

TOOLS FOR ADAPTATING UKRAINE'S ARTIFICIAL INTELLIGENCE ECOSYSTEM TO MEET EUROPEAN UNION STANDARDS

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Abstract. This article focuses on preparing Ukraine's AI industry for the implementation of EU standards. The author examines six tools listed in the 2023 Roadmap for the Regulation of AI in Ukraine and their potential application within the AI ecosystem. These adaptation tools aim to promote the development of AI technologies in Ukraine while aligning legislation with EU standards. The article explains the relevance of AI impacts in regulatory sandboxes and descriptive risk assessment methodologies. It also outlines tasks related to labeling input and output data for machine learning and generative AI, as well as labeling AI systems before their deployment. Additionally, the article discusses atypical acts such as white papers and codes of conduct, and provides some of present instructions and recommendations for AI development worldwide. The author emphasizes the need to expand the Roadmap's tool list, potentially including software for testing and educational programs. This article contributes to suggesting holding public discussions on the necessity of AI strategy for Ukraine in conjunction with the adopted government's concept. The study incorporates successful experiences from AI industry leading countries such as Canada, Great Britain, Japan, Singapore, the USA, and Japan, alongside with initiatives from international forums and organizations.

Keywords: AI industry, EU AI Act, implementation of EU standards on AI, Roadmap for AI, Ukraine's AI ecosystem.

Author contributions

The author prepared the article independently. The author independently selected the literature, analyzed it and formulated conclusions

Disclosure statement

The author does not have any competing financial, professional, or personal interests in relation to others.

INTRODUCTION

The European standards for AI, as outlined in the EU AI Act, have now become a global benchmark for regulating the development and deployment of AI technologies.

The alignment with EU standards is not only necessary for a country seeking full membership to harmonize its laws with the community's regulations. It is also crucial for fostering the responsible use of AI technologies at a level that directly impacts the population's well-being and economic growth.

The EU AI Act provides pathways for advancing the industry while imposing necessary constraints to ensure that AI serves the common good and minimizes potential harm.

Due to these reasons, the urgency of preparing Ukraine's AI ecosystem to meet EU standards has become increasingly apparent. The current study examines this issue by reviewing and expanding the list of adapting tools described in the Roadmap for the Regulation of AI in Ukraine.

The research results are organized around six categories of tools.

THEORETICAL FRAMEWORK

The AI ecosystem of Ukraine, comprising various organizations and technologies working together within the field of AI, needs to undergo transformation towards integration with the European Union.

While organizations at the forefront of AI development, deployment and use are key players in the ecosystem, they are not entirely freed from laws and independent in their pursuit of desired outcomes.

Therefore, the authorities should play a crucial role in preparing the AI industry to meet EU standards and align the ecosystem with the provisions of the EU AI Act. This commitment is outlined in the Roadmap, which also delineates six fundamental adapting tools. Additionally, the authorities are responsible for a conducive legal environment for the advancement of AI technologies, ensuring that they are used within the boundaries of public safety and the protection of human rights.

Ukrainian scholars have primarily focused on addressing the industry's readiness from the perspective of implementing EU law and the prospects of legal regulation (Teremetskyi et al, 2024, Kondratenko et al, 2023, Milityna, 2023). However, there is still limited research on the tools of adaptation outlined in the Roadmap, although some of them have been addressed in a study on harmonizing regulatory processes (Yanovytska, 2024).

METHODOLOGY

The study is based on the Roadmap for the Regulation of AI in Ukraine, which was developed by the Ministry of Digital Transformation in 2023. It aims to assist Ukrainian companies in preparing for the potential implementation of the EU AI Act. The approach outlined in the roadmap focuses on creating favorable conditions for adaptation, rather than imposing difficult-to-implement requirements on local companies.

The author examines various non-legislative measures in the Roadmap, ranging from regulatory sandboxes, which originated from the UK financial regulator FinTech in 2016, to the publication of guides that now mainly focus on generative AI. The author then discusses the role of these tools for Ukraine's AI ecosystem and assesses their potential application at the current stage. He also makes an attempt to expand the list.

RESULTS

Regulatory sandboxes. The term “sandbox” may evoke thoughts of a children’s play area, but in the context of technology, particularly software development and computer security, the concept of “sandboxing” has emerged. Regulatory sandboxes for AI are controlled environments where AI technologies and systems are tested under secure conditions. These environments are designed to limit experiments in terms of territory and time, allow for supervision by a state authority, and require the publication of experiment results.

