

AI for War and Good: A Ukrainian Perspective

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Photo by Viacheslav Ratynskiy, Ukrainian documentary photographer

The Analytical Report 2024



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Economic and Humanitarian Consequences of Three Years of War

Russia's full-scale war against Ukraine, now in its third year, has caused enormous human losses and a large-scale humanitarian crisis.

According to the United Nations, as of February 2024, the total number of confirmed civilian casualties has reached 30,457. However, the actual numbers may be much higher due to verification difficulties. These numbers increase primarily due to intense Russian missile attacks on civilian infrastructure. [1]

In addition to human losses, the war has caused a large-scale humanitarian crisis and the forced displacement of millions of Ukrainians: an estimated 6 million Ukrainians have become refugees, including 2 million children. [2]

Despite the heroic resistance and high morale of the Ukrainian people, the price of war remains prohibitively expensive. Ukraine's GDP fell by 29% in 2022 due to the invasion's impact. The war has pushed 7.1 million Ukrainians into poverty, reversing 15 years of development progress. [3]

According to the latest Rapid Damage and Needs Assessment (RDNA2) by Ukraine, the World Bank, the EU, and the UN, the damage to buildings and infrastructure in Ukraine has exceeded \$135 billion as of February 2023.

The total cost of reconstruction and recovery in Ukraine over the next ten years is estimated at a staggering \$411 billion, combining needs for public and private funds. [4]

The scale of war and destruction in all possible dimensions makes Ukraine a place for implementing sustainable development strategies using the latest technologies, such as artificial intelligence (AI). These technologies can be verified and provide unique data sets for future use in war zones, as well as in cases of natural and man-made disasters.

However, while sustainable initiatives are still in their infancy, military initiatives and actors have long taken over the battlefield for developing and testing military technologies, turning Ukraine into a military AI laboratory.





AI War Lab in Ukraine

The ongoing war has become an unprecedented testing ground for cutting-edge military technologies, particularly in the realm of artificial intelligence (AI) and data analytics. As the conflict rages on, major tech companies have flocked to Ukraine, transforming the war-torn nation into a real-world laboratory for their latest innovations.

This Inequalities have worsened, disproportionately affecting women, children, and people with disabilities.phenomenon has given rise to a new era of warfare, where the fusion of advanced technologies and traditional military tactics is reshaping the very nature of combat operations.

The Rise of AI in Warfare

In the early months of the Russian invasion, Ukraine found itself in a desperate situation, lacking the necessary resources to counter the overwhelming force of its adversary. It was during this time that the Ukrainian government recognized the potential of leveraging cutting-edge technologies to bridge the gap and turn the tide of the war. Companies like Palantir and Clearview AI, among others, seized the opportunity to showcase their capabilities and forge partnerships with the Ukrainian military. Microsoft, Amazon, and Google were helping in humanitarian, infrastructure and educational sectors.

Palantir: The AI Arms Dealer of the 21st Century

Palantir, a renowned data analytics company, has emerged as a pivotal player in Ukraine’s defense efforts. In a June 2022 clandestine meeting with President Volodymyr Zelensky, Palantir’s CEO, Alex Karp, pledged to open an office in Kyiv and deploy the company’s AI-powered software to support Ukraine’s defense against the Russian invasion. [5] Since then, Palantir has become an

integral part of Ukraine’s wartime government, with more than half a dozen Ukrainian agencies, including the Ministries of Defense, Economy, and Education, utilizing the company’s products.

Palantir’s software, which uses AI to analyze satellite imagery, open-source data, drone footage, and ground reports, is responsible for most of the targeting in Ukraine, according to Karp. [6] Ukrainian officials report using the company’s data analytics for various projects beyond battlefield intelligence, such as collecting evidence of war crimes, clearing land mines, resettling displaced refugees, and rooting out corruption.

Clearview AI: Ukraine’s “Secret Weapon”

Another prominent player in Ukraine’s tech arsenal is Clearview AI, a controversial facial recognition company. More than 1,500 Ukrainian government officials across 18 agencies have adopted Clearview’s technology, which has helped them identify over 230,000 Russian soldiers and officials who have taken part in the military invasion. [7] The application has extended far beyond identifying Russian troops on Ukrainian soil, as Ukrainian authorities have employed the technology to link alleged war crimes to specific individuals and gather evidence for potential prosecutions.

The emergence of “Mil-Tech Valley”

Ukraine’s embrace of cutting-edge technologies has transformed the capital city of Kyiv into a hub





Photo by Viacheslav Ratynskyi, Ukrainian documentary photographer

for military-tech startups, earning it the nickname “Mil-Tech Valley.” Smaller American and European companies, many focused on autonomous drones, have set up shop in the city, contributing to the development and testing of innovative battlefield solutions.

