Application of Artificial Intelligence and Information and Communication Technologies: Socio-Ethical Problems (Review Article)

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This article purpose is to reveal the essence of social and ethical requirements for the use of information and communication technologies and artificial intelligence in the life of a modern person, society and the state. General scientific and special scientific methods were used to achieve the goal. Peculiarity of analyzed topic implies mandatory consideration of rules and requirements already formulated by various social institutions and organizations in response to the challenges of digital reality. It is emphasized that existing ethical regulation of use of information and communication technologies and artificial intelligence is mostly limited to framework, declarative documents indicating only general approaches and the purpose of the interaction of humanity with artificial intelligence systems, a kind of warning about possible negative consequences of

the use of technologies. Despite significant overlaps in the proposed principles, the content of these norms remains almost undisclosed to this day. It was emphasized that use of artificial intelligence requires special legal regulation, as it concerns the life and health of people. Because of potential danger to civilization of information and communication technologies and artificial intelligence, it is necessary to strictly license activities related to the production and operation of such systems. For this, at the legislative level, it is necessary to clearly define those responsible for occurrence of out-of-state situations, as well as to answer the question: "Is the transition of artificial intelligence from the status of an object to the status of a subject of legal relations possible and legal?". All of the above indicates importance and significance of the chosen research goal and requires a socio-ethical understanding of the most pressing problems of applying the capabilities of artificial intelligence.

Keywords: *artificial intelligence; information and communication technologies; social challenges; ethical problems; field of information technologies.*

Research Problem Formulation

Dynamic development of modern society radically changes the world around us, in particular, in the field of communication capabilities and the rapid introduction of artificial intelligence (hereinafter referred to as *AI*).

Digital revolution as a factor in the dynamic development of society contributed to the digital economy creation, formation of digital law foundations, new configuration of social relations through the use of the Internet, social networks and other information and communication technologies (hereinafter referred to as *ICT*). As the researchers note, *"modern digital technologies form a new mode of production, create prerequisites for the transition to a new formation, digitalization of public relations and the law itself regulating these relations"* [1]. V. Zhuravel, V. Shepitko and other Ukrainian scientists note that "*digitalization is the latest reality of the advanced countries of Europe and the whole world, and therefore of Ukraine, which has chosen the European vector of development*" [2].

Currently, AI is not just a technological trend, a buzzword or a temporary fad, it is

1 Petryshyn O. V., Hyliaka O. S. Human rights in the digital age: Challenges, threats and prospects. *Journal of the National Academy of Legal Sciences of Ukraine*. 2021. Vol. 28. No. 1. Pp. 15—23. DOI: 10.37635/jnalsu.28(1).2021.15-23 (date accessed: 19.02.2024).

2 Журавель В. А., Шепітько В. Ю. Розвиток криміналістики та судової експертизи в Україні: наближення до єдиного європейського простору / Правова наука України: сучасний стан, виклики та перспективи розвитку : монографія. Харків, 2021. С. 651—669 ; Шевчук В. М. Європейський вектор розвитку сучасної криміналістики. *Адаптація правової системи України до права Європейського Союзу: теоретичні та практичні аспекти* : мат-ли Всеукр. наук.-практ. конф. з нагоди 20-ї річн. створ. Полтав. юрид. ін-ту НЮУ ім. Ярослава Мудрого (Полтава, 29.09.2022). Полтава, 2022. С. 320—323. URL: http://pli.nlu.edu.ua/wp-content/uploads/2022/12/Збірник-29.09.pdf (date accessed: 11.02.2024).

a third, computing era based on innovation and advanced technology. We are at a stage of fundamental change unlike that experienced by generation of the first industrial revolution [3].

Cloud infrastructure *Gigacloud* even notes that "*artificial intelligence is one of the most popular terms in the world today. According to some forecasts, AI will bring $15.7 trillion to the world economy by 2035*" [4].

The authors of the *Collins* dictionary named AI the word of the year and consider it the next great technological revolution.

As N. Filipenko and S. S. Lukashevych emphasize, "*artificial intelligence technologies increasingly affect various spheres of social life, determining not only the level of opportunities, but protection degree of social values*" [5].

Thereby the issues of ICT and AI application should be considered through the prism of legal, ethical, security, humanistic goals and values of modern society. Any achievements in the field of AI make sense only if they meet the ideals of self-development, self-knowledge and, ultimately, prosperity of entire human civilization. Excessive delegation of authority from a person to AI systems, on the contrary, can negatively affect existential foundations of human existence, especially acutely raise the question of the meaning of its existence and life purpose.

In recent decades, "*advanced countries around the world are investing hundreds of billions of dollars in the development of AI technologies (machine learning, computer vision, natural language processing), the use of which in products and services (especially in the defense sector) is becoming one of the leading elements of success in international markets*" [6].

Socio-philosophical discussions on ethical standards of ICT and AI use have been going on for a long time, but the theoretical understanding of the changes occurring within its systems, the modern specialization of AI and the impact of the latest developments in this area on humans, society and all branches of social life are still significantly behind introduction of these technologies into modern life.

This problem is becoming so urgent that the Ministry of Digital Transformation of Ukraine has developed a Concept for the Development of Artificial Intelligence in Ukraine [7] (hereinafter referred to as *AI Concept*) and plans to develop an Ethical

3 Вебб Е. Велика дев'ятка. Як IT-гіганти та їхні розумні машини можуть змінити людство / пер. з англ. І. Возняка. Харків, 2020. С. 9. URL: https://book-ye.com.ua/upload/iblock/8de/908f1e91_ee9d_11ea_813d_000c29ae1566_3c5783ac_ee9e_11ea_813d_000c29ae1566.pdf (date accessed: 19.02.2024).

4 Що таке штучний інтелект: історія, види та складові / Gigacloud. URL: https://gigacloud.ua/blog/navchannja/scho-take-shtuchnij-intelekt-istorija-vidi-ta-skladovi (date accessed: 15.02.2024).

5 Філіпенко Н. Є., Лукашевич С. Ю. Інформаційні методики дослідження кримінальних правопорушень, вчинених з використанням технологій штучного інтелекту. *Наукові перспективи.* 2023. № 11 (41). № 11(7). С. 1084—1095. DOI: 10.52058/2708-7530-2023-11(41)-1084-1095 (date accessed: 19.02.2024).

6 Можливості ШІ у правоохоронній системі міста. URL: https://www.everest.ua/mozhlyvosti-shi-u-pravoohoronnij-systemi-mista/ (date accessed: 17.02.2024).

7 Концепція розвитку штучного інтелекту в Україні : схвал. розпорядж. КМУ від 02.12.2020 р. № 1556-р (зі змін. та допов.). URL: https://zakon.rada.gov.ua/laws/show/1556-2020-p#Text (date accessed: 01.02.2024).

Code for the Use of AI, taking into account European experience [8].

The document states that "main task of state policy in the field of legal regulation of the use of AI is to ensure the protection of the rights and freedoms of participants in relations in the field of AI, the development and use of AI technologies in compliance with ethical standards.

For achieving the goal of AI Concept, the following tasks should be ensured:

- "*Implementation of the norms enshrined in Recommendations on Artificial Intelligence adopted in June 2019 by the Organization for Economic Cooperation and Development (OECD/LEGAL/0449)* [9]*, subject to the ethical standards provided for in Recommendations CM/Rec(2020)1, approved on April 8* [10]*, 2020 by the Committee of Ministers of the Council of Europe for Member States on the impact of algorithmic systems on human rights, in legislation of Ukraine;*
- *consideration of the compliance issue of legislation of Ukraine with the guidelines established by the Council of Europe on development and use of artificial intelligence technologies and its harmonization with the European one;*
- *assessing possibility and determining the boundaries (ethical, legal) of the use of artificial intelligence systems for the purpose of providing professional legal assistance;*
- *ensuring functioning and activities of technical committees for standardization in accordance with the requirements of ДСТУ 1.14:2015* [11] *National Standardization. Procedures for the creation, operation and termination of the activities of technical committees for standardization in the field of artificial intelligence;*
- *ensuring interaction between the relevant Technical Committees of Ukraine and international subcommittees of standardization ISO/IEC JTC 1/SC 42* [12] *Artificial Intelligence on joint development of standards in the field of artificial intelligence;*

8 Повідомлення про проведення публічного громадського обговорення проєкту розпорядження Кабінету Міністрів України «Про схвалення Концепції розвитку штучного інтелекту в Україні» / Мінцифри України : офіц. сайт. URL: https://thedigital.gov.ua/regulations/povidomlennya-pro-provedennya-publichnogogromadskogo-obgovorennya-proyektu-rozporyadzhennya-kabinetu-ministrivukrayini-pro-shvalennya-koncepciyi-rozvitku-shtuchnogo-intelektu-v-ukrayini (date accessed: 01.02.2024).