While the concept of regulatory sandboxes has been in use since the mid-2010s, there are currently no uniform standards and differing interpretations among experts regarding their nature and existence. Are they myth or reality? (CYEN Cybersecurity, 2024).

Regulatory sandboxes complement the strict liability regime typically associated with high-risk systems as classified by the EU AI Act (Truby et al, 2022, P. 293-294). They are considered a form of “anticipatory regulation” that supports innovation rather than imposing restrictions (Armstrong et al, 2019, P. 19-31). The relevant experimental approach encourages developers to test innovations in real-life conditions through trial and error (Pop & Adomavicius, 2021, P. 1-2).

It's important to note that the conditions of regulatory sandboxes do not entirely exempt participants from complying with existing legislation during the experiment. While some privileges are granted, such as operating automated vehicles without certain permits, the norms of legislation on human rights and confidentiality must still be observed. These provisions should be formally determined rather than purely hypothetical.

The EU AI Act references regulatory sandboxes in article 57, where member states are obligated to establish at least one such sandbox, with possible support from the European Commission if none exists. The sandboxes are described as controlled environments that foster innovation and facilitate the development, training, testing, and validation of innovative AI systems for a limited time before they are placed on the market or put into service. Competent authorities supervise experiments within their borders and may provide recommendations on how AI technologies fit into the legal framework.

However, regulatory sandboxes have limitations, such as potentially non-representative test conditions and challenges in securing the necessary resources and participation from companies. While regulatory sandboxes contribute to transparency, some companies may be hesitant to participate due to concerns about financing, distrust of state authorities, and the publicization of experiment results.

Risk assessment. Responsible development and use of AI systems and technologies necessitate a comprehensive approach to risk assessment. Ethical principles underpin the need for risk assessment and management frameworks in this domain.

The EU AI Act defines four levels of risk, ranging from low to unacceptably high. This classification prompts consideration of the technology's risk level during development and the creation of strategies to minimize negative consequences if the risk is deemed acceptable.

The Canadian government has devised an Algorithmic Impact Assessment tool to evaluate AI technologies for reliability within the public sector. This tool, aligned with the Directive on Automated Decision-Making, comprises over 80 questions to probe risks and their mitigation. It involves consultations with legal, privacy, and digital policy experts, transparent use of relevant datasets, implementation of the human-in-the-loop approach, and measures to protect personal data.

Enhancing risk assessment tools remains a pressing theoretical concern. Recent initiatives include risk scenario construction and quantitative assessment aligning with the provisions of the EU AI Act (Novelli et al, 2024), as well as the innovative DRESS-eAI methodology based on data management (Felländer et al, 2022).

The Roadmap references the HUDERIA methodology of the Council of Europe, which derives its name from the initials of Human Rights, Democracy, and the Rule of Law Impact Assessment. HUDERIA aims to conduct a comprehensive assessment of the potential and actual risks posed by AI systems to human rights and freedoms, democratic principles, and the rule of law (Leslie et al, 2021, p. 231). However, some experts consider this methodology's scope to be excessively broad (Mantelero & Fanucci, 2022).

One should develop general and specialized methodologies for different types of risks to use as the foundation for an extensive risk assessing questionnaire-transformer. These risks represent phenomena that could potentially violate the ethical principles of AI. The concept of a transformer implies the adaptability of the methodology to the systems or technologies being tested, with a common methodology defining further vectors.

It's worth noting that in line with the EU Act on AI, Holistic AI has introduced a risk assessment calculator. This tool enables the definition of liabilities for AI models and systems based on their inherent risk level.

AI labeling. In the context of technologies and AI systems, the term “labeling” encompasses two distinct procedures. Data labeling involves identifying input data used for machine learning, and content labeling or marking involves marking texts, images, audio, and video files created using generative AI.

These procedures play different roles in the life cycle of AI technologies. Data labeling occurs during the development stage to prepare raw data for machine learning by elucidating its content. For instance, an age tag may be assigned to a person's image. Content labeling takes place when using generative AI technologies. Generated content is labeled as machine-generated.

Both forms of labeling are referenced in the EU AI Act. Data labeling aligns with other data preparation processes, particularly annotation, which involves defining the type of data for machine learning. Article 10 mandates the development of high-risk AI systems based on compliance with quality requirements for training, validation, and testing datasets. This includes criteria such as representativeness, accuracy, completeness, and considering the specific usage environment for AI.

