

**CHAPTER 19.**  
**ARTIFICIAL INTELLIGENCE IN INTERNATIONAL SECURITY SYSTEMS:**  
**EFFICIENCY IN THE ERA OF SMART STATE EMERGENCE**

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**Abstract.** This article explores the use of AI in international security systems and its role in the effective functioning of modern "smart states." The main principles and possibilities of using AI for detecting, predicting, and countering cyber threats, monitoring and optimizing border control processes, forecasting and early warning of conflicts, optimizing humanitarian aid, and crisis response are considered. Various technical innovations and their potential in addressing security issues are discussed. This article aims to analyze in detail the impact of AI on enhancing the efficiency and security of international relations, especially in the context of the emergence of the "smart state" concept. The advantages and possible risks of AI application in the security sphere are examined, and prospects for further development in this research direction are identified.

The article also highlights the legal aspect of AI implementation and regulatory framework in Ukraine. The main problems requiring legislative resolution in the field of AI technology usage in various spheres of society's life are identified. Attention is focused on the necessity of legal regulation for protecting democratic human rights in AI technology access. Various options for legal regulation of AI usage are proposed. Psychological aspects of AI-human interaction are outlined. Understanding the principles and strategic decisions for AI implementation in a smart state are proposed.

**Key words.** AI, artificial intelligence, smart state, international security systems, law aspects of AI, smart state emergence.

**Introduction.** Artificial intelligence (AI) in all spheres of societal life is a prospect within the next 5-10 years. This is a global trend. In the field of international security, the use of artificial intelligence (AI) is an important component of security strategies, particularly in the context of shaping the concept of a "smart state." Today, AI includes machine learning, computer vision, deep learning, and natural language processing (NLP).

AI is becoming one of the main tools for building and developing smart states, and accordingly, achieving strategic goals in ensuring welfare, comfort, and quality of life for the population, building a safe environment, and developing the economy, where key factors of production will be AI technologies, the emergence of new industries, improving the quality of government services, and saving human and material resources. The trend towards AI displacing humans from their usual processes—production, service sectors, entertainment, trade, education, and even medicine—is not a fantasy but an existing reality with a tendency to expand.

The task of a smart state is to lead these processes and ensure their effective coordination. Key initiatives regarding artificial intelligence should be the formation of priorities in motivating the use of AI technology instead of traditional tools by consumers, including both businesses and ordinary citizens, understanding the benefits of this, fostering national AI projects, and finding relevant models of public-private partnerships for their implementation.

Today, there are administrative, organizational, legal, and ethical challenges associated with the widespread implementation of AI that require the development of strategies and planning to overcome them. The current task is to understand and prepare appropriate initiatives, both managerial, technological, and legislative, to stimulate the transition from traditional ways of organizing society and state functioning to innovative ones that involve extensive use of AI.

Accurate and timely data to support decision-making and development planning in various sectors of societal life, access to affordable high-quality AI solutions for the population, cooperation and knowledge exchange, progress, and innovative solutions aimed at improving the quality of life

of citizens—all these are endless possibilities that will ensure further development of artificial intelligence.

The future belongs to states and societies that overcome the barrier between people and AI technologies and create conditions for the effective development of the AI ecosystem, significantly enhancing their capabilities to be efficient, competitive, and safe, providing their citizens with new opportunities for development and self-realization.

## **I. Artificial Intelligence in International Security Systems**

**I.1. Management Aspects of AI Usage.** AI is becoming increasingly prevalent in many spheres of life, and its use brings along a range of management aspects that require careful study. Here are some of them:

1. *Ethics and Responsibility.* The use of AI can have ethical implications such as bias, discrimination, and privacy violations. It is important to establish clear ethical principles and rules to regulate AI usage and ensure its responsible application.

It is necessary to clearly define who is responsible for the actions and decisions made by AI systems, including at the legislative level.

2. *Job Transformation.* AI can automate many tasks previously performed by humans, potentially leading to job losses. It is important to develop retraining and upskilling programs to help people adapt to changes in the labor market.

3. *Transparency and Explainability.* AI systems can be complex and opaque, which can make it difficult to control their operation and explain their decisions. Ensuring transparency in the operation of AI systems is important so that people can understand how decisions are made.

4. *Cybersecurity.* AI systems can be vulnerable to cyberattacks, leading to data theft, system malfunctions, and other problems. It is important to take measures to protect AI systems from cyber threats. One possible solution to this problem is to develop cybersecurity standards for AI systems.

5. *Regulation.* The use of AI may require new regulations to ensure its safe and ethical use. It is important to develop clear and flexible regulations that keep pace with the development of AI technologies.

6. *Economic Implications.* The use of AI can have significant positive and negative impacts on the economy. It is important to assess the potential economic implications of AI usage and develop policies that stimulate its positive impact. Investing in AI research and development is important to stimulate economic growth.

7. *Social Implications.* The use of AI can have significant positive and negative impacts on society. It is important to assess the potential social implications of AI usage and develop policies that stimulate its positive impact.

8. *International Cooperation.* Since AI is a global technology, it is important to establish international cooperation to ensure its safe, ethical, and responsible use. International cooperation aimed at developing common standards for ethics, responsibility, transparency, cybersecurity, and regulation of AI is advisable.

The use of AI can bring many benefits, but it also carries a number of risks. It is important to carefully study all the management aspects of AI usage to minimize risks and maximize benefits.

In the context of the security component, the management aspects of AI usage in international security systems include a wide range of issues related to management, strategic planning, and the effectiveness of AI usage for achieving security goals. Among the issues that AI can help address are:

- Strategic planning;
- Resource management;
- Process management;
- Ethical aspects.

The use of AI in international security systems opens up a wide range of opportunities to enhance efficiency and promptness in decision-making, threat monitoring, and analysis. Among the main directions of usage, the following can be named:

- *Forecasting and early warning of conflicts.* Artificial intelligence can analyze large volumes of data from various sources, including social media, news, diplomatic reports, and others, to identify early signs of conflicts or international tensions. AI-based analytical models can help identify key factors contributing to conflicts and develop recommendations for their avoidance or mitigation.

- *Monitoring and responding to cyber threats.* Artificial intelligence can be used for automated detection and analysis of cyber threats, including hacker attacks, malware, and cyber espionage. AI-based systems can detect anomalies in network traffic, analyze suspicious activity, and provide recommendations for protection and response to threats.

- *Optimization of humanitarian aid and crisis response.* Artificial intelligence can help optimize the distribution of humanitarian aid and response to crisis situations by analyzing geographic data, demographic characteristics, and other factors. AI algorithms can quickly and accurately assess the needs of populations in different regions and develop response strategies for international humanitarian organizations.

- *Monitoring and optimization of border control processes.* Monitoring and optimization of border control processes are important aspects of ensuring international security, especially in the face of increasing international mobility and threats of terrorism and illegal

migration. The use of AI can significantly facilitate these processes by providing fast and efficient border control. For example, AI can be used for monitoring border areas, analyzing individual behavior, recognizing and analyzing vehicles, optimizing flows, analyzing and forecasting risks.

– *Peacekeeping operations.* Peacekeeping operations are a key element of international security systems aimed at ensuring peace, stability, and security in conflict or post-conflict regions. The use of AI can play an important role in supporting and optimizing such operations. For example, AI can be used to analyze conflict situations, support decision-making, communication, and coordination processes, monitor compliance with international law, and so on.

– *Analysis of international treaties and political decisions.* Artificial intelligence can be used to analyze texts of international treaties, declarations, and political statements to identify trends, trends, and possible collisions in international relations. AI-based analytical systems can help diplomats and political analysts understand the consequences of decisions made and predict possible reactions of other countries.

## **I.2. Technical Innovations and Their Potential**

**I.2.1 Forecasting and Early Conflict Prevention.** Forecasting and early conflict prevention are crucial aspects of ensuring international security. The use of artificial intelligence in this field can assist in timely identifying potential conflict situations and taking necessary measures to prevent them. Here are some methods that can be utilized for this purpose:

1. *Data and relationship analysis:* Employing machine learning algorithms to analyze large volumes of data from various sources such as news articles, social media, observer reports, etc. Identifying key patterns and relationships among different societal groups, political leaders, regions, and other factors that may indicate potential conflict situations.

2. *Monitoring social media and open sources:* Automatically tracking and analyzing messages on social media where warnings about potential conflicts or interethnic tensions may arise. Monitoring news sources and open media outlets to detect alarming signals and address hotspots.

3. *Conflict forecasting using machine learning models:* Developing predictive models based on historical conflict data to forecast potential conflict situations in the future. Utilizing forecasting algorithms to assess risks and identify hotspots where the likelihood of conflict is highest.

