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Ukraine as a Laboratory for AI:
Examining the Transformative Role of Artificial Intelligence in Contemporary Warfare and Diplomacy

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Abstract

This paper analyzes Ukraine's emergence as a critical testing ground for Artificial Intelligence (AI), focusing on its transformative role in contemporary warfare and diplomacy. The ongoing conflict has catalyzed the rapid evolution of the Ukrainian AI ecosystem, transitioning from grassroots initiatives to organized, government-supported programs aimed at enhancing national defense and sovereignty.

The role of military AI in Ukraine has shifted significantly, becoming integral to national survival following the full-scale Russian invasion in 2022. This evolution is underscored by a marked increase in private companies developing military AI capabilities. Unlike many nations, Ukraine's government has adopted a non-regulatory stance, enabling rapid innovation to meet immediate combat needs.

However, this reliance on algorithmic warfare raises substantial concerns regarding state sovereignty, as many leading technology firms are civilian and often foreign entities. Dependence on external technologies for critical defense operations can undermine a state's autonomy and its ability to protect strategic interests.

The study further examines the dual-edged nature of AI, particularly as a tool for disinformation employed by state and non-state actors, exacerbating tensions and shaping public perceptions on migration and security.

Additionally, this paper critically addresses the ethical and legal dilemmas associated with AI deployment in conflict scenarios, advocating for a comprehensive international discourse aimed at establishing normative frameworks that uphold human rights and accountability. The analysis includes a review of diplomatic responses to AI integration, revealing how nations and international organizations are re-evaluating policies to safeguard human rights amidst technological advancements.

Ultimately, this research seeks to enrich the discourse on the intersection of technology and international relations, elucidating the intricate relationships between AI, warfare, and diplomacy in an increasingly digitalized world.

Keywords: Artificial Intelligence, Ukrainian War, Diplomacy, Human Rights, Disinformation.

Introduction

The Ukraine conflict has evolved from hybrid warfare tactics in Crimea and Donbass (2014-2022) to conventional high-intensity warfare[1] following Russia's February 2022 invasion. This escalation represents both continuity and transformation of Russia's hybrid strategy, now serving broader Kremlin geopolitical ambitions through conventional military means. The extensive campaign has precipitated a severe humanitarian crisis while prompting unprecedented Western unity characterized by economic and military support, reshaping global alliances and triggering a reevaluation of Europe's security architecture.

The academic analysis predominantly employs constructivist frameworks to interpret the conflict's complexities, examining whether Russian motivations derive from territorial ambitions or ideological opposition to Ukraine's Western integration.

Confronting its existential threat, Ukraine has strategically mobilized comprehensive defense resources while deriving tactical advantages from emerging technology integration. Artificial Intelligence (AI) once viewed as a peripheral element, has now emerged as an essential component of Ukrainian military operations, with technology corporations assuming pivotal roles in the conflict. Despite domestic talent deficits from human capital loss, defense technology startups leveraging AI solutions have proliferated since the invasion.

This conflict exemplifies AI's transformative impact on modern warfare and diplomacy through unprecedented technological integration. “Both sides have employed AI-driven strategies to enhance military tactics, conduct cyberattacks, manipulate public narratives, and shape international diplomatic engagements” (Rid, 2020), though neither has confirmed fully autonomous weapon deployments, illustrating the challenges associated with assessing the types and effectiveness of AI and autonomous technologies employed in classified operations[2].

Through private-sector collaboration, Ukraine has established a "war lab" with global implications, creating new pathways for international cooperation where public-private partnerships transcend national boundaries. Technology companies emerge as *de facto*

[1] the largest European conflict since 1945
[2] *In* the article “How AI and Autonomy in Russia-Ukraine War affect Stability”. Available at: How AI and Autonomy in Russia-Ukraine War Affect Stability | CNA

diplomatic actors, fostering a "diplomacy of innovation" that complements traditional diplomatic frameworks and extends the conflict's influence far beyond Ukraine's borders.

Ukraine's Digital Transformation and AI Governance

A significant milestone in Ukraine's technological integration was the establishment of the Digital Transformation Initiative under President Zelensky's Administration in 2019. This strategic pivot leveraged the nation's connected society to implement comprehensive modernization reforms enhancing Governmental efficiency and citizen engagement.