The EU AI Act also necessitates that providers of AI systems ensure proper labeling of generated synthetic audio, image, video, or text content (Article 50). Additionally, when implementing AI systems that create or edit content for deepfakes, disclosure of AI involvement is required.

Furthermore, labeling of AI systems with a caveat regarding their features and indications of compliance with relevant requirements, especially the EU AI Act, is essential.

It is worth noting that the labeling of artificial intelligence can be used in another context. Such is the designation of systems with artificial intelligence with a caveat regarding an existing feature with possible indications of compliance with the requirements for such systems, in particular, the EU Law on AI.

The field of healthcare is particularly sensitive to untested innovations and heavily reliant on public trust. As automated AI algorithms are increasingly being introduced in many countries worldwide, a rule has emerged that requires doctors and patients to be informed about the use of AI for their healthcare needs (e.g., AI in Healthcare Guidelines by Singapore’s Ministry of Health).

However, there is a question about how this information should be presented. For instance, if it’s a mobile application, is it sufficient to mention in the Google Play description that “this application is based on artificial intelligence”?

In a study on labeling AI-based software as medical devices in Australia, the team of authors (Ingvar et al, 2024) emphasized the need for the development of appropriate standards. This is consonant with the principles of transparency and reliability of AI, which suggests that developers and providers should not only notify users about the use of AI but also provide detailed information on how the algorithms function.

Therefore, AI labeling encompasses various practices related to development (data labeling), deployment (software labeling as a product), and marking of generative AI results. For the latter, content provenance and watermarking are often recommended. We assume that the Road Map of Ukraine emphasizes labeling in the first sense, indicating the potential use of this tool in conjunction with guides.

White paper. The term “white paper” is used in various contexts today, but in public policy, it refers to a government report on a particular topic.

An early example of a white paper in this sense is The Churchill White Paper 1922, which focused on British policy in Palestine. White papers have evolved to become well-reasoned descriptions of contemporary issues, ranging from the foundational concepts of Bitcoin in the 9-page Bitcoin Whitepaper to the application of artificial intelligence in radiology.

White papers are typically prepared in response to a public issue requiring government actions. They present a thorough analysis of a problem and propose potential solutions. White papers are distinct from two other types of documents: a long-term vision known as a strategy or strategic plan, and a preparatory document called a green paper, which outlines a problem and indicates a need for its solution, setting the stage for further discussions.

White papers play a crucial role in informing public policy decisions, bridging the gap between green papers and the development of strategies. These positions do not represent the final decisions on the specifics of future state regulations. Instead, they serve as a comprehensive and consolidated framework for engaging in discussions, especially with industry, researchers and the public in general. These discussions will help to elucidate the level of public support.

In the EU legal system, white papers are considered atypical acts, serving as additional resources for understanding legal provisions and establishing principles and approaches that are later incorporated into typical acts.

The European Commission prepared the White Paper on AI: a European approach to excellence and trust (2020) before the adoption of the EU AI Act. This document outlined policy options for implementing reliable and safe AI development in Europe. The reference point was the investment-attractive, excellent, and trusting ecosystem of AI of the EU.

The paper presents a six-action plan to form an ecosystem of excellence involving the research and innovation community, the private sector, focusing on SMEs, developing public awareness of AI, implementing AI in the public sector, and increasing the level of data access security and computer

infrastructures. All these aspects are very relevant for Ukraine at the current stage, as well as the deepening of international cooperation.

The trust ecosystem is built on the formation of the legal framework for AI, including the further development of a special law and the improvement of existing legal acts. Such an ecosystem is designed to embody the seven key requirements recommended by the High-Level Expert Group: technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination and fairness, social and environmental well-being, and accountability.

The White Paper specified that the following elements should become the subjects of the legal framework for the development and use of AI: training data, data and record-keeping, information to be provided, robustness and accuracy, human oversight, specific requirements for certain particular AI applications, such as those used for purposes of remote biometric identification.

The UK White Paper is dedicated to a pro-innovation approach to AI regulation. This approach is expected to promote innovations characterized by adaptability and autonomy, and should not be overly rigid. The introductory provisions show the possibilities and risks of AI, and also provide clarity in terms of terminology with some concepts, in particular, AI or AI system or AI technologies are placed in one row.

The regulation of the industry is based on five principles: (1) safety, security and robustness, (2) appropriate transparency and explainability, (3) fairness, (4) accountability and governance, (5) contestability and redress. An important role in the implementation of this approach is given to regulators, i.e. government organizations authorized to regulate a separate field of activity.