4. *Analysis of population dynamics and ethnic groups:* Using geographic information systems (GIS) and health data to analyze population dynamics, migration, and the distribution of ethnic groups, which may indicate potential conflict points. Modeling demographic and ethnic processes to forecast potential conflicts arising from the clash of interests among different groups.

A notable example of such an AI-based system is the Violence Early-Warning System (VIEWS) - an award-winning conflict prediction system that generates monthly forecasts of violent

conflicts worldwide for three years ahead. This system is supported by iterative research and development conducted by the VIEWS consortium (*Predicting conflict and humanitarian impacts*. Available: <http://surl.li/qljwd>).

**I.2.2 Optimization of humanitarian aid and crisis response.** Optimization of humanitarian aid and crisis response is a crucial aspect of ensuring international security, especially in the face of global crises and conflicts. The use of AI in this field can significantly enhance the efficiency and timeliness of humanitarian efforts. Some directions for optimizing humanitarian aid and crisis response using AI include the following:

1. *Crisis prediction*: Utilizing machine learning algorithms to analyze large volumes of data from various sources, including social media, observer reports, satellite imagery, and others, to identify early signs of crisis situations. Developing predictive models based on historical data to forecast potential crises and natural disasters.

2. *Resource management*: Employing analytics to determine the optimal distribution of humanitarian resources in crisis zones based on population needs, geographical location, and other factors. Establishing inventory monitoring systems and automatic alerts for replenishing supplies when a certain level of utilization is reached.

3. *Rapid response to emergencies*: Using AI systems to respond to automatic signals of emergency situations and activate necessary aid measures. Developing communication and coordination systems among humanitarian organizations, governmental structures, and other stakeholders for swift information exchange and action coordination.

4. *Impact analysis of humanitarian interventions*: Utilizing algorithms to analyze the effectiveness of humanitarian actions and identify the most efficient aid delivery strategies. AI can also assist in forecasting the consequences of humanitarian actions and developing strategies for recovery and rehabilitation after crisis situations.

Overall, the use of artificial intelligence can significantly improve the efficiency and effectiveness of humanitarian efforts and crisis response, allowing for faster and more efficient assistance to those in need (Walter J., Gutjahr P., Nolz P., 2016).

**I.2.3 Monitoring and optimization of border control processes.** Monitoring and optimization of border control processes are crucial aspects of ensuring international security, especially amidst increasing international movements and threats of terrorism and illegal migration. The utilization of artificial intelligence (AI) can significantly streamline these processes, providing swift and effective border control. Let's delve into this aspect in more detail:

1. *Monitoring border areas*: AI can analyze data from sensors, including radars, thermal cameras, and other sensors, as well as video recordings from surveillance cameras, to detect illegal border crossings and other violations.

2. *Behavioral analysis of individuals*: AI can utilize biometric data such as facial recognition, fingerprints, and iris recognition to identify individuals at the border and detect suspicious or dangerous persons. AI can analyze people's behavior at the border, identifying suspicious or abnormal actions such as nervousness, stress, or unusual movements that may indicate potential threats.

3. *Vehicle recognition and analysis*: AI can use vehicle license plate recognition technologies to identify suspicious or stolen vehicles at the border. AI can analyze data on crossing cargoes to detect dangerous materials, contraband, or other violations.

4. *Flow optimization*: AI can analyze data on people and vehicle flows, helping to predict border congestion and optimize resource allocation to ensure effective control. AI can automate certain border control processes, such as preliminary document checks or person identification, reducing wait times and increasing control efficiency.

5. *Risk analysis and prediction*: AI can use data on past events and other information sources to model potential threats and risks at the border, helping to ensure timely responses to potential threats.

The use of artificial intelligence for monitoring and optimizing border control processes can significantly improve the efficiency and safety of international security systems, ensuring effective control over the flow of people and goods at the border. Research is being conducted in this direction (*Tazrout Z. Available: <http://surl.li/qlkhf>*), transforming into technological solutions. For example, NurjanaTech's solution for border control takes a comprehensive approach to detecting and responding to threats among pedestrians, pack animals, vehicles, or vessels near the country's land and sea borders. These solutions employ a modular approach aimed at ensuring full integration between existing installations and new technologies (*Detecting, identifying, and reacting to threats in real-time. Available: <http://surl.li/qlkio>*) with capabilities to integrate radars, electro-optical systems, and other sensor data for real-time target detection, identification, and tracking, including artificial intelligence.

**I.2.4 Peacekeeping operations.** Peacekeeping operations are a key element of international security systems aimed at ensuring peace, stability, and security in conflict or post-conflict regions. The use of artificial intelligence (AI) can play an important role in supporting and optimizing such operations. Let's consider some aspects of using AI in peacekeeping operations:

1. *Analysis of conflict situations*: AI can quickly analyze large amounts of data from various sources, such as social media, observer reports, satellite imagery, etc., to provide an objective picture

of the conflict situation. AI can use machine learning algorithms to forecast potential risks and conflict situations based on the analysis of past events and other factors.

2. *Decision support*: AI can provide analytical support for assessing the situation and developing peacekeeping operation strategies based on objective data and risk analysis. AI can create computer models of situations and simulate various action strategies, assisting peacekeeping teams in making the most effective decisions.

3. *Communication and coordination*: AI can provide advanced information management systems to help coordinate actions between peacekeeping forces and other operation participants. The use of automated communication systems enables efficient communication between different elements of the peacekeeping operation, enhancing its coordination and effectiveness.

4. *Monitoring compliance with international law*: AI can be used to monitor compliance with international law in conflict zones, detect violations, and take appropriate actions. AI helps collect, analyze, and store data on violations of international law, creating an objective evidence base for further use in legal proceedings or other international actions.

The overall goal of using artificial intelligence in peacekeeping operations is to enhance their effectiveness and safety, improve understanding of the situation in conflict areas, and develop action strategies aimed at ensuring peace and stability.

A detailed description of the use of innovative technologies, including within NATO, is provided in *(New Technologies and the Protection of Civilians in UN Peace. Available: <http://surl.li/qlklu>)*.

**I.3. Legal Aspects of AI Implementation.** The topic of regulating artificial intelligence is relevant today, and discussions on various levels are ongoing. The issue is global, affecting practically every country or region. Integrated efforts to regulate AI in the African continent are outlined in the "Digital Transformation Strategy for Africa (2020-2030)," approved by the relevant ministers of the African Union governments.

In the Asian region, the result of cooperation is the "Digital Master Plan" of the Association of Southeast Asian Nations, which defines the priorities for digital development in the region, including those related to AI, by 2025. Meanwhile, countries in South and Latin America are focused on developing national government approaches to regulating AI development, and supranational forms of interaction are not yet represented.

*United Kingdom*: Foundational standards for government regulation of AI-related processes are laid out in the National AI Strategy, prepared by the government of the United Kingdom and published on September 22, 2021, and the coordinating document "Creating an Innovative Approach



to AI Regulation," presented by the government on July 18, 2022. Among other things, they establish guidelines for shaping approaches to AI management.

*Canada:* Canada's government approach to AI aims to prepare future professionals in the AI field, support key innovation centers and research, and position the country as a leader in economic, ethical, political, and legal aspects of AI implementation. Canada was the first country in the world to create a National AI Strategy (the Pan-Canadian AI Strategy) at the government level, publishing it in 2017. To develop the provisions of the Pan-Canadian AI Strategy in 2019, the Government of Canada established the Advisory Council on AI.

To introduce new rules for responsible AI development and deployment, the Canadian government has introduced a comprehensive federal bill, C-27, "On the Implementation of the Digital Charter 2022," to Parliament, one of the legislative initiatives of which is the bill "On Artificial Intelligence and Data" (AIDA).

*United Arab Emirates (UAE):* According to the Networking Readiness technological index, published annually by the World Economic Forum, the UAE entered the top thirty most advanced countries in terms of information technology in its region as early as 2018. Such achievements are primarily explained by the state policy vector aimed at developing high digital technologies and implementing innovations, among which AI technologies play a crucial role.

*United States of America (USA):* The scale of involvement of intellectual resources concentrated in universities and research hubs in the USA, exemplified by Silicon Valley, ensures the country's leadership in creating AI technologies. Legislative regulation of AI technology usage at the federal level includes a series of systemic federal laws that regulate the formation of specialized institutions (*Holos Ukrainy vid 08.08.2023 r. Available: <http://surl.li/qlkpe>*).

In the EU, the formation of a regulatory framework for regulating AI technologies is taking place simultaneously at both the European governance level and in member states. The European Commission is currently responsible for developing policy in this area. At its initiative, the European AI Alliance has been established, which encompasses over six thousand stakeholders and serves as a platform for public discussions. In the near future, the creation of an independent body, the European Artificial Intelligence Board, is planned.

