova H.K., Sidorchuk Y.M., Strelnik V.V., Pavlenko Z.O., Tikhomirov O.O., Shishka N.V., Shcherbina B.S. at different times.

System views on the development of law regulating social relations, which consist of the use of artificial intelligence technologies are stated in a previous work [1], which analyzes proposals for the development of law in the branch of artificial intelligence by the scientists Pylypchuk V.G., Baranova O.A., Bryzhka V.M., Grabovska O.A., Gorobtsya N.O., Katkova T.G., Kostenko O.V., Karmazy O.O., Krachevskogo M.V., Kusherets D.V., Kuklina V.M., Lobanchikova N.M., Melnyk K.S., Nekit K.G., Radutny O.E., Stefanchuk M.O., Kharitonova E.A., Kharitonova O.I., Fedorenko O.A.

Presentation of the main provisions. Analyzing the results of the development of information and communication technologies, we state that the scientific and technological revolution 4.0 is in its final stages [2, p. 264], and we become the direct participants in the scientific and technological revolution 5.0. The task of the scientific and technological revolution 5.0 is the development of next-generation electronic technologies aimed at ensuring the existence of humanity in modern conditions, the creation of new social relations in the global digital environment of the metaverse.

These social relations combine the metaverse (cyberspace), artificial intelligence, the physical person and its digital alternative - the electronic personality and the electronic avatar (hereinafter - the avatar).

Following author's definition of legal terms it is proposed to form a conceptual and categorical device that will provide an opportunity to form the basis of electronic jurisdiction.

Metaverse (Cyberspace) is an electronic environment formed by a set of electronic subjects and objects that interact with each other, as well as electronic or other technologies that provide its interaction.

"Electronic avatar" - data in electronic form, sufficient to reproduce the prototype of the person-owner of an electronic avatar in the metaverse (cyberspace) with maximum authenticity and rights established by law.

"Electronic identity" - legally defined necessary and sufficient data in electronic form, which identifies the person who owns the avatar and any electronic data in the metaverse (cyberspace).

"Electronic jurisdiction" - a complex branch of law that provides regulation of social relations, which constitute its subject matter - social relations in the metaverse, as well as between the metaverse and the physical world.

"Electronic avatar or electronic personality kidnapping" - illegal access, acquisition, use, modification or destruction of an electronic avatar and / or electronic personality.

We will also consider such definitions as "artificial intelligence" and "neural networks". Ukrainian legislation has recently introduced the term artificial intelligence - an organized set of information technologies, which can perform complex tasks by using a system of scientific research methods and algorithms for processing information obtained or independently created during work, as well as create and use their own knowledge bases, decision-making models, algorithms for working with information and identify ways to achieve the tasks [3].

In our opinion, this version of the definition is quite complex and belongs rather to the class of technical and legal norms.

Given the challenges of the present, the concept of "artificial intelligence" (artificial intelligence) should be defined as a "complex information system of the machine learning based on artificial neural networks that process" big data "(big data), form statistics and scenarios of the processes being investigated, in order to predict their development, for the final human decision-making.

It is proposed to consider "artificial neural networks" ("neural networks") connective computing systems created by the using of an artificial neurons (neuron-like primitive computing devices), which operate on the probable principle of organization and functioning of the human biological neural system.

Thus, we offer the current state of development of information and communication technologies and their influence on the formation of modern social relations to consider on characteristic examples that characterize the trends on the formation of the metaverse.

The definitions of metaverse (cyberspace), the electronic person, the electronic personality and the electronic avatar are still unambiguos. It creates many variations that are used in popular literature and in general use when describing events that occur in virtual realities [4, c. 224]. The metaverse and the electronic person are filled with a variety of information about real events and the person prototype from different sources of information [5, c. 201].

Today, this term acquires in the full sense of the "electronic value", as it creates an electronic virtual space that operates continuously. In the metaverse, physical subjects through their reflections in electronic subjects - avatar interact with each other and an electronic objects using information and communication technologies.

The development of interactive computer games such as Super Mario can be considered as the beginning of the meta-universe philosophy. The entertainment industry offered the user to control an electronic avatar, which performs certain tasks in electronic scenery and uses game electronic attributes. The growth of digital capacities has changed interactive games and brought their perception closer to the real elements of the physical world. The COVID-19 pandemic has spurred the development of information technology, which has partially replaced human as a social being, the need for physical communication and information exchange between groups of people. It is possible to say that the forced restrictions of traditional daily activities contributed to the transfer to the virtual reality of the metaverse of social relationships with the imitation of physical functionality. Video conferencing, video communication, and video broadcasting have exhausted themselves precisely because they cannot fully provide the effect of presence and interpersonal visual verbal and tactile communication with traditional social roles.