To implement a pro-innovative approach, regulators should implement the following tools: means of monitoring and evaluating the effectiveness of the regulatory framework and implementation of the above principles, risk assessment methodologies, horizon scanning and gap analysis, testbeds and sandbox initiatives, educational events, etc.

Code of conduct. Codes of conduct are important tools used by states and international organizations to regulate the behavior of private-sector organizations. They often carry ethical and moral implications, representing societal expectations of behavior that may not be explicitly outlined in legislation but are nonetheless crucial for social acceptance and trust.

Codes of conduct are a unique mechanism aimed at fostering industry development by promoting the voluntary adoption of consistent principles and rules. In the context of the EU AI Act, Article 95 allows for the creation of codes of conduct by both states and companies involved in the development and implementation of technologies.

An impactful event in the realm of AI was the Hiroshima process within the G7 framework, leading to the establishment of the International Code of Conduct for organizations developing advanced AI systems. This code is based on the International Guiding Principles, which encompass eleven measures recommended for adoption by all organizations involved in the life cycle of AI technologies (Hachkevych, 2024a).

A few months prior to the International Code of Conduct, a significant milestone for the industry in the USA was achieved when seven major companies—Amazon, Anthropic, Google, Inflection, Meta, Microsoft, and OpenAI—voluntarily committed to ensuring the safe, secure, and transparent development of AI technology.

These documents should serve as the foundation for the development of codes of conduct for Ukrainian companies operating in the field of AI. Emphasis is placed, among other things, on mitigating threats and risks through practices such as internal and external testing, information sharing, research on the impact of AI systems on human rights and democratic values, and the marking of AI-generated content to enhance transparency.

Ukraine needs not only to develop its own code based on these documents but also to formalize the process of companies joining and committing to comply with its provisions. Furthermore, monitoring the implementation of the code of conduct with the assistance of civil society and publishing lists of companies that have committed to the code on government websites can further instill trust in AI systems within knowledgeable populations.

Guide. This term is often used colloquially to refer to practical instructions and guidelines for the development and use of AI. Guides are becoming increasingly important as a way to raise public awareness of AI and to promote digital literacy.

Guides cover not only the technical aspects and algorithms (sometimes referred to as tutorials) but also provide advice on recommended rules of conduct, such as marking content generated by AI with a watermark and avoiding the collection of personal data of others by AI systems.

In the latter case, they are usually referred to as recommendations, which are non-binding but desirable rules of behavior in the field of AI. State authorities and international organizations develop them as soft law acts (Hachkevych, 2024c), regulating relations in the absence of specific laws. Guides can also serve an explanatory function regarding existing laws.

Many people perceive AI technologies and systems as unfamiliar or complex. Clear and comprehensive instructions are essential for them to understand how to use these new opportunities. Recommendations regarding rights and responsibilities in the development and use of AI are also important for building confidence and understanding.

Preparing guides is a responsible task based on scientific, theoretical, and legal research, as well as the collective experience of the subject area. Guides contribute to the dissemination of best practices and can lead to standardization, which is a key aspect of global AI management.

Guides can be categorized by authorship (government authorities—Guide on the Use of Generative AI from the Canadian government, international organizations—ASEAN Guide on AI Governance and Ethics, research institutes and universities—Policy on the use of artificial intelligence for academic activities in KPI named after Igor Sikorsky, businesses—AI Guide by Mozilla, and individual authors—Biecek & Kozak, 2022), by subject (general AI—UAE AI Guide as part of AI National Program, generative AI—Guidance for generative AI in education and research, specific fields like healthcare or education—Singaporean AI in Healthcare Guidelines, The Complete Guide to Artificial Intelligence in Radiology by Bayer), and according to the stages of the AI life cycle. The Japanese approach involves drafting separate guides for development (R&D) in 2017, use in 2019, and business in general (2024) in a sequential time order. The last one allocates three categories of entities through the addition of suppliers.

Recently, the Ministry of Digital Transformation of Ukraine and the Ministry of Education and Science of Ukraine collaborated to develop Instructive and Methodological Guidelines regarding the Introduction and Utilization of Artificial Intelligence in General Secondary Education. This project involved 30 specialists from the public sector, academia, professional circles, and civil society organizations.