One such initiative is the D3 (Dare to Defend Democracy) military startup accelerator, which has attracted high-profile foreign investors, including former Google CEO Eric Schmidt. Schmidt, convinced that Ukraine’s front lines would produce breakthroughs in the use of AI and drones, has invested millions into the accelerator, recognizing the immense potential for innovation amidst the conflict. [8]

The main force behind mil-tech development in Ukraine is the BRAVE1 cluster, which plays a significant role in Ukraine’s defense strategy amid the ongoing conflict with Russia. Launched on April 26, 2023, BRAVE1 is a government-led initiative designed to foster innovation and accelerate the development of defense technologies.

With the huge progress made in the sphere of mil-tech over the last two years, Ukraine has gained tremendous potential not only in receiving mod-

ern tech weapons and systems from partners, but also exporting its own breakthrough technologies. One of these milestones was organizing the NATO-Ukraine Defense Innovators Forum—the first joint event in the field of defense technology organized by NATO, the U.S. Department of Defense’s Defense Innovation Unit (DIU), the Brave1 Cluster, the NATO-Ukraine Council and the Polish Ministry of National Defense.

The forum brought together about 400 participants in the field of defense technology and innovation from more than 15 countries. [9]

“In Ukraine, we fight with innovations made in Ukraine. It is a constant work, a continuous R&D process, solving logistical problems with components, and looking for solutions five steps ahead. Ukraine is already the best R&D center for any innovation. Today we get a technology for testing, and tomorrow we will scale it hundreds of times,” said Mykhailo Fedorov, Minister of Digital Transformation. [10]

The Drone Revolution

The war in Ukraine has also catalyzed a revolution in drone use, both for reconnaissance and



Photo by Viacheslav Ratynskyi, Ukrainian documentary photographer

offensive operations. Ukraine has launched an ambitious “Million Drone Army” program, aiming to leverage the power of unmanned aerial vehicles (UAVs) and AI-enabled drones to counter the Russian threat. [11]

This initiative has not only bolstered Ukraine’s military capabilities, but it has also served as a testing ground for the latest drone technologies, including first-person view (FPV) drones, which have been employed on the battlefield for the first time. [12]

Moreover, Ukraine has embraced the use of robotic systems for a variety of tasks, such as mine clearance, supply delivery, casualty evacuation, surveillance, and even offensive operations with armed turrets and grenade launchers. The integration of these robotic systems has further highlighted the pivotal role of technology in modern warfare.

Ukrainian Unmanned Systems Forces

On June 11, the formation of a new branch of the Armed Forces of Ukraine (the Unmanned Systems Forces) was announced in Kyiv, making

Ukraine the first country to create such a branch. First Deputy Minister of Defense Ivan Havryliuk said that unmanned systems will help protect the lives of the military and defeat the enemy.

The commander of the Unmanned Systems Forces, Vadym Sukharevskyi, added that Ukraine is implementing changes based on modern military experience and is ready to dictate the rules of this war. [13]

The symbol of the new kind of troops is a swallow created by a neural network, which symbolizes victory.

The Maritime Advantage

Despite lacking a significant naval force, Ukraine has gained a substantial advantage in the maritime domain through the strategic deployment of unmanned maritime systems (UMS). These advanced technologies, including surface and underwater drones, have provided Ukraine with enhanced situational awareness, surveillance capabilities, and the ability to conduct offensive operations against Russian naval assets. [14] [15]

The Humanitarian and Reconstruction Aspects

While the focus has primarily been on the military applications of these technologies, their potential impact on humanitarian efforts and post-conflict reconstruction cannot be overlooked. Ukrainian officials have recognized the value of leveraging AI and data analytics to address challenges such as tracking displaced populations, assessing infrastructure damage, and coordinating relief efforts.

Furthermore, the data and insights gathered during the conflict could prove invaluable for Ukraine's future reconstruction efforts, enabling more efficient resource allocation, urban planning, and the restoration of critical infrastructure. The integration of these technologies into various sectors, such as education, healthcare, and agriculture, could also contribute to the country's long-term recovery and sustainable development.

Ethical Considerations and the Future of Warfare

As the use of AI and advanced technologies in warfare continues to evolve and proliferate, it is crucial to address the associated ethical implications and potential risks. Concerns have been raised regarding the potential for these technologies to be misused or fall into the wrong hands, potentially exacerbating conflicts or enabling human rights violations.

Moreover, integrating AI into military decision-making processes raises questions about accountability, transparency, and the potential for unintended consequences. As these technologies become more sophisticated and autonomous, it is essential to establish robust ethical frameworks and governance mechanisms to ensure their responsible development and deployment.