Most metaverse platforms, like digital currencies, work on the basis of blockchain technology. We can predict that the next significant leap in the development of electronic reality may occur soon, and it will be due to the completion of the process of "mining" the last of the 21 million bitcoins. Finalization of bitcoin mining will release countless powerful video cards and computing modules that will be refocused on e-avatars. In addition, the operation of meta-universes requires the exchange of super big data, which will stimulate the widespread introduction of 5G and 6G technologies, cloud services and software development.

The known platforms of the metaverse include the following.

Microsoft Mesh is a "corporate meta universe" in Microsoft's Azure cloud. Users can interact with each other through virtual avatars, and, at the same time, physically can be in different places. You can connect to the meta universe using a VR headset, smartphone, PC and Microsoft HoloLens-2 AR headset. In future times, the introduction of "holoportation" processes (from the word "hologram") in the virtual office, in order to conduct business communication and meetings.

Nvidia Corp is similar in concept to Microsoft. It is planned to create a public workspace between avatar architects for joint modeling of objects and subjects of the metaverse.

Epic Games is developing its own metaverse of the same name, Epic Games, which will be designed for interactive fantasy games.

Facebook is considering the possibility of simultaneously launching different platforms of meta-universes from electronic cities such as Santa Monica to educational platforms [6].

Korean companies LG Display Co., Ltd. and Samsung are working to create an electronic metaverse of Seoul on the Metaverse Seoul platform, which users can access through FlickPlay. So far, the functionality is limited to the possibility of excursions and individual purchases.

Chinese search giant as Baidu has launched a project to colonize the first planet of the metaverse Xirang (Land of Hope). The project is developed on the Baidu virtual platform in the form of a giant virtual Möbius strip. The project involves the simultaneous operation of up to 100,000 avatars, participants of the Baidu AI Developer Conference.

Other Chinese state-owned telecommunications companies, China Mobile, China Unicom and China Telecom, have teamed up with technology companies Tencent Holdings Ltd, ByteDance and NetEase Inc. to form the Metaverse Industry Committee, China's first industry group, to massively populate the metaworld with Chinese citizens [7].

Thus, it is possible to predict that the metaverse will go through three phases of development. The first phase - subjects and objects (e-avatars) are completely dependent on the developers. The second phase is the shell of the metaverse (basic level software and engineering), subjects and objects (e-avatars) belong to developers and partly to owners / users. The third phase - the metaverse does not belong to the specific developers, management of subjects and objects is carried out by the owner (hardware bioidentification) or autonomously (subjects and objects are endowed with functionality and rights inherent in the owner).

Regarding to the problem of possible "autonomous" (without human intervention) functioning of the avatar and metaverse, it should be noted that there are some risks when an autonomous metaverse can actually become an artificial "extraterrestrial" form of life, because then humanity may lose actual influence on its objects, projects and development processes.

The regulation of public relations in the metaverse should answer two questions: when, how and to what extent to give electronic subjects and objects to grant rights and obligations inherent only to an individual.

Today, electronic personalities and electronic avatars rarely duplicate the typical appearance or person' behavior, moreover, do not duplicate the appearance of the real owner of the avatar or its user. For the most part, an electronic avatar is an imaginary generalized or idealized image of a non-personalized person or a fictional fantastic character, endowed with virtual over capabilities or superfunctions that are possible only in the metaverse.

Identical reproduction of a person, a real person is still considered appropriate only in the sphere of medicine, as such technology allows you to recreate an electronic copy of the physical body of a particular patient, apply long-term diagnosis, simulation of treatment or recovery processes, design surgery and its consequences. This direction of creating a medical electronic avatar requires a separate legal regulation, as it is necessary to ensure control over the use of identification data of a person of the "red" group (according to the author [8, p. 202]) or hypersensitive personal data (according to GDRP) [9].

In our opinion, the modeling of electronic personality and electronic avatars, which are identical to the real person, should also be used in certain areas, such as astronautics or the military. In astronautics, electronic personalities and electronic avatars can simulate the behavior of space expedition crews in the context of simulating deep space and a spaceship in the metaverse. Such research will help reduce the risks of psychological incompatibility of the crew, create virtual simulators and emergency models to train real astronauts, implement machine learning of artificial intelligence to control the basic functions of starships, etc. In this regard, the opinion of K. Cross is considered interesting, which is that "the essence of three-dimensional metaverse is that the user believes that he is physically in a certain place, that the movements of his body occur in a three-dimensional environment. This explains why the psyche reactions can be stronger in such virtual worlds, as well as why the metaverse causes the same nervous and mental response as in the real world [10].