DISCUSSION

Regulatory sandboxes allow *testing of new technologies* in real-life conditions under preferential terms compared to the standard legal framework. To function, the state must create suitable conditions such as a legal environment, financing, involvement of experts, and feedback. The regulator's observations from these tests help in improving legal norms related to AI. Risk assessment tools help *identify potential dangers* of AI technologies, sometimes leading to the prohibition of the latter. These tools also help create a risk management system to minimize the risks of new technologies. Authorities, with input from academia, industry, and civil society organizations, should provide developers and suppliers with evaluation tools. Tough measures, such as fines based on annual turnover, can be imposed on companies that fail to conduct a risk assessment or use AI systems contrary to requirements. The labeling of AI is complex due to different understandings of the phenomenon. Data labeling is carried out by AI system developers to *ensure functional accuracy*. Deployers label AI systems to *protect users' rights* and to indicate the use of AI in services or products. Content marking for labeling generative AI serves a similar purpose, with the only difference being that it indicates the output data.

The European Union legal system includes atypical acts such as codes of conduct and white papers. While their role is similar to traditional laws, codes of conduct are more aligned with current government policy and international standards of corporate conduct, leading to *industry standardization*.

White papers, on the other hand, provide a preliminary vision of state policy and regulation, leading to *industry regulation* through further consultations and the search for formalized solutions. The term “guide” in the Roadmap refers to manuals with instructions and recommendations, which also fall under atypical acts. Both contribute to raising awareness of AI technologies and educating the population. Recommendations, in particular, play a significant role as soft law in certain states that have opted for flexible industry management. For example, Japan follows this approach.

The development of *validation applications* should be a key focus, complementing existing adapting tools and, first and foremost, assessment methodologies. One notable example is AI Verify (Singapore), which has pioneered an AI governance testing framework and software toolkit (Hachkevych, 2024b, P. 425). This framework enables the evaluation of fairness, explainability, and robustness in AI systems. Additionally, the *use of sandboxes* can provide valuable insight into the technical environments necessary for the development and testing of AI technologies. Startups with innovative ideas that have the potential to positively impact society require greater autonomy in virtual spaces for experimental purposes. Experiments within regulatory sandboxes can then be based on the outcomes of these sandboxes.

Another important proposal involves increasing public awareness of AI. While bachelor’s and master’s programs in AI are available in major cities in Ukraine, there are still hundreds of thousands of citizens who could benefit from alternative means of acquiring relevant knowledge and skills. It is essential for the Ministry of Education and Science of Ukraine to consider *incorporating AI courses into educational programs*, including a basic course for schoolchildren to complement existing computer science lessons. Furthermore, it is crucial to address the need for advanced training and additional education for professionals who interact with AI in their respective fields, such as educators, healthcare workers, and civil servants.

The authorities should also prioritize *the development of AI research*, focusing on a wide range of topics beyond just technical aspects. Given the rapid advancement of AI technologies and Ukraine’s aspirations for European integration, there is a clear need to adapt the country’s legislation with EU laws and regulations related to AI. This task requires the involvement of highly qualified scientists and lawyers who are motivated to contribute to this evolving field.

CONCLUSIONS

The study’s results indicate that Ukraine’s AI ecosystem, influenced by the prospects of European integration and the implementation of the EU AI Act standards, requires support in technical capabilities and guidance on its operational and legal framework. Recent developments have specified restrictions on personal data and intellectual property usage, as well as the transformation of ethical principles of AI into legal ones.

The Ministry of Digital Transformation plays a crucial role in adapting Ukraine’s AI ecosystem to EU standards. Submitting documents such as the Roadmap is a significant step in providing necessary support, and adapting tools contribute to industry development in preparation for new conditions. Despite challenging conditions, authorities should make maximum efforts to apply these tools to ensure the effective implementation of the EU AI Law in the near future and expedite Ukraine’s European integration.

Analysis of documents such as the EU AI Act, the UK White Paper, and the International Code of Conduct suggests the need to expand the list of tools to meet the needs of Ukrainian companies, particularly startups. This expansion could involve developing validation applications and establishing software sandboxes. Public awareness of AI is crucial, and proposals include integrating relevant courses into educational programs and providing advanced training for professionals in various fields.

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ІНСТРУМЕНТИ АДАПТАЦІЇ ЕКОСИСТЕМИ ШТУЧНОГО ІНТЕЛЕКТУ В УКРАЇНІ ДО СТАНДАРТІВ ЄВРОПЕЙСЬКОГО СОЮЗУ

Анотація. Стаття присвячена питанням підготовки галузі штучного інтелекту в Україні до імплементації стандартів ЄС. Автор розглядає шість інструментів, перелічених в Дорожній карті з регулювання штучного інтелекту в Україні 2023 р., та оцінює перспективи їхнього застосування по відношенню до української екосистеми штучного інтелекту. Їхня роль полягає в тому, щоб створити належні умови для забезпечення в майбутньому ефективного виконання Закону ЄС про штучний інтелект.