The Artificial Intelligence Act (*Artificial Intelligence Act. Brussels, 2021*) is a draft law of the European Union aimed at creating a safe environment for the use and development of AI. On December 9, 2023, the European Parliament reached a preliminary agreement with the Council on the AI law. The agreed text must be formally adopted by both the Parliament and the Council to become EU law.

The AI Act consists of 12 chapters, each regulating a separate area of application and development of artificial intelligence. This legislative proposal has an extraterritorial character. The main provisions of this legislative act include, among other things:

- defining the risk levels of AI systems;
- introducing mandatory certification for certain AI systems, such as biometric identification systems, critical infrastructure systems, educational or professional assessment systems;
- establishing requirements for certain AI systems regarding the necessity of informing users that they are interacting with an AI system rather than a human;
- setting transparency rules for AI systems intended to interact with individuals, emotional recognition systems, and AI systems used for creating or processing images, audio, or video content;
- prohibiting the use of certain AI methods.

The AI Act classifies AI programs by risk level and regulates them accordingly. It is based on a risk-based approach that classifies AI systems into five categories, as specified on the European Commission's website: prohibited AI systems; high-risk AI systems; limited-risk AI systems; low-risk or non-risky AI systems.

High-risk AI systems include those that have a significant impact on users' rights, health, or safety. These AI systems must comply with a list of mandatory requirements and undergo conformity assessment procedures before being placed on the EU market. Suppliers and users of these systems have clear safety obligations. Systems in this category are divided into eight main groups, including those using biometric identification, applied in critical infrastructure (e.g., transport), determining access to education or assessing students (e.g., exam scoring), used in law enforcement and judicial spheres, and others (*Petriv O.*, Available: <http://surl.li/pucrl>).

The Ukrainian government has declared a path to its own AI development strategy and the formation of a progressive policy in the field of artificial intelligence and an agenda for the world. Today, AI is actively used in various directions in Ukraine. Ukraine has started work towards legal regulation of AI use. As a member of the Council of Europe's Ad Hoc Committee on Artificial Intelligence, in October 2019, Ukraine joined the Organization for Economic Co-operation and Development's Recommendations on Artificial Intelligence (OECD/LEGAL/0449).

In 2020, by the Cabinet of Ministers of Ukraine Decree of December 2, 2020, No. 1556-r (*Kontseptsiiia rozvytku shtuchnoho intelektu v Ukraini*. Available: <http://surl.li/gtojg>), the Concept for the Development of Artificial Intelligence in Ukraine was approved, which, for the first time at the legislative level, provides a definition of artificial intelligence and sets out the goals, principles,

and tasks for the development of AI technologies in Ukraine. The implementation of the Concept's tasks is planned until 2030.

According to the Concept, AI is an organized set of information technologies that enable the execution of complex tasks through the use of a system of scientific research methods and information processing algorithms, obtained or independently created during work, as well as creating and using proprietary knowledge bases, decision-making models, information processing algorithms, and defining ways to achieve set tasks.

The Concept proclaims the development and use of AI systems only under the condition of the rule of law, fundamental human and citizen rights and freedoms, democratic values, and ensuring appropriate guarantees when using such technologies and implementing AI technologies in the fields of education, science, economy, public administration, cybersecurity, justice, defense, and other areas to ensure Ukraine's long-term competitiveness in the international market.

Among the recent developments towards standardizing the use of AI in Ukraine is the roadmap for regulating artificial intelligence in Ukraine (*Rehuliuvannia shtuchoho intelektu v Ukraini*. Available: <http://surl.li/qmlmk>), developed by the Ministry of Digital Transformation. This roadmap is primarily aimed at supporting business competitiveness and ensuring access to global markets in terms of the scale of AI usage worldwide, while it also emphasizes the need for measures for the gradual integration of AI Act norms into domestic legislation.

Therefore, based on the above, let us try to take a brief excursion into the legal fields where, in our opinion, the standardization of AI usage will require priority decisions and/or such decisions are already being implemented.

Field of law - a set of relatively separate legal norms and institutions regulating and protecting a specific sphere of social relations characterized by qualitative uniqueness and unity (homogeneity). (*Entsyklopediia suchasnoi Ukrainy*. Available: <http://surl.li/qmlnq>)

First of all, let's turn to the general theory of state and law, namely the classical objects and subjects of law. The object of law is material and immaterial goods regarding which legal relations arise. The counterpart to the category of the object of law is the subject of law. The objects of law include: things, money, securities, and other property, including property rights; works and services; information; intangible personal goods (human honor and dignity, freedom, and inviolability, etc.); products of intellectual activity and intellectual property rights; behavior and actions of legal and natural persons. The types and scope of material and immaterial goods that constitute the objects of law are determined by the legislator and enshrined in laws and other regulatory legal acts. The concept of the "object of law" is practically identical to the concept of the "object of legal regulation". (*Entsyklopediia suchasnoi Ukrainy*. Available: <http://surl.li/qmlqj>)

**Civil law.** In this area, the cornerstone regarding the standardization of artificial intelligence is the dilemma of whether AI is a subject or an object of law? Discussions on this issue are ongoing, and in our opinion, they will only increase with the development of AI capabilities and its learning.

The issue of recognizing artificial intelligence and robots as new subjects of civil law is increasingly being raised among scientists, and there is currently no consensus on this issue. However, due to the continuous development of modern technologies, legal regulation in this area will also evolve.

The theory of the subject regarding artificial intelligence is associated with the use of the term "electronic person." Scholars who express this view regarding artificial intelligence emphasize the existence of individual subjective rights and obligations in such a person and civil legal capacity in general. Thus, in the doctrine of civil law, it is argued that electronic person has civil legal capacity, and therefore, there are all grounds to consider artificial intelligence a subject of civil law. It is also proposed to include "cyber capacity" in the list of types of legal capacity of legal entities – the ability to be an active participant in relations in the IT sphere. At the same time, "cyber capacity" can be realized not only through legal transactions but also through legal actions within the framework of special legal capacity of AI. The development of the doctrine of civil legal capacity of artificial intelligence is reasonable. As researchers emphasize, in October 2017, the "human-like robot Sophia was granted citizenship and thus became a citizen of Saudi Arabia, becoming the first robot to acquire legal personality in a certain country (Zozuliak O. I., 2022).

Nick Bostrom conducted research on the phenomenon of intelligent machines and concluded that by 2022, artificial intelligence systems would think approximately 10% as humans, by 2040 - 50%, and by 2075, thought processes would be indistinguishable from human ones (Mylonenko Yu. V., 2018).

We also recall the positioning of artificial intelligence in the Resolution of the European Parliament 2018/2088(INI) precisely as an "electronic person" (*European Parliament resolution. Available: <http://surl.li/qmlxv>*). The issue of expanding the circle of subjects of civil law is particularly interesting and debatable from the perspective of analyzing the Resolution of the European Parliament 2015/2103(INL), the provisions of which provide for a specific legal status for intelligent robots (Floridi L., 2016). According to the Civil Code of Ukraine (*Tsyvilnyi kodeks Ukrainy. Available: <http://surl.li/kixz>*). (Article 2. Participants of civil relations), the participants of civil relations are natural persons and legal entities. Participants of civil relations include: the state of Ukraine, the Autonomous Republic of Crimea, territorial communities, foreign states, and other subjects of public law. These entities are endowed with certain rights and obligations accordingly.

Directly in Ukrainian legislation, the types of objects of civil rights are also defined. According to Article 177 of the Civil Code of Ukraine, the objects of civil rights are things, money, securities, digital things, property rights, works and services, results of intellectual, creative activity, information, as well as other material and immaterial goods. Objects of civil rights can exist in the material world and/or in the digital environment, which determines the form of objects, features of acquisition, exercise, and termination of civil rights and obligations regarding them.

The current domestic legal regulation of artificial intelligence defines it as an object of law because it is inappropriate to equate artificial intelligence with living beings considering the current level of AI development since artificial intelligence in any of its embodiments is currently devoid of the ability to exercise subjective rights and legal obligations (devoid of legal capacity and legal capacity), as well as devoid of emotions. The reality is that any artificial intelligence is created by a human or group of humans. Therefore, it is the developers of AI who are responsible for the safety of its implementation and use and the potential infliction of property (material) and moral harm to others. AI can be sold or given as a gift, or any other actions provided for by civil legislation can be taken with this technology, freely alienated, or transferred from one person to another by way of succession or otherwise. Therefore, today AI technology is an object of the material world that may give rise to civil rights and obligations.