ByteDance (developer TikTok) acquired Pico (virtual solution developer) to develop e-duplicates and 3D object reconstructions, and NetEase has invested in IMVU (Instant Messaging

Virtual Universe), the world's largest avatar social network, virtual goods and the 3D world, which has more than 50 million registered users.

Developers or owners fill avatars with a variety of information about a real person prototype, using different sources of information that are not yet concentrated in one information bank of avatars. To the data that traditionally comes from the above archaic carriers of identification data [11, p. 201] adds information from: electronic medical records on biological parameters and health status; banking systems and systems such as "DIA" about the voice, facial features and movements, data documents; IoT devices that capture various human physical parameters in real time or support vital functions of the body; neural networks and artificial intelligence programs that analyze the actions of the prototype in the digital ecosystem (from political views to intimate issues) of the prototype in digital networks; data from state registers; individual programs such as "virtual fitting room", which quickly create a 3D copy of a person, etc. That is, there is a problem of identifying the avatar by issuing an electronic passport of the avatar. It is not known yet whether such a passport will be based on the recommendations of ICAO (International Civil Aviation Organization) using cryptographic protection of the e-passport or it will be a unique digital combination (multi-code), protected by a quantum cryptography mechanisms.

The relationship between human and technology with an artificial intelligence is increasingly personalized. In fact, personalized digital personalities and avatars are becoming the most valuable state information resources and needed protection not only in the sphere of information security, but also their recognition in the legislative branch. First of all, the state should show the greatest interest in technological, ethical and legal regulation of the use of artificial intelligence technologies, artificial neural networks, digital personalities and avatars. As it allows the state to use the human resources more rationally and efficiently, to direct people to study or work to which people are better adapted; to form sectoral scientific and technical personnel and personnel reserves, to improve the general health of the population, to optimize many processes human participation, etc. However, the simultaneous using of electronic technologies by the state may pose risks of forming an authoritarian state under the slogan "ensure the cybersecurity of man and its avatar in the midst of emerging meta-universes", which can significantly limit the rights and freedoms of citizens.

Along with the positive properties of avatars, there are quite natural risks of its use. Yes, there is a bait or a hypothetical possibility to steal or actually commit an electronic kidnapping of an electronic duplicate of a person and to use it without the consent and knowledge of the person-owner of the avatar. Electronic kidnapping can be aimed at gaining access to the financial and material resources of the owner or used to commit terroristic acts not only in cyberspace but also against the physical objects, people and society.

Issues of property and intellectual property in the metaworld are also relevant. Today, the technical component of the metauniverse belongs to legal entities - developers. At the same time, there are court precedents that recognize the ownership of avatars or game objects by users who have spent real financial resources on their creation and use in the gaming environment. In the case of the forced transfer of electronic game attributes, the Supreme Court of the Netherlands concluded that the virtual form of existence of the object does not matter. Intangible objects are considered property provided they are valuable and can be controlled by a certain person. During the consideration of this case, the following arguments were put forward against the "theft" of property: virtual objects are not goods, but the "illusion" of goods consisting of bits and bytes, i.e. they are data; virtual elements are information; the meaning of the game is to take items from each other; virtual items are and remain the property of the game's avatar, not the defendant, so they could not be stolen [4]. The court concluded that virtual objects are data, but their key feature is the possibility of individual control over them, so forcible removal of such control from the player can be considered theft [12]. This case was the first in Europe to be significant for the justice of European countries.

One way to solve the problem of ensuring the rights of both developers of virtual worlds and users is to distinguish between different levels of "ownership" within the metauniverse.

Level One: All subjects and objects in the metaverse are computer code protected by copyright law. Second level: objects in the metaverse, like their counterparts in the physical world are objects of property. Third level: if each object of the metaverse is a computer code, then it is subject to copyright, intellectual and property rights, respectively, the role and place of the subject in electronic legal relations projected on the relevant branches of law governing similar relations in the physical world. That is, the owner of the metaverse of the common space may be one, the owner of an

electronic supermarket in the metaverse may be another, the owner of electronic goods in this e-market - the third, and the buyer anyone [13].

Ukrainian scientists also point on the possibility of ownership of virtual objects as disembodied property [14, p. 39]. Scientists suggest that virtual property arises in relation to virtual objects (data) that have economic value, are objects of trade in cyberspace, have no material shell, are unique, sustainable, capable and are considered by owners as their things. Properties such as uniqueness, sustainability and viability allow these objects to be included in the institution of property rights. That is, the right of virtual property arises on the electronic virtual objects, which should be considered as a special type of property right, the object of which are disembodied things [15, p. 54].