9 Recommendation of the Council on Artificial Intelligence (OECD/LEGAL/0449). Adopted on: 22/05/2019. Amended on: 08/11/2023. OECD, 2024. 11 p. URL: https://legalinstruments.oecd.org/en/instruments/oecd-legal-0449 (date accessed: 03.02.2024).— *Прим. авт.*

10 Рекомендація CM/Rec (2020) 1 Комітету Міністрів державам-членам щодо впливу алгоритмічних систем на права людини : прийнято Ком. Мін-в 08.04.2020 р. на 1373-му засід. заступ. мін-в. URL: https://www.echr.com.ua/document/rekomendaciya-cm-rec-20201-vid-08-04-2020/ (date accessed: 10.02.2024).— *Прим. авт.*

11 ДСТУ 1.14:2015 Національна стандартизація. Процедури створення, діяльності та припинення діяльності технічних комітетів стандартизації : прийнято наказом ДП «УкрНДНЦ» від 31.12.2015 р. № 217 (зі змін. та допов.) [Чинний від 01.06.2016]. Київ, 2016. 46 с. URL: https://dntb.gov.ua/wp-content/uploads/2021/02/%D0%94%D0%A1%D0%A2%D0%A3-1.14-2015.pdf (date accessed: 19.02.2024).— *Прим. авт.*

12 ISO/IEC JTC 1/SC 42 Artificial Intelligence. URL: https://www.iso.org/committee/6794475.html (date accessed: 04.02.2024).— *Прим. авт.*

- *support for initiatives to create organizational forms of cooperation between interested legal entities and individuals in the field of artificial intelligence;*
- *development of the Code of Ethics for Artificial Intelligence with the participation of a wide range of stakeholders;*
- *consideration of the need to regulate public relations in the field of artificial intelligence development at the legislative level*" [13].

Therefore, conclusion about legal, security and socio-ethical principles of procedure planning of development and implementation of ICT and AI in all fields of public life seems fair.

Analysis of Recent Researches and Publications

Some aspects of the problem under research were considered by: Yu. Baturin, K. Basin, P. Bilenchuk, A. Vengerov, V. Venediktov, M. Viekhov, O. Gavrilov, V. Golina, V. Golubev, O. Ivanenko, V. Zhuravel, M. Karchevsky, M. Kovalenko, V. Kolpakov, A. Komzyuk, O. Kokhanovska, V. Kuznetsov, M. Logvinenko, S. Lukashevich, T. Mikhailina, O. Mozhaev, M. Panov, V. Pyvovarov, M. Polieva, V. Severin, S. Semiletov, V. Sydorenko, K. Skoromnikov, F. Tarasenko, L. Tereshchenko, T. Tarakhonich, B. Ukraintsev, N. Filipenko, V. Frolov, V. Shevchuk, V. Shepitko, A. Chernykh, S. Chornyi, S. Yasechko, etc. At the same time, many problematic issues of ICT and AI application remain debatable today and require additional coverage and development.

Development of philosophical, ethical, technical, legal, security, social and humanistic principles of interaction with AI aimed at effective and safe use of AI will help to eliminate these shortcomings. Such studies will make possible to formulate the content of the main requirements for developers and users of AI systems at any stage of its development and improvement, minimize possible negative consequences, determine the limits of the use of ICT and AI, intelligently and humanely realize their potential to solve the global problems of our civilization. Currently, much has already been done at the level of state structures, law enforcement agencies, scientific organizations, business and civil society to identify such principles, but their content is often not disclosed.

Consequently, research relevance is due to the need for a deeper and adequate reflection in legal, security and other documents that develop and approve the further development of social society of the realities of the impact of ICT and AI on society and humans, the need to identify the content of basic principles of human interaction with AI systems through the analysis of its most essential characteristics; identification of possible social, ethical consequences and prospects for human-AI interaction, safe and effective implementation of state functions.

Article Purpose

The aim of the article is to analyze the latest research of modern foreign and domestic scientists and determine the most optimal ways to use ICT and AI, identify and minimize its negative impact and develop established ethical standards for its application.

13 Концепція розвитку штучного інтелекту ... . URL: https://zakon.rada.gov.ua/laws/show/1556-2020-p#Text (date accessed: 14.02.2024).

Research Methods

The theoretical and methodological basis of this research is general scientific and special scientific methods (dialectical, analytical abstraction, comparative, interpretation, as well as a systematic approach) that were used to reveal ethical norms of the introduction of ICT and AI in all fields of public life.

Main Content Presentation

Encyclopedia Britannica defines AI as «*the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience. Since the development of the digital computer in the 1940s, it has been demonstrated that computers can be programmed to carry out very complex tasks — such as discovering proofs for mathematical theorems or playing chess — with great proficiency. Still, despite continuing advances in computer processing speed and memory capacity, there are as yet no programs that can match full human flexibility over wider domains or in tasks requiring much everyday knowledge. On the other hand, some programs have attained the performance levels of human experts and professionals in performing certain specific tasks, so that artificial intelligence in this limited sense is found in applications as diverse as medical diagnosis, computer search engines, voice or handwriting recognition, and chatbots*» [14].

Collins English Dictionary interprets AI as «*artificial intelligence is a type of computer technology which is concerned with making machines work in an intelligent way, similar to the way that the human mind works*» [15].

In turn, the *Oxford English Dictionary* considers AI as «*the capacity of computers or other machines to exhibit or simulate intelligent behavior; the field of study concerned with this. In later use also: software used to perform tasks or produce output previously thought to require human intelligence, esp. by using machine learning to extrapolate from large collections of data. Also as a count noun: an instance of this type of software; a (notional) entity exhibiting such intelligence*» [16].

In other words, the development and use of ICT and AI opportunities are still in the field of constant discourse, which results are one of the most important subjects of discussion for scientists and practitioners around the world.

Most importantly, almost all scientists agree with the thesis that concept of artificial consciousness "*implies availability of an artificial conscience* [Here and further in the quotes we emphasize.— *Authors*.] *as a mechanism for ensuring the ethics of AI decisions. This issue was positively perceived at the meeting of the Group of Governmental Experts on Lethal Autonomous Weapons Systems of the UN Office for Disarmament Affairs on June 27, 2022*" [17].

14 Copeland B. J. Artificial intelligence / Encyclopædia Britannica. URL: https://www.britannica.com/technology/artificial-intelligence (date accessed: 19.02.2024).

15 Artificial intelligence / Collins English Dictionary. URL: https://www.collinsdictionary.com/dictionary/english/artificial-intelligence (date accessed: 05.02.2024).

16 Artificial intelligence / Oxford English Dictionary. URL: https://www.oed.com/viewdictionaryentry/Entry/271625 (date accessed: 05.02.2024).

17 Шевченко А. І., Барановський С. В., Білокобильський О. В., Бодянський Є. В., Бомба А. Я. та ін. Стратегія розвитку штучного інтелекту в Україні : монографія / за заг. ред. А. І. Шевченка. Київ, 2023. С. 61. URL: https://jai.in.ua/archive/2023/ai_mono.pdf (date accessed: 07.02.2024).

However, we consider different approaches to understanding ICT and AI, given the current level of development of its systems. Since today the debate about the selective, universal, general in AI is exclusively in the field of forecasts and predictions, we conclude that it is necessary to use the most general classification of AI, which subdivides the many available types of *AI into strong AI* and *weak (narrow) AI*.

At the same time, strong AI is still a speculative topic, and the object of scientific knowledge, in our opinion, today can only be AI created by man to solve specific practical problems, that is, narrow AI.

In turn, «*weak artificial intelligence (AI) — also called narrow AI — is a type of artificial intelligence that is limited to a specific or narrow area. Weak AI simulates human cognition. It has the potential to benefit society by automating time-consuming tasks and by analyzing data in ways that humans sometimes can't. Weak AI can be contrasted to strong AI, a theoretical form of machine intelligence that is equal to human intelligence*» [18]: that means narrow AI can be characterized as a group of technologies or as a result of human application of scientific knowledge to solve various practical tasks. Most researchers emphasize the systemic nature of narrow AI. Today, AI is considered a fully or partially autonomous system that organizes itself, has the ability to think, learn, and make decisions independently. An artificial intelligence system is a software-hardware complex containing hardware and software. Hardware includes all physical parts of a computer or machine: the carrier of AI, that is, the electronic and mechanical parts that make up the system. Software contains programs used to control the machine. Computer technology specialists often call these parts *hard* and *soft*. Thus, an artificial intelligent system is a computer capable of performing functions characteristic only of a person, it is a system, the elements of which are a hardware complex, software and data set.

Hardware system are physical devices ensuring operation of applications. Software is a set of computer code and connections between its components which functions thanks to hardware system. Data set contains input and output data and the latter are the result of input data processing and exist as a solution and action of the AI system.

AI systems are both applications running in virtual space (for example, an image or text recognition program) and hardware devices with software (for example, unmanned vehicle, robot cleaner). Let us emphasize once again that all modern AI systems and work with AI are examples of narrow AI.

Systemic nature of narrow AI is evidenced by the definition of the high-level expert group of the European Commission, which formulated the following definition of AI: "*Artificial intelligence (AI) systems are software (and possibly hardware) systems developed by humans having a complex goal, act in physical or digital dimension, collecting data about the environment, interpreting collected and structured or unstructured data in the form of reasoning based on previously obtained knowledge or the results of processing new information and capable of making a decision on the best course of action from the point of view of achieving the goal set by a person. Such artificial intelligence systems are able to follow the rules set by the developer,*

18 The Investopedia Team. Weak AI (Artificial Intelligence): Examples and Limitations / Investopedia. Jan 01, 2022. URL: https://www.investopedia.com/terms/w/weak-ai.asp#:~:text=Key%20Takeaways-,Weak%20artificial%20intelligence%20(AI)-also%20called%20narrow%20AI-,is%20equal%20to%20human%20intelligence (date accessed: 09.02.2024).

construct a digital model of a particular process or phenomenon, and can also change their own behavior, adapting it to environmental conditions that have changed as a result of previously perfect actions" [19]. This definition can be found in a separate document prepared by the expert group and published under the *Defining AI: Core Capabilities and Disciplines* title.