At the same time, in this matter, in our opinion, it is inappropriate to draw a conclusion. The speed of AI development and its learning is impressive, research into this technology is conducted on a global scale. Let's remember N. Stevenson, C. Clarke, A. Asimov, and V. Vinge with their predictions of the development of digital society, robots, and technologies. Therefore, the question of defining AI as a subject of civil law remains open, and therefore, work on it needs to be done now to timely respond to the challenges associated with the need for changes in domestic civil law due to the possibility of the emergence of a new type of legal entity.

***The next relevant direction is copyright***, and in this area, in our opinion, the domestic legislator has significantly advanced towards the legal regulation of AI. In 2023, the Law of Ukraine "On Copyright and Related Rights" dated December 1, 2022, No. 2811-IX (*Zakon Ukrainy «Pro avtorske pravo ta sumizhni prava»*). Available: <http://surl.li/qmmbp>) entered into force. This law is an adaptation of legislation to the current state of technology development and an important step in regulating copyright in computer programs and databases. An interesting feature of the law is the introduction of the concept of "non-original objects" created by computer programs.

Non-original objects generated by a computer program (programs) are protected by a sui generis right under Article 33 of this Law. A non-original object generated by a computer program is an object that differs from existing similar objects and is formed as a result of the functioning of the

computer program without the direct participation of a natural person in the formation of this object. Works created by natural persons using computer technologies are not considered non-original objects generated by a computer program (for example, an article or book created by a person using ChatGPT).

Subjects of sui generis rights to non-original objects generated by a computer program may be persons who own property rights or have licensing authority for the computer program provided for in the first part of this article. As a result of the creation of a non-original object generated by a computer program, personal non-property rights do not arise.

The sui generis right to a non-original object generated by a computer program arises from the fact of generating this object and begins to operate from the moment of its generation. The term of validity of the sui generis right to a non-original object generated by a computer program expires after 25 years, calculated from January 1 of the year following the year in which the non-original object was generated. The law also provides for corresponding protection of rights, including judicial protection.

**Criminal law.** The issue of regulating AI in criminal law and civil law is similar. First of all, this issue concerns the recognition of AI as a subject or object. In criminal law, accordingly, the issue concerns the recognition of AI as a subject of a criminal offense or as an object of such an offense, a tool or means of its commission.

The following properties of artificial intelligence are highlighted: 1) the ability to process significant amounts of information obtained from various sources; 2) the ability to self-learn (including accumulating experience, generalizing, finding non-obvious connections) and reasoning; 3) planning skills; 4) the ability to contemplate (in response to developers' contemplations about it, artificial intelligence will spend more powerful resources contemplating them) (*J. Barrat, Available: <http://surl.li/qmmgf>*).

According to Article 18 (Subject of a Criminal Offense) of the Criminal Code of Ukraine, the subject of a criminal offense is a convicted natural person who committed a criminal offense at an age from which, according to this Code, criminal responsibility may arise. Above, we have already described the prospects for the development of AI, including its status as a legal entity and corresponding legal personality.

Granting artificial intelligence the status of an "electronic person" is unlikely to encounter objections or non-acceptance in the field of criminal law relations. After all, the fact of recognizing a legal entity as a subject of numerous legal relations, including criminal ones, is not controversial (Art. 96-3, 96-4, 96-6. Chapter XIV-1 "Criminal Law Measures Regarding Legal Entities" of the Criminal Code of Ukraine) (*Radutnyi O. E., 2017*).

Scientific literature describes the position regarding the possible inclusion in the Criminal Code of Ukraine of a section tentatively titled "Criminal Law Measures Regarding Electronic Persons," if the latter are not recognized as subjects of the crime with all subsequent legal consequences of such a systemic change (*Karchevskiy M., Radutniy O., 2023*). Next is the question of whether AI is an object or subject of a criminal offense, or a tool or means of its commission? According to domestic legal doctrine, the object of a crime is social relations, interests, goods protected by criminal law from socially dangerous encroachments, and to which harm is caused or the danger of such harm is created in the process of committing a crime.

The subject of a crime is an item of the material world about which or in relation to which a crime is committed, and with certain characteristics of which criminal law associates the presence in the actions of a person of signs of a specific criminal offense. In turn, the means of committing a crime are objects that the offender used to commit the crime and directly influenced the object, subject, or victim of the crime. These are objects that are directly used by the perpetrator to commit actions that constitute the elements of a completed crime, while the tools are only used to overcome obstacles in achieving the criminal goal (*Shalhunova S.A., 2019*).

Therefore, according to national legal doctrine, an artificial intelligence system can be considered an object of crime when it is a component of social relations protected by law. However, depending on the circumstances, AI can be used to commit a criminal offense or pose a direct threat to protected rights and legitimate interests of individuals, society, and the state.

Criminal law primarily describes the elements of a crime based on its objective side. The objective side of a crime is the set of legally significant features that characterize the external aspect of the crime, including: socially dangerous conduct (mandatory feature), socially dangerous consequence, causal connection between socially dangerous conduct and socially dangerous consequence, time, place, manner, circumstances, and means (tools) of committing the crime (optional features, which may be mandatory, qualifying, or privileged in the commission of a specific crime) (*Us O. V., 2018*).

Thus, considering the aforementioned circumstances, it is already advisable today to rethink the understanding of the place of AI in criminal law relations. The current norms of the Criminal Code of Ukraine require reconsideration in light of the fact that AI in its various embodiments is used in the commission of a significant percentage of criminal offenses, and the proportion of these offenses will increase: crimes in the field of national security, human trafficking, drugs and weapons trafficking, the banking sector, fraud, violations of electoral rights, and more. These are not exclusive categories of crimes in which AI is used.

Currently, there are numerous controversial issues in the practical application of the norms of the Criminal Code of Ukraine in this direction. One recent example is the draft law "On Amendments to the Criminal Code of Ukraine regarding the establishment of liability for electronic communication fraud" (*Vidpovidalnist za elektronno-komunikatsiine shakhraistvo*. Available: <http://surl.li/qmmmsp>), which proposes the introduction of additional norms, given the presence in the domestic Criminal Code of offenses provided for in Part 4 of Article 190, 200, 231, the norms of which do not meet the requirements of today in the field of illegal use of digital solutions.

Therefore, there is an urgent need to address this issue before the legal regulation of AI, taking into account the possible granting of the status of an "electronic person." It may be proposed to improve the norms of the Criminal Code of Ukraine for additional qualification of a criminal offense committed using AI as a tool or means. Currently, Article 361-1 (Creation for the Purpose of Illegal Use, Distribution or Sale of Harmful Software or Technical Means, as well as their Distribution or Sale) of the Criminal Code of Ukraine does not meet modern requirements, as it envisages a specific unlawful purpose. However, AI in its various embodiments is created with good intentions and later used to commit various categories of offenses. This issue becomes especially relevant in connection with the widespread use of AI in the commission of certain crimes, provided for in Chapter XX (Criminal Offenses against Peace, Humanity, and International Order) of the Criminal Code of Ukraine, for example, violations of international humanitarian law during armed conflicts when AI-powered weapons are used against civilian populations.

***The use of artificial intelligence in procedural aspects (criminal and civil procedure).***

Clarifying the circumstances of committing a criminal offense and establishing the guilty party is an undeniable fact: AI technologies in the field of biometric verification/identification, input of biometric data, management of this data; alternative chatbots to counteract chatbots in the drug trade; technologies for predicting crimes and actions of potential offenders; profiling of offenders; expert examinations, conducting covert investigative (search) actions (CIA). The question of the application of AI in countering military aggression and investigating relevant crimes is particularly relevant. Artificial intelligence helps identify Russian military personnel, search for targets, intercept enemy communications, and is also an integral part of conducting propaganda and disinformation campaigns. This list of AI technology uses in the process of detecting and proving crimes is inexhaustible and will expand.

For example, let's mention the RICAS system - a real-time intelligence and crime analysis system (*RICAS*. Available: <http://ricas.org>). RICAS allows for the following types of analysis: crime structure analysis, overall profiling analysis, specific investigation analysis, comparative analysis, analysis of offender groups, specific profile analysis, and investigation analysis. It is also worth



mentioning the software with AI elements "Cassandra," which will analyze the possibility of repeat offenses by a criminal. This assessment is carried out by an algorithm that assigns scores to various questions and then summarizes them. In a few years, there will be a large dataset, based on machine learning results, where "Cassandra" will learn to analyze not only responses to a list of simple questions but also all other data available about the criminal (*Shevchuk T.A., Syvstun Ya.V., 2021.*).