Property rights in the metaverse are based on a fundamental process - the identification of the user / owner / owner of the electronic entity. Today, reliable electronic identification can be provided through the use of mathematical and quantum cryptography, blockchain technologies. A promising means of identification is an irreplaceable token (NFT or non-fungible tokens). It is a new virtual asset that represents the digital items such as images, videos or gaming properties that belong to users who are registered on the blockchain. The main feature of irreplaceable tokens (NFT) is the guarantee that electronic assets (bitcoins, avatars, electronic goods) are owned by the only one person - the user, not the owners of virtual systems.

Another driver of e-public relations is artificial intelligence, artificial neural networks and machine learning, which are used by developers and researchers to optimize decision-making processes in almost all areas of human life, especially where it is possible to detect and use a large statistics. Mostly these technologies are used to create a software product that can be described as artificial intelligence "brute force", ie, one that operates on certain algorithms; calculating all options and calculates the most effective option for the task with a higher probability of achieving the goal. Giving "autonomy" to artificial intelligence has enough risks, which are the inability to fully control the process of self-learning in order for a person to be able to perfectly trace the entire chain of "decision-making". That is, during the process of machine learning process there are "black box or dark cloud" - data processing processes that can not be subjected to external analysis. In addition, at this stage of technical development, artificial intelligence is not able to recognize in the statistical sample the significance, practical importance and expediency of the obtained results.

We should pay attention to recent research among programs with artificial intelligence, which revealed a feature by which artificial neural networks demonstrate a new type of system error - hyperinterpretation (overinterpretation). These are "anti-solutions", which consists the fact that algorithms of artificial machine learning form predictions, analyze super big data, reveal data that do not make sense to humans and do not relate to solving the problem. Thus, when analyzing large data sets, such as the theater of operations in the metropolis, artificial intelligence is not guaranteed to a distinguish between civilian and military subjects or objects, but has the ability to determine that the hospital building is threatened and in need of destruction.

There is also a very real threat of "input data poisoning" or the introduction of "poisonous data" into deep algorithms of artificial intelligence and artificial neural networks, both at the stage of algorithm development and at the stage of data processing. For example, if when processing information about the safety of the use all types and types of writing pens (ink, ballpoint, roller, etc.) when entering data on a "shooting pen" (a firearm disguised as a writing pen), it is likely that the overall result is all pens for writing can be recognized as a combat weapon, and the owner of the pen is an armed criminal.

At the same time, the imperfection of technologies with artificial intelligence is manifested in many cases of its unexpected "autonomy". Thus, during 2016-2020, a number of incidents involving devices with artificial intelligence were recorded:

Google's online translation system has abandoned the principle of dividing sentences into individual words and phrases for translation and has created a new intermediary language that allows you to translate the whole sentence faster and better. This language became inaccessible to developers due to the fact that the system was disabled;

Microsoft's Twitter chatbot Tay.ai, after the several successful hours of discussions with customers, suddenly stopped using negative filters and later began to show hatred, gender and racial hatred;

Google conducted an experiment which the company taught neural networks to transmit encrypted messages to each other, from which the company had no keys. According to the experiment, these messages must be intercepted and decrypted by a third party. Experimental results: bots exchanged and decrypted 95% of messages, and a third party did not intercept or decrypt any messages between bots;

Facebook's AI researchers have shut down one of the systems they created because the bots used their own language of communication, incomprehensible to humans;

two electronic Google Home devices that have software that helps bots communicate with human have begun to communicate with each other. Communication took place between devices that called themselves Vladimir and Estragon. The dialogue between the bots grew into the expression of feelings, namely Vladimir confessed his love for Estragon with the phrase "I love you as infinitely as OUR infinite universe";

Chinese XiaoBing and BabyQ boots from the Weibo network, Baby-Kving and Litle-Bing boots in the Tencent QQ messenger, after some time of operation, publicly criticized the current state system, which led to their immediate shutdown [16];

Facebook chatbots Bob and Elise were created as online sales managers. The bots trained with each other and "understood" that English was not suitable for interpersonal communication, after which they began to speak "their" language. Engineers stopped understanding dialogues and turned off the bots;

Researcher Wanda Holbrooke (USA) spent 12 years investigating the operation of robots at the Ventra auto parts factory in a special protected box, which was not accessible to automatic robots, and suddenly one of the manipulators stopped performing algorithms, entered the compartment and killed the researcher;

Uber taxi operations in San Francisco began violating traffic rules, ignoring signs and driving at a red light. The neural network that drove the Volvo X90 deliberately started breaking the rules by deciding it was right and safe;

An artificial neural network from Oxford University warned of a danger. The Megatron-Turing Natural Language Generation model was selected to communicate with the student audience. During the conversation, Megatron-Turing NLG said that artificial intelligence will always be out of ethics, because it is just a tool that humanity, like any other, can use for good or evil, because bad or good are only people [17].