This definition, in our opinion, can be called the most correct, since it notes the main properties and abilities of AI that distinguish it from any other objects and phenomena of social reality, thereby reflecting the deep essence of this phenomenon.

It should be noted that in the report of the ad hoc intergovernmental committee of experts on AI of the Council of Europe, this definition of AI is recognized as the most accurate [20]. However, it cannot be considered final, since the technical sciences and AI technology in the modern world are in constant development.

There is often confusion in the conceptual apparatus due to the identification of AI with the methods, methods, algorithms, and mathematical models created to ensure its working functions. It is, in particular, about machine learning and artificial neural network. Machine learning (hereinafter referred to as machine learning) is a group of methods (learning with a teacher, learning without a teacher, learning with reinforcement) that provide data analysis by a program for decision-making. With the help of these methods, separate intellectual tasks are solved — such as collecting and analyzing data, drawing conclusions, etc. An artificial neural network (hereinafter referred to as ANN) is «*neural networks, also known as artificial neural networks (ANNs) or simulated neural networks (SNNs), are a subset of machine learning and are at the heart of deep learning algorithms. Their name and structure are inspired by the human brain, mimicking the way that biological neurons signal to one another. Artificial neural networks (ANNs) are comprised of a node layers, containing an input layer, one or more hidden layers, and an output layer. Each node, or artificial neuron, connects to another and has an associated weight and threshold. If the output of any individual node is above the specified threshold value, that node is activated, sending data to the next layer of the network. Otherwise, no data is passed along to the next layer of the network. Neural networks rely on training data to learn and improve their accuracy over time. However, once these learning algorithms are fine-tuned for accuracy, they are powerful tools in computer science and artificial intelligence, allowing us to classify and cluster data at a high velocity. Tasks in speech recognition or image recognition can take minutes versus hours when compared to the manual identification by human experts. One of the most well-known neural networks is Google's search algorithm*» [21].

In other words, ANN is a mathematical model created for analyzing and processing data and making decisions on this basis in the case of using MN methods. The creators

19 Ethics Guidelines for Trustworthy AI. Independent High-Level Expert Group on Artificial Intelligence Set up by the European Commission. 8 April 2019. 41 p. URL: https://www.aepd.es/sites/default/files/2019-12/ai-ethics-guidelines.pdf (date accessed: 12.02.2024).

20 Ad Hoc Committee on Artificial Intelligence (CAHAI) Policy Development Group (CAHAI-PDG). Draft Questionnaire for the Multi-Stakeholder Consultation. CAHAI-PDG(2021)01. 19 p. URL: https://rm.coe.int/cahai-pdg-2021-01-draft-questionnaire-on-feasibility-study-rev14012020/1680a11d31 (date accessed: 16.02.2024).

21 What is a neural network? / IBM. URL: https://www.ibm.com/topics/neural-networks (date accessed: 19.02.2024).

of ANNs were inspired by biological neural networks, so it is built from artificial neurons (processors), which make AI software "intelligent", become methods and tools for achieving the desired result by AI systems. The essence of AI systems is fully expressed in the above definition.

As the researchers note, there are several types of AI:

- " *purely reactive (these machines have no memory or data to work with, specializing in only one area of activity. For example, in a chess game, the machine watches the moves and makes the best decision to win);*
- *limited memory (such systems collect previous data and continue to add it to their memory. Have enough memory or experience to make the right decisions, while their memory is minimal. For example, such a machine might suggest a restaurant based on a person's location);*
- *theory of mind (this type of AI understands thoughts and emotions, and interacts socially);*
- *self-conscious (self-conscious machines are the future generation of new technologies. They will be intelligent, sensitive, conscious)*" [22].

Thus, the AI common in modern society exists in the form of its weak (or narrow) version, designed to perform specific, human tasks. It is noted for its systemic nature, which ensures the integrity of the interacting components represented by software and information software, as well as hardware devices. It is able to collect data, interpret them in the form of considerations, make decisions based on available information base about the possible and best way to solve the task assigned to.

Let us consider the opinions of Ukrainian scientists about the concept of information and information technologies (hereinafter referred to as *IT*), where AI has become the most widespread.

Let us start with the *information* definition. As already noted by N. Filipenko and S. Lukashevich, «*despite the rich practice of using information flows in the intellectual activity of a modern person and the extensive theoretical development of this scientific category, today there is no stable definition of the concept of «information». This is due, first of all, to the diversity of areas of application of information; secondly, to the multi-vector nature of information flows; thirdly, to the large number of operators exchanging (disseminating) information; fourthly, to the rapid development of modern communication links and technologies, etc. The essence of the category under consideration is also strongly influenced by the lack of a single unified scientific language (i.e., the concept is used within the science in which it is applied). Specialists are no longer satisfied with the old definition of information, they need more specific features. Moreover, there are many definitions of information, and each of them reflects either the specifics of the field of knowledge in which a particular definition is used, or the specifics of the professional activity of the person who gave or proposed the said definition, or simply his or her personal taste and terminological inclinations*» [23].

They noted that «*with regard to the scientific definition of this concept, we emphasize that information is the definition of content obtained from the external world*

22 Що таке штучний інтелект … . URL: https://gigacloud.ua/blog/navchannja/scho-take-shtuchnij-intelekt-istorija-vidi-ta-skladovi (date accessed: 07.02.2024).

23 Filipenko N. Ye., Lukashevych S. Yu. Information Technologies in Law Enforcement, Security and Expert Activities. *Наука і техніка сьогодні*. 2023. No. 13 (27). Pp. 13—22. DOI: 10.52058/2786-6025-023-13(27)-13-21 (date accessed: 08.02.2024).

in the process of our adaptation to it and the adaptation of our feelings to it. The process of obtaining and using information is the process of our adaptation to the contingencies of the external environment and our life activity in the external environment. The application of the general laws of the theory of philosophy allows us to understand the natural essence of information, so information will be understood as a certain characteristic of reflection due to the fact that reflection is a general property, an attribute of matter and is always characterized by organization. Having analyzed the above, we note that it is the category of reflection that is the key that allowed us to discover the nature of information. The specification of the content led to a simultaneous expansion of the scope of the concept of «information» and began to characterize not only the aspect of human communication, but also communication phenomena in technology, biological and other processes. We consider information to be a strategic product, it is the basis of management activities, reflects not only the conditions of existence, quality, patterns, features of the object, the functioning of the subject, but also the management system as a whole, with its elements in particular» [24].

According to Yu. Piliukov, «*in the theory of exact sciences, in particular mathematics, there is a different approach to understanding the nature of information from the philosophical one. In cybernetics, information is understood as any set of signals, influences or data that a system absorbs from the environment (input information), transmits to the environment (output information) or, ultimately, stores in itself (internal, intra-system information)*» [25].

Ukrainian scientists, developing this statement, note that «*in the theory of law, the study of legal phenomena is closely related to the development of a separate general scientific information approach, which has resulted in a new direction that combines the subject of forensic science with information processes* [26]. *At the same time, some scholars identify the concept of "information" with such concepts as "data", "information", "message", "knowledge", etc. Due to this, such concepts as "evidentiary", "orientation", "forensic", "operational and investigative"* [27], *information, etc. have appeared and spread in the theory of legal sciences.*

The impact of information and, ultimately, IT on civilization, as well as the impact of informatization processes on the socio-economic and political fields is considered quite positive, but the newest deviant manifestations are emerging (transforming) and interfering with sustainable life systems in the world every day. Some of them are positive, contribute to development of social relations in general and are the driving forces of progress in technology, economics and culture, even changing outdated schemes of morality and aesthetics. Instead, some of them generate negative changes, destroy established social relations with

24 Filipenko N. Ye., Lukashevych S. Yu. Op. cit. DOI: 10.52058/2786-6025-023-13(27)-13-21 (date accessed: 08.02.2024).

25 Пілюков Ю. О. Використання інформаційних систем в експертних підрозділах МВС України : дис. ... канд. юрид. наук. Київ, 2009. С. 190. URL: http://dspace.wunu.edu.ua/handle/316497/45008 (date accessed: 09.02.2024).

26 Лукашевич В. Г. Криминалистическая теория общения: постановка проблемы, методика исследования, перспективы использования : монография. Киев, 1993. С. 84—90.

27 Салтевский М. В. Идентификация и информация. *Правоведение*. 1965. № 3. С. 84 ; Яременко В. В., Філіпенко Н. Є. Основи реалізації оперативно-розшукової інформації : наук.-практ. посіб. Київ, 2009. 216 с.

the onset of negative phenomena for societies [28].