However, unlike the Civil Procedure Code of Ukraine, the Criminal Procedure Code of Ukraine has not yet introduced the concept of electronic evidence. Instead, the Criminal Procedure Code of Ukraine (*Tsyvilnyi protsesualnyi kodeks Ukrainy. Available: <http://surl.li/qmmzd>*) defines electronic evidence as information in electronic (digital) form containing data about circumstances relevant to the case, including electronic documents (including text documents, graphic images, plans, photographs, video and audio recordings, etc.), websites (pages), text, multimedia and voice messages, metadata, databases, and other data in electronic form. Such data may be stored, in particular, on portable devices (memory cards, mobile phones, etc.), servers, backup systems, and other places where data in electronic form are stored (including on the Internet). The procedure for submitting such evidence, their evaluation, storage, and return are determined.

While the Criminal Procedure Code of Ukraine leaves procedural questions regarding the understanding of the status of evidence obtained through AI technology open, defining their relevance and admissibility, standardizing the procedure for obtaining evidence through the use of AI technology considering the specifics of various aspects of application (biometric identification of offenders and their profiling, determining the possibility of recidivism, CIA, expert examinations, and analytics, among others), procedural questions neutralizing potential risks to human rights associated with the use of AI technologies in evidence gathering remain unaddressed.

There is an urgent need to ensure:

1. Standardization of AI technology (specific DSTU or procedures).
2. Legal regulation of AI usage in the field of detection, documentation, and proof of criminal offenses.

Given this, it is advisable to start working towards standardizing all the above-mentioned issues, and it would be reasonable to develop a new section of the Criminal Procedure Code of Ukraine dedicated to this direction.

***A separate topic in the process of legal regulation of AI is the protection of personal data.*** Currently, domestic legislation on personal data protection is outdated and does not fully ensure the protection of such rights in light of the development of international standards (*Zakon Ukrainy «Pro zakhyst personalnykh danykh»*. Available: <http://surl.li/jria>). Therefore, due to the significant increase in digital technology activity, the legislator has identified several focuses in the draft Law

"On Personal Data Protection" (No. 8153 dated 25.10.2022) (*Proekt Zakonu «Pro zakhyst personalnykh danykh»*). Available: <http://surl.li/qmnav>). Among other things, the use of tracking technologies for personal data subjects' actions in electronic communications and services, features of profiling and automated processing of biometric data, and others are provided for, which in turn will contribute to standardizing AI in personal data processing and protection.

We have focused only on specific areas of law in the field of AI legal regulation, but today computer programs, information technologies based on artificial intelligence, such as various chatbots, generative platforms, virtual assistants, and works with the prospect of obtaining the status of an "electronic person," have become widely used in all spheres of life. Each of these manifestations of AI requires legal regulation with the establishment of clear boundaries and the filling of concepts, both in general and in specific areas of application. Therefore, a clear and understandable conceptual-categorical apparatus is needed. Currently, Ukrainian legislation contains several legal acts, in addition to the Concept, that contain terms relevant to understanding AI: the Law of Ukraine "On Basic Principles of Ensuring Cybersecurity of Ukraine," the Law of Ukraine "On Electronic Communications," the Law of Ukraine "On Information Protection in Information and Communication Systems." The list of terms and definitions is quite extensive, including information technologies, computer programs, robots, electronic communication technologies, electronic communication network, and others.

The issues discussed and the author's assessment provided are certainly debatable and open to wide discussion given their relevance. However, it is permissible to propose certain conclusions regarding further steps in AI legal regulation:

- Formulate a legal regime overall for the use of artificial intelligence, which will subsequently necessitate the creation of a legal regime for the application of AI in a specific field;
- Develop a conceptual-categorical apparatus for AI usage overall, and subsequently considering a specific field of law;
- Establish criteria for maintaining a balance between administrative regulation and free access to AI in the interests of societal and state development;
- Provide regulatory regulation of the peculiarities of personal data processing using AI technology and protection of such data;
- Develop a framework regulatory act (law) on artificial intelligence, which will define the legal and organizational foundations of state policy in the field of AI usage, as well as the rights, duties, and responsibilities of individuals and legal entities participating in the relevant activities or using AI;

– Furthermore, ensure amendments to domestic legislation in relevant areas of law, with detailed provisions on the use of AI, taking into account the peculiarities of the social relations regulated by a particular regulatory act.

**I.4. Environmental challenges and the contribution of AI to their resolution.** Even if the world adheres to the commitments of the Paris Agreement, the temperature in the Arctic is projected to continue rising by 3-5°C by 2050, as summarized by the UN Environment Report (*Available: <http://surl.li/qmnka>*). Glacier melting will lead to sea-level rise and threaten four million people and approximately 70% of the current Arctic infrastructure. The report emphasizes the need for decisive measures to reduce emissions.

According to the World Economic Forum report 'Using Artificial Intelligence for Earth' (*Vsesvitnii ekonomichnyi forum. Available: <http://surl.li/qmnlr>*) artificial intelligence (AI) refers to computer systems that 'can perceive their environment, think, learn, and act according to their programmed goals.' On a city scale, AI can improve overall energy efficiency by incorporating data from smart meters and other devices to forecast the city's energy needs. This will help municipal service providers optimize energy production, effectively reducing their climate impact.

Additionally, technology providers are actively developing AI-based modeling tools. For example, IBM has developed a program to help cities predict heatwaves. The program models the climate on a city scale and explores different strategies to test which ones will best reduce heatwaves. For instance, if a city wants to plant new trees, machine learning-generated models can determine the best locations for planting to create optimal tree cover and reduce heat from sidewalks.

Artificial intelligence can be used to achieve a variety of critical tasks for humanity:

- Creating new low-carbon materials to replace steel and concrete.
- Timely prediction of extreme weather conditions for appropriate responses.
- Monitoring deforestation through satellite imagery.
- Transforming natural clouds or creating artificial clouds using aerosols to reflect more solar heat back into space (*Shtuchnyi intelekt (ShI) na zakhysti klimatu, ekolohii ta bioriznomanittia. Available: <http://surl.li/qmnoa>*).

Despite the global positive aspects of using AI in the field of ecology, concerns about the danger of using AI are also voiced. For AI to perform its tasks, it needs to master vast amounts of data. To learn to recognize a car, an algorithm must sift through millions of images of cars. ChatGPT processes huge textual databases to learn to work with human language.

Data processing takes place in data processing centers (DPCs). It requires significant computational power and is very energy-intensive. Two to four percent of global CO<sub>2</sub> emissions

come from the entire infrastructure of such data centers and data transmission networks. This is approximately the same as emissions from aviation transport.'

In a 2019 study, scientists from the Massachusetts Institute of Technology calculated that 'training' one large AI device could result in emissions of up to 284 tons of CO2 equivalent - almost five times more than the emissions from a car throughout its production and operation period (*Miuller N.*, Available: <http://surl.li/qmnqj>).

Contrary to criticism, scientists have proven that AI-based technologies can provide users with more opportunities to reduce their own carbon footprint. These include various smartphone applications or other technological solutions that help calculate users' individual contributions to overall greenhouse gas emissions and provide practical recommendations for reducing these contributions, such as reducing meat consumption, using public transport instead of a private car, economical electricity consumption at home or in the office, etc. Artificial intelligence, with reasonable approaches, will become a powerful assistant in combating climate change (*Rolnick D.*, Available: <http://surl.li/qmnrr>.), which is a threat to human existence.

At the end of 2019, a group of researchers in the field of artificial intelligence presented a comprehensive scientific work entitled 'Machine Learning for Combating Climate Change.' This work thoroughly examined 13 areas (from utilities to agriculture and manufacturing) where AI algorithms can help humanity in combating climate change and challenges.

***Electric power systems.*** Artificial intelligence is often referred to as the new electricity due to the immense potential of this technology to transform many different sectors. Interestingly, the electric power supply system itself is one of the areas that artificial intelligence can transform in the near future.

Today, electric power systems account for about a quarter of all human-induced greenhouse gas emissions. Machine learning technologies can help reduce emissions from power generation systems by accelerating the development of clean energy technologies, improving forecasts of energy demand and clean energy generation volumes, and through overall optimization of energy production management and monitoring systems.

***Transportation.*** The transportation sector is responsible for a quarter of all carbon emissions and currently shows no trends of emission reduction. Two-thirds of transportation emissions come from road travel, with aviation showing the highest emission intensity and fastest growth.

With artificial intelligence technologies, we can improve the design of transportation vehicles, build more thoughtful infrastructure, optimize public transportation schedules, assist in the development of shared mobility systems, shift transportation from roads to rail, which is the most efficient in terms of greenhouse gas emissions.

***Residential and municipal sector.*** Energy used by buildings accounts for a significant portion of emissions. By implementing several relatively easy-to-implement solutions, emissions from buildings can be reduced by 90%.

Artificial intelligence technologies can provide critical tools for managing energy consumption in individual buildings and shaping energy efficiency policies for entire cities. Various machine learning techniques can help develop solutions that will be most effective for specific buildings and ensure the implementation of these solutions through appropriate "smart" systems. At the urban planning level, neural networks can gather and process vast amounts of data to make more informed decisions in the city-building process.