The Administration's digital-first approach was exemplified by Zelensky's virtual electoral campaign conducted through social media platforms such as Telegram and Instagram[3], which consolidated the legitimacy for a President characterized by a disruptive Agenda.

The campaign engineer, Mykhailo Fedorov[4] , was laying the groundwork for a comprehensive national digital transformation strategy inspired by the Baltic states. Following this success, Fedorov was appointed Vice Prime Minister and Minister of Digital Transformation, tasked with actualizing the President's vision encapsulated in the motto: "*A State in a Smartphone*".

Central to this vision is the electronic government portal and the DIIA mobile application[5], which translates to "action" and serves as an acronym in Ukrainian for *"DERJAVA I IA"* (The State and Me).

This initiative establishes a digital ecosystem that integrates an electronic wallet, official services, and digital literacy training, all designed to facilitate comprehensive digitalization and accessibility of state services. Zelensky highlighted that "We are the first country in the world with digital passports and the fourth in Europe with a digital driver's license. (…) Digitization is a fight against corruption, reduction of communication between citizens and officials, simplification of procedures. It is the future".[6]

[3] The electoral campaign was predominantly virtual, lacking traditional rallies, debates, and in-depth interviews, although it was bolstered by the television series *"Servant of the People"* (In Ukrainian "*Слуга народу" (Sluha narodu*) that brought him fame.

[4] At the age of 28, Mykhailo Fedorov was appointed as the Vice Prime Minister and Minister of Digital Transformation of Ukraine. Later he was recognized by the publication "*The Politico*" as the "No. 1 Rulebreaker" in the Tech 28 Ranking of 2022.

[5]*In* the official website of DIIA. Available at: Державні послуги онлайн | Дія
[6]*In* the official site of President of Ukraine. Available at: Volodymyr Zelenskyy supports the strategy of digital transformation of Ukraine for the coming years — Official website of the President of Ukraine

Before the escalation of the conflict in 2022, Ukraine's technological ecosystem positioned it as a regional leader, ranking first globally in AI companies (Oxford Insight, 2020). "Ukraine is a country widely and rightly regarded as Europe's hotbed of tech talent, expertise and innovation. Home to more than 1000 software companies, over 100 global R&D centers and 2000 startups, it holds gravitas as a technology epicenter of Eastern Europe"[7].

A recent study titled *"The AI Ecosystem of Ukraine: Talent, Companies, and Education"*[8] commissioned by Ukraine's Ministry of Digital Transformation asserts that Ukraine has the second highest number of IT specialists among CEE countries[9], with 243 identified AI-focused enterprises. This emphasizes Ukraine´s entrepreneurial strength and showcases its impressive contributions to scientific output.

The military aggression against Ukraine has exacerbated pre-existing challenges in digital development and *R&D* investment, leading to significant human capital loss due to large-scale emigration, which poses serious risks to the country's economic recovery and competitiveness, particularly in the innovation sector. According to the *Global Talent Competitiveness Index 2023*, Ukraine ranks 64th, a decline from 61st in 2021.

Despite the disruptions caused by the ongoing conflict with Russia, Ukraine's AI sector remains resilient as the country successfully trained over 7,000 AI developers by 2022, establishing itself as a leader in IT graduate production in Eastern Europe[10].

Ukrainian Government Initiatives for AI Integration

Historically, Ukraine's defense sector has employed AI sporadically, primarily due to its predominantly state-owned nature and a focus on traditional hardware, which has delayed its emergence as a *hub* for software-driven solutions.

Acknowledging the critical importance of AI in the advancement of unmanned systems and the enhancement of cyber defense, the Ukrainian Government has aligned its initiatives with the

[7]*In* the article "Ukraine – Leading IT Valley in Eastern Europe". Available at: Ukraine – Leading IT Valley in Eastern Europe
[8]In the Report "The AI Ecosystem of Ukraine: Talent, Companies, and Education". Available at: AI-Ecosystem-of-Ukraine-by-AI-HOUSE-x-Roosh-ENG.pdf
[9]Central and Eastern European countries typically include Albania, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia
[10]*In* the Report "Research of the AI Ecosystem". Available at: RESEARCH OF THE AI ECOSYSTEM / AI Research / AI HOUSE (2024)

objectives outlined in the 2021 Military Security Strategy[11]. By 2023, the Cabinet of Ministers launched policies designed to promote defense-related AI and reinforce the national industrial base.