Scientists identify the following main information threats of our time:

1. Spread of areas of specific expertise application in detection and investigation of crimes in the field of computer information and high technologies creates new risks associated with the possibility of cross-border circulation of information that is increasingly used for criminal geopolitical, military-political, terrorist, extremist and other illegal purposes to the detriment of international security and strategic stability.
2. Use expansion of information and psychological influence technologies by the special services of individual States to destabilize internal political and social situation in certain regions that threatens sovereignty and territorial integrity of States.
3. Intensification of information and psychological influence on Ukrainian society, especially young people, in order to impose a pro-Russian position and call for betrayal of Ukraine's national interests.
4. Strengthening influence of terrorist and extremist organizations, which in their practices actively use mechanisms of information influence on individual and public consciousness, actively recruit supporters and sympathizers through social networks to incite hatred on religious, racial, ethnic grounds.
5. Emergence of new and improvement of existing computer crimes, especially in economic and financial field.
6. Increase in the number of computer attacks on critical infrastructure and air transport facilities.
7. Insufficiency of scientific research aimed at creating promising high technologies, low level of introduction of domestic developments in the field of information security, etc. [29]

The *AI Concept* emphasizes that *"use of artificial intelligence technologies in ensuring information security is one of the factors that will contribute to ensuring national interests. In particular, monitoring social networks and Internet resources of electronic media using artificial intelligence technologies makes it possible to identify systemic trends and problems, act proactively, and analyze the target audience"* [30]. To achieve the goal of the *AI Concept* in this area, "*the following tasks should be performed:*

- *formation and use of information resource, ensuring high rates of its filling and specified quality criteria (availability, reliability, timeliness, completeness);*
- *creation of a protected national information space using artificial intelligence technologies;*
- *detection, prevention and neutralization of real and potential*

28 Арістова І. В., Баранов О. А., Дзьобань О. П. та ін. Юридична відповідальність за правопорушення в інформаційній сфері та основи інформаційної деліктології : монографія / за заг. ред. проф. К. І. Бєлякова. Київ, 2019. С. 108. URL: https://ippi.org.ua/sites/default/files/monografiya_ok_0_0.pdf (date accessed: 03.02.2024).

29 Філіпенко Н. Є., Снігерьов О. П., Бубліков А. В. Застосування спеціальних знань під час виявлення, профілактики й розслідування злочинів у сфері комп'ютерної інформації та високих технологій (*оглядова стаття*). *Теорія та практика судової експертизи і криміналістики*. 2020. Вип. 22. С. 162—178. DOI: 10.32353/khrife.2.2020.12 (date accessed: 03.02.2024).

30 Концепція розвитку штучного інтелекту ... . URL: https://zakon.rada.gov.ua/laws/show/1556-2020-p#Text (date accessed: 14.02.2024).

threats of dissemination by the media of the cult of violence, cruelty, pornography, attempts to manipulate public consciousness, in particular, by disseminating inaccurate, incomplete or biased information" [31].

Thereby safe and ethical use of information occupies one of the leading places in the modern development of world community.

In provisions of normative legal acts of Ukraine and research papers of foreign and Ukrainian authors, we find several almost identical terms: *information technologies* and *information and communication technologies*.

The current Law of Ukraine: *On the National Informatization Program*, where the term *information technology* is no longer used, contains a definition of the term *informatization*, understanding it as "*set of interrelated organizational, legal, political, socio-economic, scientific, technical, technological and production processes aimed at creating conditions for ensuring the development of the information society and the introduction of information, communication and digital technologies*" [32].

According to Art. 1 of Law of Ukraine: *On the National Informatization Program* that has expired, "*information technology is a purposeful organized set of information processes using computer facilities that provide high speed data processing, fast information retrieval, data dispersal, access to information sources regardless of their location*" [33].

According to the definition of H. Shvachych and V. Tolstoy, "*information technology is a data processing technology (information resource) consisting of a set of technological elements: collection, accumulation, search, processing, transmission of data to users based on modern technical means*", and the term "*ICT <…> is often used as a synonym for <…> IT , although ICT is a more general term that emphasizes the role of unified technologies and the integration of telecommunications (telephone lines and wireless connections), computers, firmware, software, storage and audiovisual systems that allow users to create, access, store, transmit, and modify information. In other words, ICT consists of IT, as well as telecommunications, media broadcasting, all types of audio and video processing, transmission, network management and monitoring functions*" [34].

ICT is a general term that combines all technologies for the transfer of information. The concept of ICT is quite broad and variable. The most common is the interpretation of ICT as a rationally organized set of actions in information space for targeted production and dissemination of information to influence a specific audience: communication technologies: *planned impact on target groups* [35].

31 Концепція розвитку штучного інтелекту … . URL: https://zakon.rada.gov.ua/laws/show/1556-2020-p#Text (date accessed: 19.02.2024).

32 Про Національну програму інформатизації : Закон України від 01.12.2022 р. № 2807-IX. URL: https://zakon.rada.gov.ua/laws/show/2807-20#n191 (date accessed: 06.02.2024).

33 Про Національну програму інформатизації : Закон України від 04.02.1998 р. № 74/98-ВР (утрат. чин.). URL: https://zakon.rada.gov.ua/laws/show/74/98-%D0%B2%D1%80#Text (date accessed: 19.02.2024). Він поступився місцем Закону України від 01.12.2022 р. № 2807-IX «Про Національну програму інформатизації».

34 Швачич Г. Г., Толстой В. В., Петречук Л. М., Іващенко Ю. С., Гуляєва О. А., Соболенко О. В. Сучасні інформаційно-комунікаційні технології : навч. посіб. Дніпро, 2017. С. 5, 7. URL: https://nmetau.edu.ua/file/ikt_tutor.pdf (date accessed: 19.02.2024).

35 Reddick C. G. Handbook of Research on Strategies for Local E-Government Adoption and Implementation: Comparative Studies. IGI Global, 2009. 1106 p.

ICT is a set of technologies that ensure recording of information, its processing and exchange (transmission, dissemination, disclosure) and IT are methods and means of obtaining, transforming, transmitting, storing and using information [36].

Consequently, ICT can be defined as a set of actions related to the processing, storage and interpretation of information, as a result of which it is modified in accordance with the needs of a particular subject. In this form, data gets into public information flow, provoking a certain (mostly predicted and planned) reaction of influence audience. "*ICT is a set of methods, tools and techniques that are used to collect, process, store, disseminate information in the interests of its users*" [37].

The *AI Concept* states that field of AI is an area of activity in the field of IT ensuring creation, implementation and use of AI technologies [38].

According to Ukrainian scientists, "*AI is a function of artificial consciousness, represented by a system of algorithms created and controlled by it, which provides self-learning in accordance with available information, acquired knowledge, rules, laws of society and its experience, the creation of new knowledge on this basis to fulfill human orders, as well as the ability to conduct self-diagnosis and substantiate decisions made by it*" [39].

AI is a "*metaphorical name of one of the priority scientific areas that has developed in the general complex of cybernetic research on the problems of modeling thinking processes, intensification of intellectual activity through the computerization of certain types of it. Therefore, acquiring an increasingly independent character in the process of accelerated development, it becomes the basis of high information technologies and systems, a powerful driver of the historical progress of mankind*" [40].

The main directions of legal regulation of safe functioning and development of IT are determined by the need to limit the use of information and electronic systems during genetic experiments, to determine the procedure for accessing and using electronic databases of confidential information and information related to development of bioelectronic and psychocomputer systems, as well as to develop procedures filing of lawsuits in case of violation of the balance of public and personal interests providing for resolution of conflict situations that arise in connection with functioning and

36 Климанська Л. Д. Комунікативні технології моделювання політичного простору в демократичному суспільстві. *Розвиток демократії та демократична освіта в Україні* : зб. мат-лів ІІІ міжнар. наук. конф. (Львів, 19—22.05.2005). Київ, 2006. URL: https://scholar.google.com/scholar?cluster=17011766827876176489&hl=en&oi=scholarr (date accessed: 06.02.2024) ; Інформаційні й комунікаційні технології / UA5.org. URL: https://www.ua5.org/svit/281-nformacjjn-jj-komunkacjjn-tekhnolog.htm (date accessed: 06.02.2024).

37 Кочубей Л. Особливості сучасних інформаційно-комунікативних технологій в Україні. *Наукові записки Інституту політичних і етнонаціональних досліджень ім. І. Ф. Кураса НАН України*. 2017. Вип. 3 (89). С. 44—70. URL: https://ipiend.gov.ua/wp-content/uploads/2018/07/kochubei_osoblyvosti.pdf (date accessed: 02.02.2024).

38 Концепція розвитку штучного інтелекту ... . URL: https://zakon.rada.gov.ua/laws/show/1556-2020-p#Text (date accessed: 19.02.2024).

39 Шевченко А. І., Барановський С. В., Білокобильський О. В., Бодянський Є. В., Бомба А. Я. та ін. Зазнач. твір. С. 61. URL: https://jai.in.ua/archive/2023/ai_mono.pdf (date accessed: 11.02.2024).

40 Мороз О. Штучний інтелект / Філософський енциклопедичний словник // редкол.: В. І. Шинкарук (голова) та ін. Київ, 2002. С. 727. URL: https://shron1.chtyvo.org.ua/Shynkaruk_Volodymyr/Filosofskyi_entsyklopedychnyi_slovnyk.pdf (date accessed: 20.02.2024).

development of information and electronic systems. Probably, this opinion should be taken into account when determining the grounds for criminalization of an act, in particular, assessing the risks that State should counter by developing an effective criminal law policy and using the capabilities of AI in the field of IT.

An important role is played by specific expertise application during detection, prevention and investigation of crimes in the field of computer information and high technologies. As stated in modern Ukrainian specialist studies on this issue, "*specifics of identifying and researching forensically significant computer information are primarily related to the fact that this field of specific expertise contains quite diverse science-intensive areas such as electronics, electrical engineering, information systems and processes, radio engineering and communication, computing (in particular, programming) and automation. Crimes of considered categories are most often latent in nature, leave no visible traces and are difficult to disclose and collect evidentiary information due to the wide use of remote access tools, data protection, etc.*" [41].