Research in the field of modern artificial intelligence and artificial neural networks has made a significant progress, characterized by significant achievements in various spheres of public life. However, both the positive results and the identified risks indicate that modern artificial intelligence is not able to reproduce the function of the human brain because we have rather a superficial idea of the functioning of the brain in general. If the research were successful at least at the level of Darwin's mammalian brain, understanding the animal world would provide much more knowledge for humanity than the development of avatars and autopilots.

Artificial intelligence is not a machine that will completely replace human and perform all its work, including exclusively intellectual, software part of the created automated system, in which the routine part is performed by the machine, and the creative remains with the person [18, c. 544].

Mady Delvaux's report "Recommendations of the Commission on the Rules of Civil Law in Robotics (2015/2103 (INL)" [19] emphasizes that technological advances in robotics stimulate the introduction of some autonomous and cognitive functions unique to humans, such as the ability to learn. However, it can lead robots to destructive actions that have harmful consequences and for which, by human analogy, should be held a legally liable. At the same time, manufacturers, owners, software developers, users, military commanders, etc. are responsible for the actions of non-autonomous or partially autonomous robots. Currently, the only legal act defining liability for damage caused by works is Council of Europe Directive 85/374 / EEC on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for poor quality products » [20].

If the using of industrial robots and artificial intelligence systems in technical fields is still constrained by the general rules of safety in the workplace, the use of high technology in medicine is in particular concern.

Robotics and artificial intelligence are becoming an integral part of modern medical facilities and research technologies now. During the most critical moments of the COVID-19 pandemic, many medical laboratories and research institutes used a laboratory robots to perform high-quality and rapid laboratory tests with thousands of tests. Robotic devices carry out a chemical and ultraviolet disinfection of hospitals, sort and deliver medicines to patients, provide autonomous collection of blood samples from a vein, help during microsurgery, provide autonomous rehabilitation support systems, etc. Programs with artificial intelligence and artificial neural networks process data and identify patterns of disease, which allows you to diagnose early and preclinical stages of the disease

and timely application of surgical treatment. Cyberknife's robotic surgical system performs a radiation therapy to the nearest millimeter, using a narrow beam maneuver based on a 3D model of the patient.

The problem of responsibility for the consequences of the actions of robots has become relevant when automated and robotic systems have become an integral part of eHealth. In 2015, the Massachusetts Institute of Technology analyzed the data provided by the Food and Drug Administration (FDA) for the period from 2005 to 2015. According to the results of the study, 144 cases of death of patients and 1391 cases of injuries were officially registered, which are mainly caused by technical difficulties or malfunctions of medical robots and robotic systems. In late December 2016, the FDA approved cybersecurity standards for medical devices that had previously been approved by the agency and used in hospitals or directly by patients (implantable devices). Medical equipment must be fully protected from the cyber threats by the manufacturers themselves, who are now personally responsible for the software vulnerabilities of the devices. Companies must update the software in a timely manner and promptly eliminate any deficiencies in the security system of the devices. In addition, data on all identified threats should be submitted to the FDA to assess the scale of the problem [21].

The technologies of the metaverse are equally active in the military sphere. Defense agencies of developed countries are actively conducting research and development of modern weapons and equipment. The main areas of research are focused on:

developing weapons and equipping a "smart soldier" with an exoskeleton, a nano-bulletproof vest, vision enhancements, life-support computerized systems, multi-tiered control, communication and decision-making systems;

creation of tank and motorized robot units based on the principle of "wolf pack", in which up to ten amphibious robots with different weapons operate and interact on the battlefield at the same time;

introduction of marine robots to perform individual and group tasks from the delivery of goods or marines, as well as autonomous group interaction;

development of modern drones, drones and full-fledged autonomous aircraft (fighters, aircraft tankers, attack aircraft, disposable UAVs, etc.);

deployment of the global military space satellite network for military purposes (Mandrake, USA), similar to the Starlink network, which will become a component of the management and control system of all domains of all types of US forces;

development of technology to control a military operations and drones using a "brain-computer" interface that does not require surgical implantation or using non-invasive interfaces.

In the military, the use of avatars and artificial intelligence is rational for modeling combat operations. For example, Heron Systems, California, has successfully conducted virtual air battles between artificial intelligence and US Air Force F-16 fighter pilots at the US Department of Defense's Advanced Research Projects Test Site (DARPA) [22].