Дослідження показує, які допоміжні засоби можна використати для того, щоб гармонізація системи українського законодавства супроводжувалась вдосконаленням екосистеми штучного інтелекту. Розглянуті інструменти адаптації так само сприяють активному розвитку галузі. порушена тематика має відношення до реалізації науково-технічного та соціально-економічного потенціалу сфери інформаційних та комунікаційних технологій України.

У статті охарактеризована значущість регуляторних пісочниць, а також описових методологій для перевірки технологій та систем штучного інтелекту. Визначені завдання маркування вхідних даних для машинного навчання та вихідних даних для генеративного штучного інтелекту, а також маркування самих систем штучного інтелекту. Автор пояснює, як атипові акти у розумінні правової системи ЄС – білі книги та кодекси поведінки – використовуються для адаптації. Наведені приклади матеріалів довідкового характеру та рекомендацій для розвитку галузі відповідно до стандартів Закону ЄС про штучний інтелект.

Автор узагальнює роль кожного з інструментів та пропонує розширити перелік Дорожньої карти за рахунок програмного забезпечення для розробок та введення навчальних курсів зі штучного інтелекту. Дослідження сприяє проведенню публічних дискусій щодо того, чи потрібна Україні стратегія штучного інтелекту поряд з урядовою концепцією. Наведені приклади впровадження досліджуваних інструментів у таких державах-лідерах галузі, як Великобританія, Канада, Сінгапур, США, Японія. Крім того, продемонстровані міжнародні ініціативи в рамках G7 (Керівні принципи, які рекомендовані до реалізації організаціями в ЄС) та Ради Європи (HUDERIA).

Ключові слова: галузь штучного інтелекту, Дорожня карта штучного інтелекту, екосистема штучного інтелекту в Україні, Закон ЄС про штучний інтелект, імплементація стандартів ЄС щодо штучного інтелекту.

TOOLS FOR ADAPTATING UKRAINE'S ARTIFICIAL INTELLIGENCE ECOSYSTEM TO MEET EUROPEAN UNION STANDARDS

Abstract. This article delves into the preparation of Ukraine's AI industry for the adoption of EU standards. The author evaluates six tools outlined in the 2023 Roadmap for the Regulation of AI in Ukraine and their potential application within the AI ecosystem. They are designed to foster the advancement of AI technologies in Ukraine while ensuring compliance with EU standards. It is imperative for government authorities to establish favorable conditions to facilitate the seamless integration of the EU AI Law in the future.

The research demonstrates the auxiliary measures that can be employed to synchronize the Ukrainian legislation with the advancement of AI ecosystem. These adaptation tools also play a pivotal role in driving the industry's growth. This discussion pertains to realizing the scientific, technical, and socio-economic potential of Ukraine's information and communication technology sphere.

The article discusses the significance of regulatory sandboxes and outlines methodologies for testing AI technologies and systems. It defines the tasks of labeling input data for machine learning and output data for generative AI, as well as labeling the AI systems themselves. The author explains the drafting of atypical acts within the EU legal system, such as white papers and codes of conduct, for adaptation. The article provides examples of instructions and recommendations for industry development in compliance with the EU AI Act standards.

Furthermore, the author summarizes the role of each tool and suggests expanding the Roadmap to include software for developing and AI educational courses. The study contributes to the ongoing public debate on whether Ukraine requires an AI strategy alongside a government concept. It also includes examples of how the researched tools have been implemented in leading countries such as Canada, Great Britain, Japan, Singapore, the USA. Additionally, it showcases international initiatives within the G7

framework (International Code of Conduct for Organizations Developing Advanced AI Systems) and the Council of Europe (HUDERIA).

Keywords: AI industry, EU AI Act, implementation of EU standards on AI, Roadmap for AI, Ukraine’s AI ecosystem.

Cite this article: Hachkevych A. (2024). Tools for adaptating Ukraine’s artificial intelligence ecosystem to meet European Union standards, *Law and innovative Society*, 1 (22), 21-31. doi: [https://doi.org/10.37772/2309-9275-2024-1\(22\)-2](https://doi.org/10.37772/2309-9275-2024-1(22)-2).