Note that one of the most important procedural forms of application of special knowledge is expertise. The computer forensic science term (hereinafter referred to as *CFS*) has entered the modern circulation of forensic expert institutions of the Ministry of Justice of Ukraine. We believe that the current terminology is not final. The use of terms is directly or indirectly related to the appearance of new or moral obsolescence of existing technical means, so in the future both the appearance of new types of CFS and a change in its very name are possible. However, regardless of the name, its high technocratic nature and the need for it both by law enforcement agencies and society in general remain unchanged. "*The main task of experts during computer forensic is to answer questions requiring specific expertise in the field of computer forensics: knowledge about methods of searching, securing and researching digital evidence for crimes, related to computer information (cybercrimes).*

CFS makes possible to form a complete evidence base by solving most diagnostic and identification issues i.e., it solves tasks related to the search, detection, evaluation and analysis of information contained in a computer system. As a result of CFS carried out during investigation of crimes related to violations of information security in open computer networks, theft (destruction, modification) of information and violations of information security, information is formed about vulnerability of information processing processes in information systems. At the same time, information security specialists can use the results of CFS to improve modern means of information protection and ensure information security" [42]. Taking into account the achievements of foreign and domestic scientists [43] in this direction, modern level of development of science and technology and the practical experience

41 Філіпенко Н. Є., Снігерьов О. П., Бубліков А. В. Зазнач. твір. DOI: 10.32353/khrife.2.2020.12 (date accessed: 20.02.2024).

42 Ibid.

43 Можаєв О. О., Можаєв М. О., Логвиненко М. О., Чорний С. В. Автоматизована система накопичення емпіричних даних у сфері комп'ютерно-технічних експертиз. *Актуальні питання протидії кіберзлочинності та торгівлі людьми* : зб. мат-лів Всеукр. наук.-практ. конф. (Харків, 23.11.2018). Харків, 2018. С. 302—304. URL: https://univd.edu.ua/general/publishing/konf/23_11_2018/pdf/89.pdf (date accessed: 19.02.2024) ; Філіпенко Н. Є., Лукашевич С. Ю. Зазнач. твір. DOI: 10.52058/2708-7530-2023-11(41)-1084-1095 (date accessed: 21.02.2024).

of implementing CFS, the main objects of research of specialists in the field of CFS are integrated and embedded systems, open systems, communication systems, as well as multimedia information objects for the most part, the purpose of such research is to solve diagnostic and identification tasks during information system research, gain access to electronic equipment and information. Thus, special attention is paid to telecommunication services *SMS, EMS, MMS* during the research of mobile terminals, because they are able to provide information about persons involved in criminal acts (in particular, in mobile communication networks).

The *AI Concept* stipulates that "*main task in the field of cybersecurity during the implementation of the state policy for the development of the field of artificial intelligence is to protect communication, information and technological systems, information technologies, primarily those used by operators (suppliers) of key services (including critical infrastructure facilities) and are important for the continuity of the functioning of the State, society and the security of citizens*" [44].

Accordingly, "*comprehensive solution to cyber security issues requires the following tasks:*

- *improvement of legislation and creation of a modern regulatory framework for the implementation of the best world practices of artificial intelligence in the field of cybersecurity and cyber defense;*
- *development of innovative cybersecurity systems that widely use artificial intelligence technologies to automatically analyze and classify threats and automatically select a strategy for their containment and prevention;*
- *studying the issue of licensing foreign artificial intelligence developments in the field of cybersecurity, especially in the public sector;*
- *creation of national information systems, platforms and products in order to reduce the share of foreign software in the field of cybersecurity used by public administration bodies;*
- *update of state standards regarding information security, in particular state information resources, as well as the development of new national standards in the field of cyber security and cyber protection, in particular organizational and technical requirements related to security of applications, mobile devices, workstations, servers and networks, cloud computing models. Updating of standards and development of new ones should be carried out taking into account European and international standards, in particular standards: ISO 27001* [45]*, ISO/IEC 27032* [46]*»* [47].

Investigating the most relevant areas of application of ICT and AI, we found that in the process of designing, implementing and disseminating AI systems, a number of specific problems inevitably arise, which number is constantly increasing with

44 Концепція розвитку штучного інтелекту … . URL: https://zakon.rada.gov.ua/laws/show/1556-2020-p#Text (date accessed: 14.02.2024).

45 ISO/IEC 27001:2022 Information security, cybersecurity and privacy protection. Information security management systems. Requirements. URL: https://www.iso.org/standard/27001 (date accessed: 19.02.2024).— *Прим. авт.*

46 ISO/IEC 27032:2023 Cybersecurity. Guidelines for Internet security. URL: https://www.iso.org/ru/standard/76070.html (date accessed: 11.02.2024).— *Прим. авт.*

47 Концепція розвитку штучного інтелекту … . URL: https://zakon.rada.gov.ua/laws/show/1556-2020-p#Text (date accessed: 19.02.2024).

development of application scope of AI systems.

Traditionally, these problems are called *ethical*, but, in our opinion, they go far beyond the actual ethical issues. The researchers rightly note that many problematic questions arise: *"Will AI perceive morality and law and will it be guided by morality and law to make autonomous decisions?"*, *"What is the decision-making process for the AI system?"*, *"What are the moral and legal consequences of AI actions and decisions?"*; *"Can the AI system be held accountable for its actions?"*. This is not a complete list of issues that arise in case of violation of the topic of legal and moral and ethical norms that should regulate issues related to the use of AI technologies [48].

We characterize them as socio-philosophical, since they cover a wide range of issues on the interaction between humans and AI in various fields of public life, violating, in addition to the actual ethical and moral problems, existential, axiological and others. In addition, their action worsens the condition and position of a person in the world. Consequently, they require understanding and permission both from ethical considerations and from the standpoint of social philosophy.

Thus, existential problem of human loss of the meaning of being can arise, for example, as a result of the introduction of ICT and AI into production. A person who has lost his job due to his replacement by a robot often finds it difficult to find other forms of successful socialization, he feels useless, unclaimed by society and thinks about the purpose, value and meaning of his life. Axiological aspect of the impact of AI technologies on the worldview of modern man is due to the fact that society perceives AI as an absolute, unconditional value, displacing traditional values of human life on the sidelines of existence.

We should focus on a special class of problems caused by a certain novelty of the AI phenomenon, the lack of experience in its application in social practice and, as a result, the lack of human awareness of real and potential possibilities of using AI capabilities in the IT field.

Problems of applying AI capabilities in the field of IT have repeatedly become the subject of scientific discussion. According to its results, scientists have obtained important results and published reviews of the most important, in their opinion, issues.

Thus, J. Bossmann identified 9 main problems in the field of AI: unemployment, inequality, humanity, artificial stupidity, racist robots, security, evil gins, singularity and the rights of robots [49]. M. Ryan and J. Antoniou and their co-authors are already talking about 17 challenges [50]. T. Hagendorff in a fundamental study of various ethical guides [51] identified problems of non-

48 Головко О. М., Боднар Є. Етико-правові проблеми використання роботів зі штучним інтелектом. *Вісник Національного технічного університету України «Київський політехнічний інститут». Політологія. Соціологія. Право*. 2022. Вип. 3 (55). С. 93—97. DOI: 10.20535/2308-5053.2022.3(55).269563 (date accessed: 19.02.2024).

49 Bossmann J. Top 9 Ethical Issues in Artificial Intelligence / World Economic Forum. Oct 21, 2016. URL: https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence/ (date accessed: 14.02.2024).

50 Ryan M., Antoniou J., Brooks L., Jiya T., Macnish K. & Stahl B. Research and Practice of AI Ethics: a Case Study Approach Juxtaposing Academic Discourse with Organisational Reality. *Science and Engineering Ethics*. 2021. Vol. 27. Art. 16. DOI: 10.1007/s11948-021-00293-x (date accessed: 12.02.2024).

51 Hagendorff T. The Ethics of AI Ethics: An Evaluation of Guidelines. *Minds and Machines.* 2020. Vol. 30. Pp. 99—120. DOI: 10.1007/s11023-020-09517-8 (date accessed: 14.02.2024).

transparency, violation of confidentiality, discrimination, security threats, lack of accountability (responsibility).

In the report *Artificial Intelligence and Life in 2030: The One Hundred Year Study on Artificial Intelligence* [52], among the urgent problems of the use of AI systems, the following are named: threat to the security and confidentiality of personal data, violation of criminal and civil liability, unemployment, certification.

The publication: *Ethically Aligned Design: a Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems* [53] states, in particular, *"the use and impact of autonomous and intelligent systems (A/IS) become pervasive, we need to establish societal and policy guidelines in order for such systems to remain human-centric, serving humanity's values and ethical principles. These systems have to behave in a way that is beneficial to people beyond reaching functional goals and addressing technical problems. This will allow for an elevated level of trust between people and technology that is needed for its fruitful, pervasive use in our daily lives.*

To be able to contribute in a positive, non-dogmatic way, we, the techno-scientific communities, need to enhance our self-reflection, we need to have an open and honest debate around our imaginary, our sets of explicit or implicit values, our institutions, symbols and representations.

Eudaimonia, as elucidated by Aristotle, is a practice that defines human well-being as the highest virtue for a society. Translated roughly as «flourishing», the benefits of eudaimonia begin by conscious contemplation, where ethical considerations help us define how we wish to live.