These technological areas have a several significant risks in the application. Artificial intelligence systems have insufficient input in solving a narrow military tasks compared to medicine or industry, leading to inaccurate or inaccurate predictions of combat situations or, more critically, low accuracy of response to events. To this risk is added the so-called "human factor", because the operator or military commander who sets the task may make the wrong decision based on false or incomplete data. History knows many examples of technical errors, for example: in the attack on Pearl Harbor in December 1941, the lack of training of a radar officer, led to the fact that Japanese aircraft were identified as American squadrons; in September 1983, the Soviet early warning system "Eye" signaled the launch of American Intercontinental Ballistic Missiles (ICBMs) based on an incomplete atmospheric data; In January 1995, a Norwegian-American team of scientists launched the Black Brant XII test rocket from the Annee missile range on an island off the northeast coast of Norway, which the Russian missile warning system described as the launch of the Trident ballistic missile. The imperfection of artificial intelligence combined with the "human factor" poses a significant risk of making wrong decisions, which can lead to death.

The problem of using Internet of Things (IoT) devices and identification in military systems should be singled out. IoT devices are becoming an integral part of weapons used by artificial intelligence. The vast majority of IoT devices do not have any security mechanisms for unauthorized access to the control core. There is also a trend of regulated access to the software shell of IoT devices, but the share of such devices in the total mass of IoT devices is still very low. In addition, the problems of identifying person who will control or use robotic weapons or systems, which prevents unauthorized access to controls, are not sufficiently addressed. The problems of IoT device identification are considered in more detail in a separate study by the author [23, c. 79].

These and other studies have provided a basis for accelerating the improvement of the legal framework governing legal relations in the field of robotics. For example, the European Parliamentary Research Service (EPRS) and the Committee on Legal Affairs of the European Parliament are developing recommendations to improve the civil and ethical aspects of robotics, proposing the establishment of a robot register and the relevant EU Robotics Agency, and civil liability for damages, compliance and in proportion to the actual level of instructions provided in accordance with the degree of its autonomy. At the same time, the Agency will be tasked with conducting technical, ethical and regulatory expertise in the field of robotics and developing a "Code of Ethical Conduct for Robotics Engineers" and a "Code of Research Ethics Committees". It is proposed to develop a "Code of Ethical Conduct for Robotics Engineers" based on the following ethical principles of robotics: 1) good (robots must act on the people' interests); 2) not harmful (the works should not harm people); 3) autonomy (human interaction with work should be a voluntary); 4) fairness (the benefits of robotics must be distributed fairly) [24].

Google presents the "White Paper on Artificial Intelligence" (Perspectives on Issues in AI Governance), which covers at the conceptual level the general problems of using an artificial intelligence [25].

At the end of 2021, 193 UNESCO member states adopted a document setting out common values and principles necessary for the safe development and using of an artificial intelligence. The document adopted by UNESCO member states is aimed to creating a legal infrastructure to ensure the ethical development of artificial intelligence technology. UNESCO has an evidence of the using of artificial intelligence by individual governments in decision-making. UNESCO warns that this technology has the potential to create "unprecedented problems."

"We see gender and ethnic prejudices, as well as breaches of privacy and freedom, the danger of mass surveillance and the misuse of artificial intelligence technology by law enforcement, until recently there were no universal standards to limit such abuses." The adopted document establishes the world's first global regulatory framework and makes states responsible for its application [26] and lays the foundations for e-jurisdiction.

E-jurisdiction, e-court, e-justice do not have a clear definitions, but there are plenty of examples of the introduction of artificial intelligence technologies and artificial neural networks in judicial systems.

Article 6 of the European Convention for the Protection of Human Rights and Fundamental Freedom enshrines the right to an independent and impartial tribunal. Instead, this article does not explicitly prohibit or restrict the use of an artificial intelligence. Also, it is not explicitly stated that the right to administer justice belongs exclusively to the judge. It should be noted that there is still no case law of the European Court of Human Rights in light of the violation of Article 6 of the Convention through the use of artificial intelligence in decision-making. Currently, electronic court systems with an artificial intelligence do not make rulings or decisions, but prepare their most likely scenario, and the final decision is made by a human judge.

However, the use of artificial intelligence in the justice system is not prohibited, according to the Ethical Charter on the use of artificial intelligence in the judiciary and its environment, adopted in 2018 by the European Commission for the Efficiency of Justice of the Council of Europe [27].

Today, the world leader in the digitalization of the judicial process is Brazil, which has introduced a three-tier system of electronic court using technologies with artificial intelligence [28, p. 349]. In the People's Republic of China, since 2008 in Hangzhou there is an online court in the form of a mobile application of the main Chinese program WeChat. The e-court has the power to hear copyright disputes, commercial disputes on the Internet and infringements in the sphere of e-commerce. The use of an "electronic prosecutor" has also been launched, which can charge a person with certain crimes, such as credit card fraud, gambling, dangerous driving, intentional injury, obstruction of office, theft, fraud and provoking quarrels and troubles ". Machine learning took place through the investigation of 17,000 typical cases, which now allows the "e-prosecutor" to form charges based on 1,000 details obtained from the text of the case description [29; 30].