***Manufacturing.*** Industrial production, logistics, and construction materials are the main causes of emissions that are difficult to eliminate. Fortunately, thanks to the efforts of artificial intelligence researchers, the industrial sector spends billions of dollars annually collecting data on the activities of plants, factories, and logistics systems. Such volumes of information have become accessible, and thanks to the implementation of new data collection mechanisms via QR codes and image recognition.

Thus, thanks to the availability of large amounts of data and access to cloud environments for storing and processing information, the industry can become an ideal place to demonstrate the positive effect of machine learning on climate change. The work of artificial intelligence experts can potentially reduce global emissions by streamlining supply chains, improving product quality, predicting breakdowns, and optimizing heating and cooling systems.

***Agriculture.*** Greenhouse gases are emitted not only by engines and factories, but a significant portion of harmful emissions is the result of farming activities. In modern agriculture, the practice of growing a single crop over a large area of land predominates. This approach simplifies farm management but simultaneously leads to a decrease in soil nutrients and, accordingly, a decrease in its productivity. As a result, many farmers begin to actively use nitrogen-based fertilizers, which can convert into nitrous oxide - a greenhouse gas that is 300 times more potent than carbon dioxide.

Artificial intelligence algorithms can help farmers combine different crops more effectively, better predict when to plant certain crops, as well as which crops will help restore soil fertility, and consequently reduce the need for fertilizers.

Full-scale application of artificial intelligence in agronomy is already the nearest future. According to the conclusions of the U.S. National Institute of Food and Agriculture, machine learning can effectively analyze crop conditions, identify problems and their locations in the field, target the application of plant protection agents, reduce environmental impact, decrease the amount of fertilizers and water used by using them in the necessary quantity. As an example, the activities of Corteva

Agriscience, a global agricultural company, are aimed at working with farmers to develop more useful and powerful technologies. The company's researchers use Google Cloud solutions in many areas of their work, including research and development, data processing, and plant breeding departments. The company's digital technology department has utilized tools from Google Cloud and partner Kin + Carta for photometry - a project that uses artificial intelligence to forecast corn yield to plan necessary agronomic work. Corteva's mobile photometry uses machine learning, artificial intelligence, and a small amount of user data (plant density and weight of 1000 seeds) to accurately adjust corn yield measurements in the field (*Kovalenko O.*, Available: <http://surl.li/qmnzn>).

Ukrainian researchers, despite the difficulties caused by armed aggression, are not lagging behind their colleagues in researching AI in addressing environmental threats (*Ukrainskyi hidrometeorologichnyi instytut*. Available: <http://surl.li/qmoaz>). On September 18, 2023, the 78th session of the United Nations General Assembly took place. As part of the event "Artificial Intelligence to Accelerate Progress in Achieving Sustainable Development Goals," scientists from the Ukrainian Hydrometeorological Institute (UkrHMI), the State Emergency Service of Ukraine, and the National Academy of Sciences of Ukraine, in collaboration with IBM Research and Texas Agrilife Research, presented a joint environmental project.

Scientists from UkrHMI presented two online platforms, "Land & Water" and "AgroStats," through which any interested parties, environmental experts, farmers, government bodies, can obtain information on drought forecasting, water resource management, and agricultural statistics of Ukraine. These platforms are relevant due to the constant destruction of critical infrastructure in the country. They will enable making informed decisions to protect Ukraine's agriculture and water resources for future generations.

These platforms, based on AI, contribute to the achievement of the Sustainable Development Goals (SDGs) declared by the UN:

- SDG 2 - Zero Hunger,
- SDG 6 - Clean water and Sanitation,
- SDG 13 - Climate action.

Science and practice go hand in hand in researching the prospects of using AI in combating environmental hazards (*Call for Submissions*. Available: <http://surl.li/qmoch>). The University of Cambridge has established a new center focused on developing ways to use artificial intelligence to mitigate environmental risks. The center will focus on developing "new methods for utilizing AI potential for analyzing complex environmental data and thus planning sustainable paths for the future" and ongoing projects of similar scope, including those aimed at using AI to understand earthquake risks and monitor active volcanoes.

NASA, IBM, and HuggingFace have initiated cooperation to create a next-level artificial intelligence model that will help scientists track climate change, forest conditions, air quality, and other environmental aspects. According to NASA's estimates, within the Earth science program, about a quarter of a million terabytes of data will be generated in 2024. To enable scientists to effectively process these vast amounts of raw satellite data, IBM, HuggingFace, and NASA will create an open-source geospatial database that will serve as the foundation for a new class of AI capable of tracking deforestation, predicting crop yields, estimating greenhouse gas emissions, and more. For this project, IBM is applying the recently released Watsonx.ai as the base model, utilizing a year's worth of harmonized data from NASA Landsat Sentinel-2 satellites. These data are collected by a pair of ESA Sentinel-2 satellites designed to capture high-resolution optical images over land and coastal areas in 13 spectral bands. In turn, HuggingFace has hosted the database on its open-source AI platform. According to IBM, by precisely tuning to "data for mapping scars from floods and fires," the team was able to improve the model's performance by 15%, while using half the amount of data. By applying flexible, reusable AI systems with data repositories from NASA satellites and hosting them on the leading open-source AI platform, Hugging Face, the power of collaboration will be leveraged to deliver faster and more efficient solutions in the field of ecology (*Available: <http://surl.li/jtjnh>*).

In conclusion, it should be noted that artificial intelligence and ecology are simultaneously independent and closely interconnected directions of societal development, this is our reality. Ahead of us are resilient AI models capable of skillfully modeling and understanding challenges in the field of ecology and contributing to their mitigation. For the effective implementation of AI technology in the field of ecology, work is needed on both technical solutions and addressing administrative and legal aspects. This involves setting new standards, harmonizing terminology and methodologies, and regulatory framework for all the solutions and innovations that already exist and will be created due to the prospects of AI in ecology.

Ukraine is currently in an extremely difficult situation due to military aggression, and the consequences for Ukraine's ecology are catastrophic. Burned forests and fields, polluted rivers and soil, flooded cities and villages are among the visible effects. According to the State Environmental Inspection, as of January 2023, the losses for Ukraine's ecology due to 11 months of Russian military aggression amount to over 1 trillion 743 billion hryvnias, or over 47.6 billion dollars. And these are only approximate calculations, as a part of Ukrainian territories remain occupied (*Pohliad z suputnyka. Available: <http://surl.li/mkgmr>*).

Artificial intelligence can be a solution to overcome these challenges. Despite the situation in the country, active work in this direction is necessary today. The creation and functioning of a state

environmental monitoring system and its subsystems, a nationwide environmental automated information-analytical system to support decision-making and access to environmental information, and interaction of its sectoral components are planned. The positive impact of using AI technology in implementing these tasks is undeniable.

The establishment of this system is regulated by the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the State Environmental Monitoring System, Environmental Information (Environmental Information), and Information Support for Environmental Management" dated March 20, 2023, No. 2973-IX (*Available: <http://surl.li/qmoev>*). This Law comes into force six months from the date of cancellation or termination of the state of war, except for the provision that comes into force from the day following the publication of this Law, which sets tasks for the Government of the country within one year from the date following the publication of this Law to ensure the adoption of regulatory acts provided for by this Law and bring its regulatory acts into compliance with it.

The problem is that military aggression may continue, and environmental issues require immediate resolution, so active work in searching for automated solutions and implementing AI technologies to overcome environmental threats caused by the consequences of military aggression is necessary today.

Overcoming environmental threats and challenges involves the implementation of AI through the creation of various analytical systems and integrated online systems, including those to European and other international platforms, for analysis and information provision to state institutions and other users to support decision-making in the field of environmental protection and restoration, as well as planning measures to prevent harmful changes, planning and obtaining international assistance. Currently, various mobile applications in the field of public interaction and various law enforcement agencies have proven themselves positively, for example, those introduced by the Security Service of Ukraine and the national police to inform citizens about violations of the law, movement of aggressor forces, and informing about the danger of mined territories. Therefore, it would be appropriate to use mobile applications with the ability to alert law enforcement agencies about unlawful activities in the field of the environment (pollution, poaching, deforestation, illegal dumps, etc.).

**I.5. Information Security and Counteracting Cyber Threats.** The use of artificial intelligence (AI) in the context of cybersecurity is becoming an increasingly important aspect of ensuring international security. AI can make a significant contribution to preventing cyberattacks, detecting threats, and responding to them, thereby helping to reduce risks for countries and



international organizations. Several key aspects of using AI for cybersecurity within the framework of international security include:

1. *Threat Detection*: Using machine learning algorithms to analyze large volumes of data and detect anomalous activity that may indicate potential cyber threats. Monitoring network traffic and system logs to detect malicious actions and potentially harmful programs.