Whether our ethical practices are Western (Aristotelian, Kantian), Eastern (Shinto, Confucian), African (Ubuntu), or from a different tradition, by creating autonomous and intelligent systems that explicitly honor inalienable human rights and the beneficial values of their users, we can prioritize the increase of human well-being as our metric for progress in the algorithmic age. Measuring and honoring the potential of holistic economic prosperity should become more important than pursuing one-dimensional goals like productivity increase or GDP growth» [54].

This book states that *«intelligent and autonomous technical systems are specifically designed to reduce human intervention in our day-to-day lives. In so doing, these new fields are raising concerns about their impact on individuals and societies. Current discussions include advocacy for the positive impact, as well as warnings, based on the potential harm to privacy, discrimination, loss of skills, economic impacts, security of critical infrastructure, and the long-term effects on social well-being. Because of their nature, the full benefit of these technologies will be attained only if they are aligned with our defined values and ethical principles. We must therefore establish frameworks to guide and inform dialogue and debate around the non-technical implications of these technologies… Autonomous systems designed to cause physical harm have additional ethical dimensions as*

52 Stone P., Brooks R., Brynjolfsson E., Calo R., Etzioni O., Hager G. et al. Artificial Intelligence and Life in 2030: The One Hundred Year Study on Artificial Intelligence : Report of the 2015 Study Panel. Stanford University. Stanford, CA, Sept 2016. 52 p. DOI: 10.48550/arXiv.2211.06318 (date accessed: 19.02.2024).

53 Ethically Aligned Design: a Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems. Version II. The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. 266 p. URL: https://standards.ieee.org/wp-content/uploads/import/documents/other/ead_v2.pdf (date accessed: 13.02.2024).

54 Ibid.

compared to both traditional weapons and/or autonomous systems not designed to cause harm. These ethical dimensions include, at least, the following:

- *Ensuring meaningful human control of weapons systems;*
- *Designing automated weapons with audit trails to help guarantee accountability and control;*
- *Including adaptive and learning systems that can explain their reasoning and decisions to human operators in a transparent and understandable way;*
- *Training responsible human operators of autonomous systems who are clearly identifiable;*
- *Achieving behavior of autonomous functions that is predictable to their operators;*
- *Ensuring that the creators of these technologies understanding the implications of their work;*
- *Developing professional ethical codes to appropriately address the development of autonomous systems intended to cause harm»* [55].

Since daily use of IT in everyday life leads to significant changes in the material and spiritual world of a person, Ch. Reed [56] and M. U. Scherer [57] emphasize the problem of responsibility sharing in the context of applying AI capabilities in the field of IT in smart cities. They write that AI systems should always be regulated, accountable and provided with mechanisms for compensating for accidents. This is precisely the type of regulation protecting human values and human life itself, sustainable development and environmental protection, compliance with requirements of social justice. These social values, in their opinion, should have an unconditional priority over economic values, considerations of profit and benefit.

Another equally striking example: R. Kurzweil [58] and B. Goertzel [59] believe that in a world of extremely intelligent machines, ICT and AI will directly affect well-being of people, therefore, they can both help and harm a person. Imagine that AI fails or falls into the hands of politically motivated terrorist groups or military organizations. With the help of AI, for example, they will spy, collect confidential information about organizations, politicians and individuals, which will cause significant damage to civilians and State institutions.

Unfortunately, it cannot be stated unequivocally that these fears are unjustified. The leading countries of the world are already using narrow AI for military purposes. We are talking, in particular, about unmanned aerial vehicles (drones) *Northrop Grumman X-47B*, which

55 Ethically Aligned Design … . URL: https://standards.ieee.org/wp-content/uploads/import/documents/other/ead_v2.pdf (date accessed: 17.02.2024).

56 Reed Ch. How should we regulate artificial intelligence? *Philosophical Transactions of the Royal Society A. Mathematical, Physical and Engineering Sciences*. 06 Aug 2018. Vol. 376. Is. 2128. P. 201. DOI: 10.1098/rsta.2017.0360 (date accessed: 19.02.2024).

57 Scherer M. U. Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies (May 30, 2015). *Harvard Journal of Law & Technology*. Spring 2016. Vol. 29. No. 2. 48 p. DOI: 10.2139/ssrn.2609777 (date accessed: 03.02.2024).

58 Kurzweil R. The Age of Intelligent Machines. Cambridge, MA : MIT Press, 1990. 565 p.

59 Goertzel B. Should Humanity Build a Global AI Nanny to Delay the Singularity Until it's Better Understood? *Journal of Consciousness Studies*. 2012. Vol. 19 (1—2). Pp. 96—111. URL: https://www.researchgate.net/publication/233497378_Should_Humanity_Build_a_Global_AI_Nanny_to_Delay_the_Singularity_Until_It's_Better_Understood (date accessed: 03.02.2024).

13 years ago were tested in the US Navy [60]. The management of this system, the choice of how to perform the task is completely entrusted not to a person, but to a narrow AI – a drone. Today, it is not yet known whether developers will develop such systems to the level of general intelligence. However, according to *R. C. Arkin*, the US military has already shown interest in producing intelligent systems designed to kill [61].

At the same time, there are ICTs that are already actively used in countering real terrorist threats.

As Ha. Spitsyna and N. Filipenko emphasize, "*the most dangerous and destructive consequences are determined by terrorist acts associated with the use of weapons, ammunition or explosives, because they create a real threat to people's lives and health, cause the destruction of industrial, economic or defense facilities. <...> Complexity of the disclosure and investigation of the mentioned crimes is due to the following: the rapid appearance of the latest developments in the field of weapons; the weakness of the control system for the movement of weapons, ammunition and explosives along the demarcation line between the Armed Forces of Ukraine and armed terrorist groups; manifestations of corruption, shortcomings of organizational and economic activity in the Armed Forces of Ukraine; reduction of disciplinary requirements for military personnel; large gaps in the national-patriotic education of the population; the significant influence of the OUF on the socio-demographic structure of society (appearance of a large number of people who have been demobilized from ranks of the army and have combat experience and high military qualifications); an increase in stress and psychological burden on society, the emergence of panic moods caused by existence of negative military, economic and social factors; the activity of a large number of informal military-type associations; an increase in social tendencies towards the resolution of conflicts by force, the spread of manifestations of cruelty and violence; low coordination of actions of law enforcement agencies during anti-terrorist operations; the availability of a large database from the open arrays of the Internet on the creation and use of weapons and explosive devices; availability of so-called "dual-use" means that can be used as components to create homemade weapons or explosive devices; significant prevalence on the Internet of sites with overt extremist ideology, etc.*" [62].

Unfortunately, critical infrastructure facilities are and will remain the most vulnerable to terrorist attacks. That is why, on February 17, 2017, the UN Security Council unanimously adopted Resolution No. 2341 on protection of critical infrastructure facilities and expanding the capabilities of states to prevent attacks on critical infrastructure facilities and

60 Navy's Second Stealthy X-47B Drone Flies / Mlitary.com. DefenseTech. 2011-11-28. URL: https://web.archive.org/web/20210511114646/https://www.military.com/defensetech/2011/11/28/second-x-47b-uav-flies (date accessed: 13.02.2024).

61 Arkin R. C. Governing Lethal Behavior: Embedding Ethics in a Hybrid Deliberative/Reactive Robot Architecture / Eds. P. Wang, B. Goertzel, S. Franklin // Artificial general intelligence, 2008: Proceedings of the first AGI conference. Washington DC : ISO Press, 2008. Pp. 51—62. URL: https://sites.cc.gatech.edu/ai/robot-lab/online-publications/formalizationv35.pdf (date accessed: 18.02.2024).

62 Спіцина Г. О., Філіпенко Н. Є. Терористична діяльність: кримінально-правова політика протидії. *Кримінально-правові та кримінологічні засоби протидії злочинам проти громадської безпеки та публічного порядку* : зб. тез доп. міжнар. наук.-практ. конф. до 25-річ. ХНУВС (Харків, 18.04.2019). Харків, 2019. С. 189. URL: https://univd.edu.ua/general/publishing/konf/18_04_2019/pdf/9.pdf (date accessed: 19.02.2024).

called on states to confront the danger of terrorist attacks on them. In sec. II: *Measures to combat and prevent terrorism* of the UN Global Counter-Terrorism Strategy, member states noted the need to "*intensify all efforts to improve the security and protection of particularly vulnerable targets, such as infrastructure and public places, as well as in response to terrorist attacks and other disasters, in particular in the field of civil protection, recognizing that States may need assistance for this purpose*" [63].

In this context, reliable short-term forecasts of non-state terrorism at the local level are key to the application of preventive measures. As scientists note, the study of armed conflicts and insurgents contributed to the development of prognostic models based on the theory [64] of the application of AI capabilities to predict the conflict on an accurate space temporal scale [65]. However, this important information has not yet been included in terrorism research, which has largely focused on explanatory models using statistical approaches to capture and quantify the effects of the driving forces of terrorist attacks across space and time [66]. Therefore, there is a need to develop an interpretable model for predicting terrorist events on precise spatial and temporal scales which will contribute to implementation of effective measures, objective evaluation and sustainable development of relevant theories [67].