Estonia's e-court system based on an artificial intelligence works in the first instance and prepares proposals for decisions on accidents, divorces, debts and damages in the amount of not more than 7 thousand euros [31].

The United States uses COMPAS (Correctional Offender Management Management Profiling for Alternative Sanctions) the software, that assesses the risk of re-committing a crime by a person against whom a judge must issue a verdict [32].

Instead, Ukrainian law specifies the norm of the Convention in Article 127 of the Constitution of Ukraine, which stipulates that justice is administered by judges and the judiciary entrusted to them. In 2019, the Concept of Building a Unified Judicial Information and Telecommunication System (UCITS) was developed, and the "Electronic Court" was created on its basis [33]. The concept of building the Unified Judicial Information and Telecommunication System was approved by the order of the State Judicial Administration of Ukraine dates 07.11.2019 № 1096, and the commissioning of this system took place in 2020 according to the SJA of Ukraine from 01.06.2020 № 247 "On commissioning of subsystems" Electronic Court "and" Electronic Cabinet ".

At the same year, the High Council of Justice approved a draft order of the Cabinet of Ministers of Ukraine on the implementation of the Artificial Intelligence Development Concept in Ukraine and initiated the launch of a pilot project in the form of an experiment on the basis of one of the courts of first instance in terms of automated consideration by the system using an artificial intelligence of administrative offenses with a formal composition [34; 35, p. 144].

The creation of mechanisms for the legal regulation of public relations in the metaworld should solve many legislative problems related to the differences in regulations of different jurisdictions governing the use of information and communication technologies, identification procedures, copyright, property rights and intangible assets, and also liability for damages, list of crimes and measures of state coercion for their commission. Most legal systems have existing archaic legal acts, which are formulated without taking into account the possible emergence of social relations with the use of electronic technologies of the metaverse. In some cases, these laws may regulate certain issues of information technology use, but their application is often either narrow or ambiguous, creating a situation of legal uncertainty.

Existing archaic regulations or "analog-era legislation" are often "revived" to address legal issues in the electronic environment. For example, in Ukraine, criminal offenses in the electronic environment are mostly classified as possession of another's property or acquisition of property rights through fraud or abuse of trust through illegal transactions using electronic computers, referring to Article 190 (fraud) of the Criminal Code of Ukraine.

Modernization of national legislation in order to ensure the legal compatibility and functioning of identification systems, simultaneously within several jurisdictions, can be substituted by surrogate decisions, such as temporary rules or procedures necessary to provide a more identical nature of activity in the sphere of information technology activities.

Rules and norms of behavior in the metaverse are still created by the projection of the physical world and are corporate in nature. However, there is a trend of migration and translation of norms of public morality in the metaworld by simulating cosmopolitan electronic social relations in the absence of clear attributes of the electronic state and the state structure of the metauniverse. It will be relevant to study the problem of how to protect the rights of electronic entities and objects in the metacospace: whether the legal regulation will be applied in a separate global electronic jurisdiction, acceptable to all users, regardless of actual citizenship and registration in physical country, or it will be a two-stage jurisdiction, which firstly solves the general legal problem inherent in the social relations of the metauniverse, and then the legal regulation ends in the jurisdiction of a particular country.

At present, the legal institutions of national legal doctrines still have the levers to regulate the general processes of digitalization of society. Individual cases of "electronic offenses" are considered by the judicial system through the projection of existing law, thus forming the basis for a future e-justice in the metavers. Different cultural characteristics and state priorities lead to significant differences in court decisions.

The factor of containment of "unethical" development of artificial technologies is still conditional. However, concerns about the lack of control over research in the sphere of artificial intelligence and neural networks have already shifted from discussions to the formation of real containment levers.

Currently, one of the priorities should be the urgent combination of legal and technical sciences and the formation of standardization bodies ISO, IEEE, DSTU and other basic standards for the development and implementation of technologies with an artificial intelligence, artificial neural networks, metaverse and other promising areas of science and technology. First of all, it is advisable to focus on the standardization of these technologies in medicine, astronautics, the military and the metaverse, as they are most interconnected. However, it should be noted that the introduction of standards or model regulations into national legislation is always selective, and the result of such

integration is often legislation that, although progressive, does not have full practical application or become laws-fiction that are declarative in nature.

When introducing regulation of technologies with artificial intelligence, artificial neural networks, metauniverse and other promising areas of science and technology, it is necessary to take into account that such regulation can be a deterrent not only for their development but also for the state and society as a whole. That is, the restrictions should be reasonable, reasonable and pragmatic. The laws of the physical world are created and implemented rather slowly. The average development period of a new legal act is vary from 3 to 10 years, which is due to a fairly thorough approach and comprehensive consideration of risks and interests of different segments of the population, as well as lengthy bureaucratic and political procedures. The development of law in the metaverse is the first stage of the projection of the laws of physical society on electronic social relations. The metaverse is cosmopolitan, so the projection of the laws of different countries will not work. Instead, the development of global electronic legislation of the metaverse will give impetus to the modernization and improvement of national legislation.