2. *Attack Prediction*: Developing predictive models based on historical data and trend analysis to forecast future cyber threats. Using analytics to identify possible attack scenarios and determine the most probable attack vectors.

3. *Defense Against Attacks*: Utilizing artificial intelligence to automatically detect and block malicious programs and malicious traffic. Developing access management and authentication systems that use analytical methods to detect anomalous user behavior.

4. *Recovery After Attacks*: Using analytical tools to assess damages after cyberattacks and develop recovery strategies. Automated analytics help identify weaknesses in the system and develop action plans in case of access loss or security breaches.

5. *International Cooperation*: Using artificial intelligence to analyze global trends in cybersecurity and collaboratively respond to threats with other countries and international organizations. Sharing information and training machines to detect and respond to cyber threats in real-time.

The overall goal of using artificial intelligence in cybersecurity is to ensure international stability and protection against cyber threats on a global scale.

**I.6. Psychological Aspects of Human Interaction with AI Systems.** For the user, generative artificial intelligence (AI) appears to be superhuman or at least significantly enhanced in cognitive terms. To the naive user, it appears as an incredibly fast and precise scientific librarian combined with a erudite professor. It facilitates the synthesis and exploration of global knowledge much more efficiently than any existing technological or human interface, doing so with unique comprehensiveness. Its ability to integrate diverse realms of knowledge and simulate various aspects of human thinking makes it erudite to such an extent that it surpasses the ambitions of any highest-level human group. However, at the same time, it has the ability to misinform its human users with incorrect statements and outright fabrications.

The long-term significance of generative artificial intelligence extends beyond commercial implications or even non-commercial scientific breakthroughs. It not only generates answers but also raises philosophically profound questions. It will influence diplomacy and security strategy. However, none of the creators of this technology are addressing the problems it will create itself.

Even if generative artificial intelligence models become fully interpretable and accurate, they will still create problems inherent to human behavior. This may have certain consequences. As people rely less on their brains and more on their machines, they may lose some abilities. Our ability to think critically, write, and (in the context of text-to-image conversion programs like DALL-E and Stability.AI) constructivism may atrophy. The impact of generative artificial intelligence on education may manifest in a decrease in the ability of future leaders to distinguish what they understand intuitively from what they mechanically learn. There is an urgent need to develop a sophisticated dialectic that allows people to challenge the interactivity of generative artificial intelligence, not just substantiating or explaining the answers of artificial intelligence, but also questioning them. To curb our societal dependence on machines as arbiters of reality, strict cultural norms will be necessary rather than legal bans.

It is important for people to develop confidence and the ability to doubt the results of artificial intelligence systems (*Henri Kissindzher, Erik Shmidt, Daniel Huttenlocher. Available: <http://surl.li/qmojk>*).

Among the main advantages of artificial intelligence are:

1. *Disease diagnosis.* According to research by the international analytics agency Global Market Insights, from 2017 to 2024, annual growth in the use of artificial intelligence in healthcare is expected to reach 40%. That is, the impact of artificial intelligence on medicine will increase by almost half. Artificial intelligence technologies are already used in disease diagnosis, genome research, and drug development. They allow for more qualitative provision of information, patient servicing, time and cost savings.

2. *Legal sphere.* Artificial intelligence technologies are used in law enforcement. These include judicial and law enforcement registries, databases, systems that can identify a person, provide the necessary requested information about them, and so on.

3. *Analysis and processing of large volumes of data in all areas of industry, economy, and other spheres.* No person can receive, analyze, and give a clear result as much, as quickly, and as accurately as artificial intelligence. If a person can make mistakes in calculations, taking into account the human factor, then artificial intelligence is programmed to provide the most correct answer in the shortest possible time.

4. *Assistance of artificial intelligence technologies in the space industry and science.* Scientists have developed virtual intelligent assistants called CIMON to help astronauts identify dangers during long space flights, malfunctions in a spacecraft. For planning a mission to Mars and being there directly due to the limitation and unavailability of complete information, artificial

intelligence is the only reasonable system that can help. Artificial intelligence technologies can be used where a person physically cannot be or it would be dangerous.

5. *Time saving.* Artificial intelligence does not need to be taught at all - it is already programmed to perform certain types of work, unlike a person.

6. *Cost savings and efficiency of use in the banking sector.* Artificial intelligence helps in detecting fraud in the banking sector, as well as in the development of investment policy. Banks have AI-based software systems that help prevent money laundering.

On the other hand, we have threats of artificial intelligence:

1. *Mass unemployment.* It can cause an economic crisis, conflicts, a path to lawlessness and crimes.

2. *Loss of control over artificial intelligence.* Creating artificial intelligence with a human brain model can cause uncontrollability of robots by humans. This is all in the distant future, as it seems to us, but we see a rapid development of robot-like technologies that directly affect human life.

3. *Development of conflicts on religious, social, and economic grounds.* Given the above, there is no single opinion and reliably correct statement regarding the positive or negative impact of artificial intelligence on humanity. AI technologies can both help humans achieve another scientific and technological revolution and become a threat. They provide society with the necessary elements for life, thereby making it vulnerable and dependent (*D. Makhnenko. Available: <http://surl.li/aikch>*).

To address many of the challenges associated with interacting with modern technical systems, especially after the emergence of specific "technophobias," it is important to understand that no machine can think like a human or act like a human (in terms of lacking motivation and goal-setting as such). The attempt to create an intelligent, primarily human-like entity has led to the formation of numerous anthropomorphisms regarding various technical systems within a certain part of human society. People have begun to interpret the activity of a machine from the perspective of their own activities and the value-motivational determinants underlying them. This provides an answer to the question of the emergence of artificial intelligence as a social-psychological phenomenon.

The creation of a "human-like machine" aimed not to open up a technical space for evolution to humanity, so the machine was endowed with human traits to overcome the psychological barrier of further symbiosis. In the distant future, machines will have human-like properties: motivation, values, needs precisely because this symbiosis is supposed to happen, but for now, these philosophical-anthropological quests are the subject of futuristic predictions of the distant future. However, people have already begun to perceive smart technologies from the standpoint that they can still "take revenge on humanity," "seize power" precisely through excessive extrapolation of their own personality traits onto objects that cannot have these traits in any case. And the more intelligent

machines become similar to their creators, the more anthropomorphism manifests itself in the world of information technology. Technophobia as unfounded fears or feelings of hostility towards technology and automation have various reasons for their emergence, with the most common associated with the objective understanding of the loss of jobs against the backdrop of the rapid replacement of human labor with automated machine work. This raises many ethical problems related to the limits of AI usage and its impact on human private life.

However, no technical system can do without humans as a source of queries and a source of knowledge. It has been found that generative artificial intelligence turned out to be an imitation, and in the field of content creation, it can combine, make substitutions, and reconstruct, but it is not capable of the creative process itself. This conclusion was reached by experts from Microsoft, Delft University of Technology, the Royal Mauritshuis Gallery, and the Rembrandt House Museum in Amsterdam while working on "The next Rembrandt" project.

Understanding the origins of artificial intelligence technologies allows us to understand their primary purpose - to free humans from excessive routine. However, human perception of this technological process has been enriched with unnecessary ideological notions, transforming mathematical algorithms into entities that they were not and could not be. Humanity must be prepared for changes in the labor market, a decrease in the share of labor in sectors that are already intensively being developed by machine learning algorithms: the field of mathematical calculations, linguistic translation, programming. This does not mean that humanity is on the brink of mass unemployment, but it will enable the application of human labor in cases where its expediency will be determined by purely human exclusivity (*Kyrychenko V. V., 2023*).

Modern artificial intelligence research provides an opportunity to identify a specific set of features common to natural and artificial intelligence, as well as to identify the main parameters for their evaluation (*Derevianko S. P., Prymak Yu. V., Yushchenko I. M., 2020*).