The collaboration between the Armed Forces of Ukraine, the Ministry of Digital Transformation, and the Ministry of Defense has yielded key initiatives such as the Center for Innovation and Defense Technologies[12] and the Unmanned Systems Forces[13], both aimed at integrating AI into the national defense strategy.

The National AI Strategy[14]adopted in 2020[15] emphasizes the integration of AI in national security and defense, stressing the importance of solutions that enhance operational effectiveness while upholding human rights and adhering to strict ethical standards.

Through the Ukrainian Global Innovation Strategy *WINWIN*[16], the Ministry of Digital Transformation of Ukraine aims to further enhance Ukraine´s tech potential as the digital transformation of the country is a critical imperative to overcome the damage of the aggression and restore Ukraine´s competitiveness.

In April, Ukraine launched the Brave 1[17] defense innovation coordination platform to enhance synergies with its digital transformation program. Supervised by Deputy Prime Minister Mykhailo Fedorov, the platform[18] aims to clearly define Government priorities while fostering collaboration within the defense technology sector.

Despite these advancements, the initiatives remain primarily reactive, addressing immediate battlefield needs rather than engaging in long-term strategic planning.

AI Military Innovation

[11]*In* the official Website of the Defense Intelligence of Ukraine. Available at: Volodymyr Zelenskyi Approved Military Security Strategy of Ukraine
[12]Official website of the Center for Innovation and Defense Technologies. Available at:Центр інновацій та розвитку оборонних технологій
[13]The Unmanned Systems Forces are the world's first branch of the military to employ unmanned aerial, surface, subsurface and ground systems and robotics in combat operations. In the official website of the Unmanned Systems Forces. Available at:Unmanned Systems Forces Official Website
[14]*In* the official Website of *Verhovna Rada of Ukraine*. Available at: Про схвалення Концепції розви... | від 02.12.2020 № 1556-р
[15]According to the National AI Strategy, "AI is understood as an organized set of information technologies, with the use of which it is possible to perform difficult complex tasks by using a system of scientific research methods and algorithms for processing information obtained or independently created during work, as well as to create and use own knowledge bases, decision-making models, algorithms for working with information and determine ways to achieve the tasks" (2020).

[16]*In* the Website WINWIN. Available at: WINWIN. UKRAINIAN GLOBAL INNOVATION STRATEGY
[17]*In* the official Website of *BRAVE1*. Available at:Brave1 - Ukrainian Defense Innovations
[18]This initiative facilitates collaboration among key entities, including the Ministry of Defense, the General Staff of the Armed Forces, the National Security and Defense Council, the Ministry of Strategic Industries, and the Ministry of Economy.

Ukraine's defense capabilities have undergone rapid technological transformation through AI integration across multiple operational domains. Key developments include the *GIS ARTA* and *Kropyva* artillery systems developed in 2014 by *Army SOS* volunteer organization, which enhance situational awareness and reduce response times from target detection to engagement, and the *Virazh Planshet* air defense system developed by Ukrainian military scientists.

Complementary innovations such as *Zvook*'s neural network-based acoustic sensors and UA Damage's AI-driven satellite assessment platform demonstrate comprehensive technological adaptation across reconnaissance, targeting, and damage assessment functions.

Ukraine's strategic emphasis on unmanned systems exemplifies a deliberate doctrine of personnel preservation and operational efficiency maximization when confronting numerically superior adversaries. This approach is epitomized by *Aerorozvidka*[19], often referred to as a "*war startup*" has emerged as a prominent entity, integrating over 170 unmanned systems into frontline operations and establishing the Ukrainian Armed Forces as a critical driver of technological innovation in combat.

The operational deployment in Ukraine maintains human-centric command structures wherein AI-driven analytics to augment rather than supplant human decision-making authority over critical military assets. This strategic configuration addresses fundamental ethical imperatives surrounding autonomous weapons systems while optimizing operational effectiveness through enhanced intelligence-gathering capabilities.

A coalition of nonmilitary programmers and computer scientists established Delta, an initiative that employs AI and machine learning to identify targets, analyze Russian tactical movements, and propose strategic solutions. In response to significant ammunition shortages faced by the Ukrainian army during the conflict, Delta[20] developed AI-driven innovations utilizing consumer-grade drones, bespoke software, and 3D-printed components, achieving substantial cost reductions compared to traditional precision missiles, which typically exceed hundreds of thousands of dollars. This initiative has garnered notable attention from NATO, demonstrating its effectiveness during the 2017 NATO hackathon and subsequent military exercises[21].