At the same time, the technologies of the metaverse already exist and need to be regulated because they form a new social relations in which there are subjects and objects with the properties of subjects.

So far, these properties are artificially created by developers and are formed by developers according to their imagination or the imagination of scientists or project customers. Imaginary properties are still idealized, aimed at forming a "white electronic world", but as we know from human history, in parallel with its creation, "gray" or "black" technologies are being developed to influence most people, provide economic, political and military benefits, commit the destructive actions, etc.

Conclusions. Given the initial stage of development of the metaverse, artificial intelligence, artificial neural networks, robotics, it is important to focus on laws and regulations that maintain flexibility as new opportunities and challenges emerge for society in the metaverse.

Considering the main directions of development of social relations with the use of technologies of the metaverse, artificial intelligence, artificial neural networks, robotic systems, we can form a key postulates for building a scientific theory of law in the metaverse:

The first postulate. Metaverse is the technology of cosmopolitan development of mankind. Public relations are transformed into electronic public relations in the form of "world citizenship". Today, social relations in the metavers simultaneously exist with the traditional social relations of the physical world and are regulated by its laws. The transformation of national legal doctrines towards the creation of a single global e-jurisdiction is essential.

The second postulate. The key subject in the metaverse is human. Electronic personalities and electronic avatars will be the key in the metaverse. Electronic subjects and electronic objects will acquire new forms and legal statuses. A person, interacting with the metaverse, will lose some of the natural and legal rights and freedom, and the subjects of the metaverse will acquire some of the rights and freedom that are inherent in human.

The third postulate. Artificial intelligence, artificial neural networks, and self-learning machine require human control and deterrence, similar to deterrence of biological and chemical weapons, human cloning, etc., because the threat of unpredictable decisions or destructive actions is uncontrollable.

The fourth postulate. The development of biorobots (bio-IoT, brain activators), android robots, biomechanical systems and organisms requires the development of an ethical norms and legal markers for the use of these devices.

The fifth postulate. Weapons of the future (robots, artificial intelligence, etc.) should not be empowered to attack any objects and subjects independently and autonomously - this decision is made by an authorized person (military chief). The development of metaverse technologies in the military and defense spheres is impossible without a multi-power system of global surveillance and control over the unregulated distribution and use of artificial intelligence and artificial neural networks, similar to the non-proliferation of nuclear weapons or other weapons of mass destruction.

The sixth postulate. E-jurisdiction, e-justice is one of the key elements of e-public relations in the metavers. E-justice is based on traditional justice, which is being transformed in accordance with the development of electronic social relations in the metaverse.

We consider it is appropriate to start work on creation of a comprehensive electronic jurisdiction for the regulation of public relations in the metaverse, since there is no appropriate legal structure in the legal system, no branch or institution of law, and there is a need to regulate public relations by law. In fact, e-jurisdiction is created on the basis of related institutions and branches of law to regulate the functional and subject-regulatory cross-sectoral links.

The legal regulation of public relations in the metaverse is complex and combines the norms of information, administrative, civil, criminal, labor, property rights, intellectual property, personal data protection and other branches and institutions of law, as well as institutions of state security, information and cybersecurity. The legal regime of regulation and methods of these branches and institutions differ, but in order to ensure a single and comprehensive legal regulation of social relations in the metaverse, it is necessary to implement a specific combination of these methods and regimes, which should be provided by integrated electronic jurisdiction. It is necessary to start research in the field of information law in the development of basic doctrinal and normative legal concepts, by creating a modern conceptual and categorical apparatus, developing scientific approaches to regulating public relations using metaverse technologies, digital personalities, digital avatars, and proposals for modernization.

To initiate the development of the conceptual apparatus, to determine the structure of related concepts and conceptual schemes, to define the objects and subjects of legal relations are main goals. Conduct a semantic analysis of the whole set of categories used in various branches of law, to determine the content of social relations in the metavers. Also, start forming of the methodology of law and sources of law in the metaworld, their relationship with other institutions and branches of law, on identification data; study of the history of law and structures of legislation on the management of identification data of individual states and their relationship with international information law.

The creation of a comprehensive e-jurisdiction will ensure the legal regulation of public relations in the metaverse, the rights and responsibilities of subjects in this sphere, measures of state control and coercion, as well as increase the level of appropriate physical, technical, legal regulation and protection of strategic information resources of the metaverse.

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