Parameters of evaluation	Key characteristics	
	Human intelligence (HI)	Artificial intelligence (AI)
Information analysis	For humans, it is anticipated to perform sequential, logical actions in interpreting acquired knowledge.	AI can analyze environmental information using sensors (motion, sound, light, etc.). One of the capabilities of AI is computer vision - AI technologies for real-time collection and analysis of video information.
The ability to reason	This ability in humans is associated with the process of thinking and is manifested in certain interconnected	One direction of AI is modeling reasoning, which involves creating symbol systems where a specific task is

	judgments aimed at determining the truth of a particular thought.	inputted, and the expected output is its solution.
Learning ability	In humans, this manifests in the ability to develop one's abilities and seek solutions in new situations.	One of the fields of AI is machine learning, which is the process of an intelligent system independently acquiring knowledge during its operation.
Self-learning	Human intelligence involves the orientation of activities towards independent acquisition of knowledge and experience.	A promising research direction is self-learning in AI, which involves the development of machine learning algorithms through the modification of SOINN (Self-Organizing Incremental Neural Network).
Language understanding	Language understanding involves extracting various types of information from an input linguistic signal, including the content of the message, the identity of the speaker, the language being spoken, as well as the emotional or psychological state of the speaker.	One of the directions of AI is natural language processing, which deals with the computer analysis and synthesis of natural language.
Emotion recognition	In humans, there is a process of perceiving, interpreting, and understanding the expressive manifestations of other people.	In the early 21st century, emotional computer systems (or emotional AI) were developed – devices capable of recognizing, interpreting, processing, and simulating human emotions.

The main common characteristics of natural and artificial intelligence include information analysis, reasoning ability, learning capability, self-learning ability, language understanding, and emotion recognition. However, human intelligence and artificial intelligence significantly differ in the results of their functioning (humans may exhibit a wider range of abilities, while machines may demonstrate greater intensity of these abilities) and motivational aspirations (actions by humans are purposeful).

The efforts of scientists to maximize the resemblance of artificial intelligence to human intelligence have led to the introduction of the concept of "emotional artificial intelligence" - intelligent systems capable of recognizing human emotions, interpreting them, and reacting to them adequately. In practical terms, emotional artificial intelligence is most promising in the social and medical fields. Modern social robotics is equipped with auxiliary tools for the interaction of emotional robots with people with disabilities and the elderly.

In turn, we believe that despite humanity's fears and the debate over the interaction between AI and humans, the implementation of AI in various spheres of life will contribute to human psychological comfort. This is because AI technology will enhance the duration and quality of life through the modernization of medical services (bioengineering, nanomedicine); the possibility of quality education; increasing individual safety through improved security environments; enhancing work efficiency and productivity; improving citizen-state interaction through the implementation of AI innovations, and consequently saving resources and time.

## **II. Artificial Intelligence and the Modern Smart State**

**II.1. The Main Principles of a Smart State.** A smart state is a governance concept that relies on innovative technologies and data to improve citizens' lives, streamline government operations, and ensure the effective functioning of all sectors of society. The key principles of a smart state include:

- *Digitization:* Actively leveraging digital technologies for the transition to electronic governance, a digital economy, and digital services for citizens.
- *Innovation:* Encouraging the development of innovations and technological startups to accelerate economic development and enhance quality of life.
- *Open Data:* Providing access to open government data to increase transparency, accountability, and public participation.
- *Effective Governance:* Using data analytics to make informed decisions and optimize government processes.
- *Cybersecurity:* Ensuring the protection of critical infrastructure and data from cyber threats.
- *Citizen Engagement:* Creating mechanisms for active citizen participation in decision-making and policy formation.
- *Sustainable Development:* Working towards creating resilient and sustainable systems that address current needs while considering future generations.
- *Environmental Sustainability:* Focusing on the development of eco-friendly technologies and reducing carbon footprint to ensure environmental sustainability.

These principles aim to create an intelligent and innovative governance system that meets the requirements of modern society and contributes to its sustainable development.

**II.2. The Impact of AI on the Formation of Smart States.** Qualitative changes in the use of network digital technologies over the past decades have led to the identification of four stages of the digital revolution:

The first stage of the digital revolution (1990-2000) was characterized by the formation of necessary infrastructure to provide access to information via the Internet, with websites primarily intended for reading (receiving) information rather than posting and promoting it.

During the second stage (2000-2010), users personally became active participants in creating and accumulating data.

The third stage (2010-2020) was marked by the era of social networks and messengers (applications for instant messaging).

The fourth stage involves the construction of the so-called neural network, where communications between people, animals, and things will be based on principles of neurocommunication, utilizing artificial intelligence and the ubiquitous Internet of people, things, data, processes, etc (*Liashenko V.I., Vyshnevskoho O. S., 2018*).

Thus, the transition to the fourth stage, which includes extensive use of AI, is currently underway. Naturally, these processes, like any change, have two sides, as we mentioned above while analyzing the prospects of AI technology application in various spheres of society and state existence. These include risks in the field of human rights protection, technological and environmental hazards, economic troubles, including increased unemployment. However, we have also described the massive positive consequences of the prospects of implementing AI technology. Timely regulatory control of AI will ensure the protection of human rights and freedoms, AI technology will protect the environment and enable the development of medical care and treatment of severe diseases, and alongside the disappearance of certain professions, the introduction of AI will lead to the emergence of new ones.

Therefore, the task of a smart state in ensuring a comprehensive approach to the implementation of AI in all spheres of societal development, anticipating existing challenges, as well as developing and providing consultative and technological support in the implementation and use of AI technology.

For the effective and healthy transformation of society through the implementation of AI, while respecting democratic human rights and the rule of law, it is considered necessary to adhere to a number of principles in using AI in a smart state:

1. The principle of equal rights and opportunities for access to AI technology. Equal access to AI technology should be ensured for everyone in accordance with the requirements of legislation, information, and knowledge provided on the basis of such technology.
2. The principle by which AI will be used to create positive changes in various spheres of existence of the smart state and its population. This principle involves improving the quality of

healthcare and education services, creating new jobs, developing entrepreneurship, agriculture, transportation, environmental protection, ensuring a safe environment, and public safety.

3. The next principle is that the implementation of AI will contribute to the economic development of the smart state through increased efficiency and productivity, the acquisition of new competitive qualities and properties in various sectors of the economy, and accordingly competitiveness in the global market.

4. The principle of legal regulation, according to which the implementation of domestic standards for AI use in various industries will be ensured, of course, taking into account international experience, as well as ensuring regulatory regulation of AI technology use by adopting appropriate legislation.

5. The principle of information and cyber security, according to which the smart state, through legal, administrative, and organizational measures, ensures simultaneous development of AI technology in society and prevention, elimination, and management of challenges and risks in the fields of information security, cybersecurity, protection of personal data, privacy, and user rights of AI.

Thus, the task of a smart state on the path to widespread AI implementation is comprehensive state management of these processes, overcoming institutional and legislative barriers, launching national-level AI implementation projects, attracting relevant investments, stimulating the scientific community and business to develop AI technologies, coordinating market mechanisms in the field of AI use. A smart state must lead the processes of AI implementation and ensure their regulation.

**II.3. Challenges and Development Prospects.** The implementation of AI in various spheres of society will largely depend on the regulatory policies of the state and the creation of favorable conditions. The directions in which a smart state can influence the implementation of AI are quite broad, ranging from ensuring legal protection to investment. The main tasks of a smart state should include: regulatory regulation, including standardization in various fields of AI application, formation of AI usage culture, funding research in this area, and formation of new platforms for AI application.

Strategic decisions on the implementation of AI in a smart state include:

1. Government and state institutions' leadership in the development of artificial intelligence in all areas of public life.
2. Elimination of regulatory barriers hindering the implementation and development of AI.
3. Introduction of incentives and motivations for businesses, industries, and the economy as a whole to encourage them to transform their activities through the adoption of AI technology.
4. Creation and development of infrastructure for AI usage in everyday life.



5. Stimulating demand for AI technology from citizens and implementing national infrastructure projects based on principles of public-private partnership (in education, science, medicine, transportation, etc.).

6. Development and stimulation of AI usage in entrepreneurship by creating conditions for innovative activities through the implementation of appropriate financial and administrative mechanisms.

7. Development and deepening of citizens' competencies in the field of AI application, shaping society's and citizens' needs for the use of such technologies.

**Conclusions.** In light of the foregoing, based on the analysis conducted, the following main conclusions can be drawn. The use of artificial intelligence (AI) in international security systems is an important component of security assurance strategies, particularly in the context of the emergence of the 'smart state' concept. AI demonstrates effectiveness in detecting, predicting, and countering cyber threats, as well as optimizing various processes such as border control, early conflict prevention, humanitarian assistance, and crisis response. AI is a powerful tool that can optimize and improve all aspects of security discussed in the article.

It is also worth noting that the article highlights both the advantages and potential risks of using AI in the security field, as well as identifying prospects for its further development. Special attention is paid to the importance of legal regulation of AI use, particularly in Ukraine, as well as the protection of democratic human rights in the context of access to this technology. Psychological aspects of AI-human interaction, as well as strategic decisions regarding AI implementation in a smart state, are considered key aspects in the article.

The overall goal of the article is to promote understanding of the importance and potential of AI usage in the field of international security, as well as to develop recommendations for its effective utilization considering legal, ethical, and psychological aspects.

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