[19] *In* the official Website of *Aerorozvidka*. Available at: ГО Аеророзвідка
[20] *In* the article "Ukraine´s Delta situation awareness system now operational across all defense units". Available at: Ukraine's Delta situation awareness system now operational across all defense units - Euromaidan Press
[21] *In* the article "Ukraine´s Battle-Forged DELTA System catches NATO eye: Export Talks Underway for Advanced Situational Awareness Platform". Available at: Ukraine's Battle-Forged DELTA System Catches NATO Eye: Export Talks Underway for Advanced Situational Awareness Platform · TechUkraine

The Ukrainian case demonstrates how existential threats can compress decades of defense innovation into months, revealing the military potential of accessible consumer technologies when rapidly mobilized by undertrained forces.

According to a March 2025 Forbes article[22], Ukraine's target of producing 4.5 million drones in 2025, substantially exceeding Russia's projected 3-4 million units, demonstrates the conflict's profound impact on defense manufacturing transformation and positions Ukraine as a leader in drone warfare capabilities, as stated by President Volodymyr Zelensky.

This surge in production, though reliant on imported components and foreign financing, signifies a strategic shift towards achieving domestic technological autonomy and decreasing dependence on external military support. Ukraine's experience is fostering reverse technological dependencies, as developed nations increasingly look to learn from its innovations born out of conflict.

Foreign Entities' Involvement in AI Implementation Across Sectors

The Ukrainian conflict exemplifies an emergent paradigm of warfare wherein private technology corporations assume quasi-sovereign authority over critical state functions, thereby fundamentally challenging Westphalian principles governing the state's monopoly on legitimate violence.

This transformation manifests most prominently through Ukraine's deliberate adoption of minimal regulatory frameworks for AI Governance, creating a strategic paradox that prioritizes immediate battlefield effectiveness over traditional sovereignty mechanisms.

In the early months of the conflict, American, British, and European forces provided approximately €100 billion in military aid, including significant conventional firepower, which has markedly influenced the trajectory of the war. As of 9 January 2025, the total level of military assistance provided by the US since the start of the Biden administration[23] stands at $66.5 billion.

[22]*In* the article: "*4.5 Million Drones is a lot of drones. It´s Ukraine´s Goal for 2025*". Available at: 4.5 Million Drones Is A Lot Of Drones. It's Ukraine's Goal For 2025.

[23]In the Research Briefing "Military Assistance to Ukraine (February 2022 to January 2025). Available at: Military assistance to Ukraine (February 2022 to January 2025) - House of Commons Library

Ukraine's digital reform initiatives have also received backing from various external entities, particularly through the EU4DigitalUA and DT4UA Projects, continuing the work of EGOV4UKRAINE Program implemented in 2016-2021[24].

These partnerships extend beyond financial aid, focusing on bolstering Ukraine's domestic defense industrial base through agreements on data sharing and the co-production of defense solutions.

A significant factor shaping Ukraine's current AI landscape is the wave of emigration that followed its independence in 1991, which produced a generation of specialists closely linked to the American technology sector. This diaspora has mobilized to support Ukraine[25].

The integration of major American technology corporations into Ukrainian state functions represents an unprecedented characteristic of contemporary military operations, providing essential infrastructure support that fundamentally alters traditional warfare paradigms. Following February 2022, Ukraine secured critical communication capabilities through the deployment of approximately 25,000 Starlink terminals, with the satellite network demonstrating notable resilience against Russian cyberattacks while facilitating secure military command and control operations. SpaceX's satellite communication infrastructure has maintained critical real-time data transmission capabilities in territories where conventional IT systems have been compromised, while General Atomics has augmented surveillance and precision strike effectiveness.

In the face of Russian attacks and threats to public administration data, Ukrainian authorities received vital support from Microsoft and Amazon, which transferred 10 petabytes of information to cloud services to ensure the continuity of state functions. Google has contributed by offering cybersecurity services.