Dr. A. Python from Zhejiang University (China) and colleagues have found a way to improve the work of AI in this area. The scientists developed a framework "*for predicting terrorist attacks around the world by first studying terrorist attacks that occurred during 2002-2016 (795 weeks) in 13 regions, including all subcontinental regions listed in the Global Terrorism Database (hereinafter referred to as GTD) and West Africa. For each region, predictive models have been built that allow identifying, evaluating and comparing the role of the main terrorist driving forces. Researchers have prepared a tree-like algorithm of interpreted machine learning with so-called gradient boosting. To cover all regions of the world that have experienced terrorist attacks for a long time, the authors divided the regions into cells, each of which covers an area of 50 × 50 km, and set a time parameter of 795 weeks. Then a tree-like machine learning algorithm began to work, analyzing the probability of terrorist attacks*

63 The Protection of Critical Infrastructure Against Terrorist Attacks. Compendium of Good Practices. UN Office of Counter-Terrorism ; UN Security Council CTED ; Iterpol, 2022. 155 p. URL: https://www.un.org/counterterrorism/sites/www.un.org.counterterrorism/files/2225521_compendium_of_good_practice_web.pdf (date accessed: 19.02.2024).

64 Lim M. T., Metzler R., Bar-Yam Ya. Global Pattern Formation and Ethnic/Cultural Violence. *Science*. 2007. Vol. 317 (5844). Pp. 1540—1544. DOI: 10.1126/science.1142734 (date accessed: 02.02.2024) ; Zammit-Mangion A., Dewar M., Kadirkamanathan V., Sanguinetti G. Point process modelling of the Afghan War Diary. *Proceedings of the National Academy of Sciences*. 2012. Vol. 109. Is. 31. Pp. 12414—12419. DOI: 10.1073/pnas.1203177109 (date accessed: 03.02.2024).

65 Hegre H., Karlsen J., Nygård H. M., Strand H., Urdal H. Predicting Armed Conflict, 2010–2050. *International Studies Quarterly.* 2013. Vol. 57 (2). P. 255. DOI: 10.1111/isqu.12007 (date accessed: 03.02.2024).

66 Nemeth S. Ch., Mauslein J. A., Stapley C. The Primacy of the Local: Identifying Terrorist Hot Spots Using Geographic Information Systems. *The Journal of Politics*. Apr 2014. Pp. 304—317. DOI: 10.1017/S0022381613001333 (date accessed: 19.02.2024).

67 Python A., Bender A., Nandi A. K., Hancock P. A., Arambepola R., Brandsch J., Lucas T. C. D. Predicting non-state terrorism worldwide. *Science Advances.* 2021. Vol. 7. Is. 31. DOI: 10.1126/sciadv.abg4778 (date accessed: 19.02.2024).

(and countermeasures) in each cell every week around the world" [68].

According to scientists, AI has quite effectively predicted events in territories that have repeatedly suffered from attacks, but it is difficult for them to build forecasts for regions where there have been no terrorist attacks for a long time. This data imbalance reduces the accuracy of models, but it can be achieved by applying additional parameters.

These problems are particularly acute in the process of using relatively recently invented *Generative Pre-trained Transformer* chat (hereinafter referred to *as* GPT-4), based on AI. The *GPT-4* with AI chatbot is a generative language model launched by the commercial company *Open AI* on March 14, 2023 to develop previously developed *GPT* chatbots. It is called generative because it is able to create new data, not just analyze existing data. GPT-4 *chat* not only recognizes patterns, but also uses them to create new data.

Modern chatbot composes poems and songs, prepares slides in a certain style, successfully interviews for a job at Google, writes marketing campaigns for a certain demographic group, comments on online games and creates high-resolution images, makes forecasts, financial analytics, generates the simplest code, communicates in many languages of the world. The products obtained by *GPT-4* are almost indistinguishable from human-generated content, since this system uses all the information available on the Internet. Therefore, at first glance, *GPT-4* looks like a full-fledged partner of a person in the creative work of creating innovative products. The advantages of this new AI tool (compared to its predecessors) are obvious, but it is important to see and understand the downside of this phenomenon and the problems it creates.

As the researchers note, «*one of the key concerns surrounding GPT-4 is the issue of bias. AI models like GPT-4 are trained on vast amounts of data, which means that they can inadvertently perpetuate biases present in the training data. This can result in biased outputs and reinforce existing societal prejudices. It is essential for developers and researchers to address this issue and ensure that GPT-4 is trained on diverse and unbiased data to mitigate potential harm.*

Another ethical consideration is the potential misuse of GPT-4. With its advanced capabilities, GPT-4 could be used to spread misinformation, create deepfake content, or even manipulate public opinion. This raises concerns about the responsibility of individuals and organizations in using GPT-4 ethically and responsibly. It is crucial to establish guidelines and regulations to prevent misuse and promote ethical practices in the development and deployment of AI technologies.

Additionally, the impact of GPT-4 on the job market cannot be overlooked. As AI continues to advance, there is a legitimate concern about job displacement and the need for re-skilling the workforce. GPT-4's ability to generate human-like content raises questions about the future of content creators, writers, and journalists. It is crucial for society to anticipate these changes and proactively prepare for the integration of AI technologies into various industries» [69].

68 Комп'ютер проти тероризму: вчені навчили ШІ передбачати теракти по всьому світу / Фокус. 04.08.2021. URL: https://focus.ua/uk/digital/489637-kompyuter-protiv-terrorizma-uchenye-nauchili-ii-predskazyvat-terakty-po-vsemu-miru (date accessed: 11.02.2024).

69 Exploring the Ethical Impact of GPT-4: The Future of AI [Electronic resource] / SINCODE. Oct 31, 2023. URL: https://www.sincode.ai/blog/exploring-the-ethical-impact-of-gpt-4-the-future-of-ai#:~:text=With%20its%20advanced%20capabilities%2C%20GPT,GPT-4%20ethically%20and%20responsibly (date accessed: 19.02.2024).

Similar concerns are expressed by other experts. For example, research *8 Ethical Considerations of Large Language Models (LLM) Like GPT-4 states* [70] that «*as LLMs become more powerful, it is vital to consider the ethical implications of their use. From generating harmful content to disrupting privacy and spreading disinformation, the ethical concerns surrounding the usage of LLMs are complicated and multifold. Large Language Models have the potential to generate harmful content such as hate speech, extremist propaganda, racist or sexist language, and other forms of content that could cause harm to specific individuals or groups.*

While LLMs are not inherently biased or harmful, the data they are trained on can reflect biases that already exist in society. This can, in turn, lead to severe societal issues such as incitement to violence or a rise in social unrest. For instance, Open Ai's Chat GPT model was recently found to be generating racially biased content despite the advancements made in its research and development... a major ethical concern related to Large Language Models is their tendency to hallucinate, i.e., to produce false or misleading information using their internal patterns and biases. While some degree of hallucination is inevitable in any language model, the extent to which it occurs can be problematic. This can be especially harmful as models are becoming increasingly convincing, and users without specific domain knowledge will begin to over-rely on them. It can have severe consequences for the accuracy and truthfulness of the information generated by these models. Therefore, it's essential to ensure that AI systems are trained on accurate and contextually relevant datasets to reduce the incidence of hallucinations... Another serious ethical concern related to LLMs is their capability to create and disseminate disinformation. Moreover, bad actors can abuse this technology to carry out influence operations to achieve vested interests. This can produce realistic-looking content through articles, news stories, or social media posts, which can then be used to sway public opinion or spread deceptive information. These models can rival human propagandists in many domains making it hard to differentiate fact from fiction. This can impact electoral campaigns, influence policy, and mimic popular misconceptions, as evidenced by TruthfulQA. Developing fact-checking mechanisms and media literacy to counter this issue is crucial... Weapon proliferators can potentially use LLMs to gather and communicate information regarding conventional and unconventional weapons production. Compared to traditional search engines, complex language models can procure such sensitive information for research purposes in a much shorter time without compromising accuracy. Models like GPT-4 can pinpoint vulnerable targets and provide feedback on material acquisition strategies given by the user in the prompt. It is extremely important to understand the implications of this and put in security guardrails to promote the safe use of these technologies» [71].

Another significant ethical problem of using AI capabilities in the field of IT is the progression of people's dependence on such programs and the gradual delegation to them by humans of solving increasingly complex and important tasks [72]. According

70 Sajid H. 8 Ethical Considerations of Large Language Models (LLM) Like GPT-4 / UNITE.AI. Apr 10, 2023. URL: https://www.unite.ai/8-ethical-considerations-of-large-language-models-llm-like-gpt-4/ (date accessed: 06.02.2024).

71 Ibid.

72 Baird A., Maruping L. M. The Next Generation of Research on IS Use: A Theoretical Framework of Delegation to and from Agentic IS Artifacts. *MIS Quarterly*. 2021. Vol. 45. Is. 1b. Pp. 315—341. DOI: 10.25300/MISQ/2021/15882 (date accessed: 19.02.2024).

to the researchers, in developing countries where there is a lack of experts in certain fields of knowledge, *GPT-4* chat can replace them by generating the information needed by users. The widespread use of chatbots in education currently requires restructuring and adaptation of the educational process, the work of teachers, researchers and university management to the conditions of a rapidly changing digital environment. Similar technologies are also actively used by students to write scientific papers, which causes problems with plagiarism and academic integrity [73]. In addition to the obvious problems, it is worth considering the risk of more global and long-term negative consequences. It is, for example, about the possible rejection of education seekers from in-depth study and critical analysis of various aspects of the subject they are studying, as a result of their use of the *GPT-4* chat giving quick result without real immersion and mastering new skills and acquiring new knowledge. Thus, *S. O'Connor* notes that this can lead to atrophy of critical thinking and creative potential, which are necessary for human development [74].