Palantir Technologies has assumed a central role in Ukraine's military operations, providing precise targeting data through big data analytics and algorithmic learning systems. Over seven Ukrainian agencies, including the Ministries of Defense, Economy, and Education, currently utilize Palantir's products. The company's AI-powered software analyzes diverse data sources including satellite imagery, open-source intelligence, drone footage, and field reports, with

[24]In the article « EU for Digital Ukraine". A eu4digitalua – EU4DigitalUA, проєкт ЄС в Україні
[25] with influential figures such as Max Levchin, co-founder of PayPal, and Jan Koum, co-founder of WhatsApp, exemplifying the contributions of Ukrainian talent to the global tech ecosystem.

Palantir's President Alex Karp asserting that this technology is responsible for most targeting operations in Ukraine.

These multifaceted collaborative arrangements extend beyond conventional financial assistance models, encompassing comprehensive data-sharing protocols and co-production agreements designed to strengthen Ukraine's domestic defense industrial capacity while simultaneously creating new forms of strategic interdependence.

As Margarita Konaev[26]provided her expert insights in an article published by TIME discussing the unique involvement of Palantir Technologies in the Ukrainian War noted that "Most companies operating in Ukraine right now say they align with U.S. national-security goals—but what happens when they don't? What happens the day after?"[27].

This question has gained renewed relevance with the 2025 Trump Administration transition, creating uncertainties regarding continued support for ongoing initiatives, though comprehensive assessment remains limited due to restricted open-source information availability.

AI as a Tool for Disinformation

"Having a lot of information doesn't in and of itself guarantee either truth or order."
Yuval Noah Harari[1]

Carl von Clausewitz's post-Napoleonic observation that wartime intelligence is frequently contradictory, false, or uncertain remains particularly relevant in contemporary conflicts, where disinformation has evolved into a critical instrument for both operational objectives and narrative control. The Russo-Ukrainian conflict exemplifies this phenomenon, with disinformation being systematically weaponized to manipulate public perception, foster societal discord, and erode institutional trust.

[26] Adjunct Senior Fellow with the Center for a New American Security
[27] *In* the article *"How Tech Giants Turned Ukraine Into an AI War Lab".* Available at: Tech Companies Turned Ukraine Into an AI War Lab | TIME

Russia strategically appropriates liberal rhetoric to expose Western normative inconsistencies, systematically undermining the liberal international order's legitimacy. This approach involves excavating out liberal norms by infusing them with illiberal content while maintaining legitimacy, exemplified through Russia's instrumental use of Responsibility to Protect doctrine to justify military intervention in Ukraine that contradict its humanitarian foundations.

The institutionalization of this strategy extends through domestic information warfare mechanisms, demonstrated by designating the Ukraine intervention as a "special military operation" with legal sanctions against alternative terminology. This reveals how authoritarian regimes exploit liberal institutional facades while systematically undermining their substantive content, creating contradictions between formal constitutional protections and their practical nullification.

These behaviors stem from identity dynamics rooted in tension between Russia's great power self-perception and Western reluctance to provide such recognition. This recognition deficit causes grievances influencing revisionist foreign policy orientation, though constructivist analysis suggests mutual acknowledgment of legitimate interests could facilitate pragmatic frameworks accommodating normative pluralism within the international system.

Sergei Medvedev[28], in "*A War Made in Russia*" characterizes the conflict as historical reconstruction, noting that the 2014-15 Donbas separatist actions led by Igor Girkin[29] resembled historical reenactments, while the 2022 invasion was framed through the absurd "denazification" narrative, with Russia positioning itself as the Soviet Union confronting Nazi Germany. Ultimately, the war in Ukraine exemplifies, as Clausewitz observed, the continuation of politics by other means.

AI technologies are fundamentally transforming the disinformation landscape. Early conflict examples, such as the fabricated video depicting President Zelensky urging surrender, highlighted deepfake technology's potential impact despite its limited sophistication at the time. Conversely, AI advancements have introduced sophisticated detection mechanisms capable of analyzing textual, visual, and audiovisual content for manipulation indicators, bias patterns, and false information markers. AI-powered platforms such as NewsGuard utilize algorithmic

[28]Sergei Medvedev is a fellow at the Helsinki Collegium for Advanced Studies at the University of Helsinki, and a Professor at the Charles University in Prague.
[29]Igor Girkin is a former Russian army veteran and FSB officer who orchestrated militant activities during the Crimea annexation and Donbas War, later convicted of extremism charges in 2024.

assessment systems to evaluate publication credibility and detect propaganda-disseminating bot networks across social media.

Ukraine's Constitution establishes information security as a fundamental state responsibility, with Article 17 declaring that "the protection of Ukraine's sovereignty and territorial integrity, as well as the provision of its economic and information security, are the most important functions of the state"[1]. This mandate has been operationalized through the Doctrine of Information Security (2017) and Strategy for Information Security (2021), alongside the Law on Countering Disinformation, which balances emergency measures with international legal standards.

AI Regulatory Framework in Ukraine

Prior to 2022, Ukraine lacked comprehensive AI regulatory frameworks. The Government adopted a deliberately non-regulatory strategy empowering technological innovators to address frontline requirements through combat-ready AI applications.

The Ministry of Digital Transformation has promoted a business-friendly strategy that fosters innovation without imposing stringent regulations, utilizing a bottom-up approach to provide voluntary guidelines and tools to prepare businesses for future regulatory landscapes. “Fedorov and his deputies began marketing the battlefields of Ukraine as laboratories for the latest military technologies”[30].

Regarding the regulation of AI in the defense sector, Deputy Minister of Digital Transformation for IT Development Oleksandr Bornyakov stated that during the full-scale war, there is no expectation for regulation of AI in projects related to military needs. In countries where the principle of "good governance" is in place, state regulation is primarily used "to encourage" and for strategic and tactical planning[31].

While the Concept of Development of Artificial Intelligence in Ukraine (2020) and AI Regulation Roadmap (2023) establish guiding principles rather than formal regulations,

[30] *In* the article *“How Tech Giants Turned Ukraine Into an AI War Lab”.* Available at: Tech Companies Turned Ukraine Into an AI War Lab | TIME

[31] *In* the article *“Regulation of artificial intelligence in the military sector: limitations or encouragement?” (*original in ukrainian: “Регулювання штучного інтелекту у військовій сфері: обмеження чи заохочення?”). Available at: Штучний інтелект у військовій сфері - як Україна використовує ШІ у війні з Росією - ZN.ua

Ukraine demonstrates commitment to international AI governance through parliamentary ratification of the "Digital Europe" program (February 2023) and endorsement of the Bletchley Declaration on AI Security (November 2023). However, systematic research on wartime information security remains limited, with independent impact assessment of AI-driven versus traditional disinformation methods proving particularly complex.

Ukraine's strategic regulatory vacuum represents a fundamental departure from conventional governance models, where wartime survival needs take precedence over traditional ethical frameworks, substituting immediate battlefield effectiveness for long-term regulatory considerations and transforming standard "ethics by design" approaches into pragmatic "ethics by survival" imperatives.

Conclusion

This analysis determines that the ongoing conflict in Ukraine has catalyzed an unprecedented digital transformation within the information technology sector. The role of military AI in Ukraine has evolved from a marginal aspect of defense to a critical component of national survival in the aftermath of the 2022 invasion. This shift is underscored by the increase of private enterprises dedicated to advancing AI capabilities.

The Ukrainian Government has positioned itself as an innovation facilitator, streamlining bureaucratic processes for technology adoption and restructuring institutional frameworks to align with rapid advancements.

The Ukrainian "war lab" operates as a technological showcase that highlights Ukraine as an innovative player on the international stage. This capacity for innovation under extreme pressure not only reinforces the narrative of Ukrainian resilience and modernity but also attracts strategic technological partnerships with Western nations, ultimately positioning Ukraine as a crucial ally for future collaborations centered on innovation.

However, structural challenges constrain the full realization of technological potential. The absence of cohesive strategic vision, coupled with limited institutional capacity for public-private coordination, creates vulnerabilities undermining long-term objectives. The reliance on

external technologies for critical defense operations also raises concerns about a state's autonomy and its ability to safeguard strategic interests.

Ukraine aspires to become a member state of the European Union and has expressed a commitment to harmonizing its national legislation in alignment with EU standards. However, within the context of war, it is crucial to assess the extent to which these legislative changes are being implemented.

The innovations cultivated within the "war lab" create new pathways for international cooperation, as public-private partnerships transcend national boundaries, technology companies emerge as de facto diplomatic actors, and a "diplomacy of innovation" arises to complement traditional diplomatic frameworks.

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НАЦІОНАЛЬНА СТРАТЕГІЯ РОЗВИТКУ ШТУЧНОГО ІНТЕЛЕКТУ В УКРАЇНІ 2021-2030, КИЇВ 2021, Міністерство освіти і науки України Національна академія наук України.

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