Availability of this technology to the mass consumer and developers through programming languages (for example, *Python*), cloud services (for example, *Amazon Web Services, Microsoft Azure, Google*) makes it possible to apply it as widely as, for example, *Excel* and *Access* software. This ease and simplicity multiply the risk of harm to a person due to the use of information generated by this system which has nothing to do with the real solution of the tasks facing a person.

At the same time, the use of ICT and AI capabilities in education greatly facilitates its administration. For example, most AI technologies in the field of education are still used to check the attendance of classes and the fulfillment of tasks by students, assess and analyze answers in exams, and draw up personal training plans. *IBM* has developed a *Teacher Advisor* that helps third-grade (US) math teachers make personalized lesson plans [75]. This system adapts learning materials for students in the same class but with different skill levels. In the future, *IBM* plans to increase the number of subjects and classes, management and conducting of classes with/in which it will contribute.

Duolingo, a language learning software company, uses AI to analyze user activity and assess their learning progress. This software creates personalized lesson plans and regularly tests new strategies to improve their effectiveness [76]. *Duolingo* structures lesson plans so that each user can learn how to improve their own results and implement the most effective options for learning foreign languages.

In our opinion, the problems caused by application of AI capabilities in the field of IT require a socio-ethical understanding,

73 Stokel-Walker Ch. Al bot ChatGPT writes smart essays — should professors worry? *Nature*. 2022 Dec 9. DOI: 10.1038/d41586-022-04397-7 (date accessed: 09.02.2024).

74 O'Connor S. Open artificial intelligence platforms in nursing education: Tools for aca demic progress or abuse? *Nurse Education in Practice*. 2023. Vol. 66. Art. 103537. DOI: 10.1016/j.nepr.2022.103537 (date accessed: 19.02.2024).

75 Harris E. A. Next Target for IBM's Watson? Third-Grade Math. *The New York Times*. Sept 27, 2016. URL: http://www.nytimes.com/2016/09/28/nyregion/ibm-watson-common-core.html (date accessed: 18.02.2024).

76 Guliani P. Duolingo Looks to Dominate the Mobile Education Market With New Flashcard App TinyCards / Forbes. July 22, 2016. URL: http://www.forbes.com/sites/parulguliani/2016/07/22/duolingo-looks-to-dominate-the-mobile-education-market-with-new-flashcard-app/ (date accessed: 17.02.2024).

since their content corresponds to the main intention of socio-philosophical research. Social philosophy traditionally studies the universal, essential features of society, the most general laws of its dynamics, the deep causes of specific events and processes, and prospects for the development of society from the standpoint of integrity and systematicity. All this knowledge is necessary for her to clarify the place and role of a person who is the creator of values and norms necessary for the common existence of significant groups of people functioning of social institutions, existence of social reality in general.

These issues are and will remain the subject of consideration by philosophers. So, «*three main themes that repeat across multiple papers concern, firstly, surveillance and algorithmic decision-making — its nature (Søe), harms (Brincker), acceleration (Vestergaard), normalization (Selinger and Rhee) — and possible rethought ownership (Schneider). Another reoccurring theme is the harm of the widespread myth or ideology of "technological determinism." Namely, the notion that even though technology is made and implemented by human hands, we somehow are entirely incapable of shaping its developments and use. Several papers explicitly analyze and express concerns about this notion (see especially Vestergaard and Brincker), and others implicitly counter it by way of proposing new directions (see especially Alfano and Schneider). A last theme that repeats in these articles is the importance of public spaces, and the need for new ways of supporting the social and democratic fabric of society in the face of current trends of surveillance and misinformation (Søe, Vestergaard, Brincker, Alfano, and Schneider)*» [77].

In other words, in the focus of socio-philosophical research, there is always a person as the central element of the universe, creator and carrier of all the properties and qualities of the social, without which there is no point in talking about society. Thus, the problems arising while human interaction with AI systems should be added to the range of issues studied by social philosophy, since discussion and resolution of these issues concerns foundations of human existence in the world, its position in relation to the rest of the components of social reality, as well as the immediate and remote prospects for its development.

As noted in professional researches, «*philosophy of mind examines questions about mental states, cognition, and consciousness in humans, and these inquiries become even more intriguing when applied to AI. Philosophers ponder whether AI can genuinely possess conscious experiences or if it merely mimics human-like behavior without true subjective awareness. As AI increases its sophistication, these views become more relevant to our ethical responsibilities in creating and interacting with intelligent machines. One captivating thought experiment in this domain is the concept of the philosophical zombie — a hypothetical being that is physically identical to a conscious human but lacks subjective experience or consciousness. It is indistinguishable from a conscious person in behavior and responses, but has no inner experience. Philosophers use this experiment to consider whether AI could ever be functionally identical to conscious beings without necessarily having consciousness. Transparency and accountability are vital ethical concerns in AI. The "black-box" nature of some AI algorithms makes it challenging to understand the reasoning behind their decisions. The concept of accountability becomes more complex as AI systems become more autonomous and operate beyond human*

77 Pedersen E. O., Brincker M. Philosophy and Digitization: Dangers and Possibilities in the New Digital Worlds. *SATS. Northern European Journal of Philosophy*. July 8, 2021. DOI: 10.1515/sats-2021-0006 (date accessed: 05.02.2024).

oversight. Philosophers grapple with questions regarding the allocation of responsibility when AI makes mistakes or causes harm. They explore the role of human designers, the training data used to create AI models, and the transparency of decision-making processes as crucial factors in determining accountability» [78].

Thereby socio-philosophical research is also necessary to identify the complex nature of the problems of applying AI capabilities in the field of IT, to find solutions to these problems not only from the theoretical positions of ethics, axiology, philosophical anthropology and other branches of knowledge about man and society, but to understand integrity of human social life, implementation of humanistic ideals, activity nature, purposeful human function, its ability to transform nature and the resulting central position of man in social activity.

Conclusions

Summarizing the above, we note that a security threat or harm is a central, system-forming security, legal and socio-philosophical problem of the application of AI technology in the field of IT.

In the sources considered by us, researchers name the following most frequently discussed issues and problems of applying AI capabilities in the field of IT: violation of human autonomy, social injustice, violation of confidentiality, lack of responsibility, opacity, harm to humans.

Certainly, the proposed list of ICT and AI application problems is not exhaustive. The penetration of AI systems into all spheres of public life, the continuous improvement of technologies and the growth of their impact on human life and activity will eventually clarify and replenish this list. In addition, it is obvious that social problems can cause not only the use of AI capabilities in the field of IT: non-AI technologies are also quite capable of acting as a source of these problems. However, use of AI can enhance the effect of other causes, as well as independently worsen human situation in the world.

All of the above necessitates a systematic, holistic, balanced study of the impact on society and humans of the use of AI capabilities in the field of IT by means and methods of humanistically oriented and socio-philosophical interpretation of human interaction with AI, which makes it possible to find solutions and ways to overcome existing and possible problems and obstacles in this area in the future.

Застосування штучного інтелекту й інформаційно-комунікаційних технологій: соціально-етичні проблеми (*оглядова стаття*)

Наталія Філіпенко, Сергій Лукашевич, Олена Андреєва, Александар Іванович

Метою статті є розкрити сутність соціальних та етичних вимог до застосування інформаційно-комунікаційних технологій і штучного інтелекту в житті сучасної людини, соціуму й держави. Для досягнення поставленої мети застосовано загальнонаукові та спеціальні наукові методи. Своєрідність аналізованої теми передбачає обов'язкове зважання на правила і вимоги, уже сформульовані різноманітними соціальними інституціями й організаціями у відповідь на виклики цифрової реальності. Наголошено, що наявне етичне регулювання застосування інформаційно-комунікаційних технологій і штучного інтелекту здебільшого обмежено рамковими, декларативними документами, які позначають лише загальні підходи та мету взаємодії людства із системами штучного інтелекту, своєрідне застереження про можливі негативні наслідки застосування технологій. Незважаючи на суттєві збіги в запропонованих принципах, зміст цих норм до сьогодні

78 Pedersen E. O., Brincker M. Op. cit. DOI: 10.1515/sats-2021-0006 (date accessed: 22.02.2024).

залишається майже нерозкритим. Акцентовано, що використання штучного інтелекту потребує спеціального правового регулювання, оскільки йдеться про життя та здоров'я людей. Через потенційну небезпеку для цивілізації інформаційно-комунікаційних технологій і штучного інтелекту необхідно суворо ліцензувати діяльність, пов'язану з виробництвом і експлуатацією таких систем. Для цього на законодавчому рівні потрібно чітко визначити відповідальних за виникнення позаштатних ситуацій, а також відповісти на питання: «Чи можливий і чи правомірний перехід штучного інтелекту зі статусу об'єкта у статус суб'єкта правовідносин?». Усе згадане вище свідчить про важливість і значущість обраної мети дослідження та потребує соціально-етичного осмислення найбільш актуальних проблем застосування можливостей штучного інтелекту.

Ключові слова: *штучний інтелект; інформаційно-комунікаційні технології; соціальні виклики; етичні проблеми; сфера інформаційних технологій.*

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