AI War Lab in Ukraine

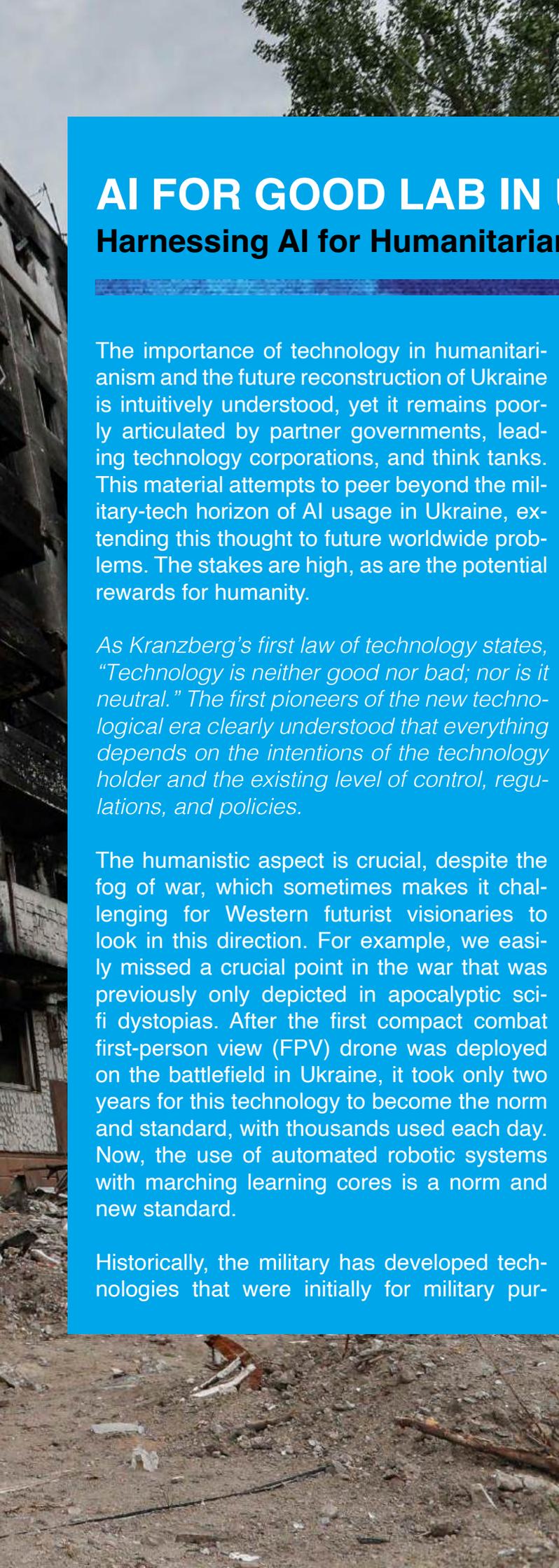
The war in Ukraine has undoubtedly accelerated the integration of AI and cutting-edge technologies into modern warfare, transforming the country into a real-world laboratory for military innovation. While the immediate focus has been on leveraging these technologies to counter the Russian threat, the long-term implications extend far beyond the battlefield.

As the world grapples with the ethical and humanitarian challenges posed by this technological revolution, it is imperative to strike a balance between military necessity and the principles of human rights and international law. The lessons learned from Ukraine's experience could shape the future of warfare and influence the development of global norms and regulations governing the use of AI in armed conflicts.

Ultimately, the AI war lab in Ukraine is a stark reminder of the transformative power of technology and the urgent need for responsible stewardship to ensure that these advancements serve the greater good of humanity. Using the latest technologies at this stage of the war is critical for Ukraine and allows for gaining an advantage in the face of a total shortage of conventional weapons. However, the main actors and corporations involved should use AI not only for war but also for good.



Photo by Viacheslav Ratynskiy, Ukrainian documentary photographer



AI FOR GOOD LAB IN UKRAINE: Harnessing AI for Humanitarian Innovations

The importance of technology in humanitarianism and the future reconstruction of Ukraine is intuitively understood, yet it remains poorly articulated by partner governments, leading technology corporations, and think tanks. This material attempts to peer beyond the military-tech horizon of AI usage in Ukraine, extending this thought to future worldwide problems. The stakes are high, as are the potential rewards for humanity.

As Kranzberg's first law of technology states, "Technology is neither good nor bad; nor is it neutral." The first pioneers of the new technological era clearly understood that everything depends on the intentions of the technology holder and the existing level of control, regulations, and policies.

The humanistic aspect is crucial, despite the fog of war, which sometimes makes it challenging for Western futurist visionaries to look in this direction. For example, we easily missed a crucial point in the war that was previously only depicted in apocalyptic sci-fi dystopias. After the first compact combat first-person view (FPV) drone was deployed on the battlefield in Ukraine, it took only two years for this technology to become the norm and standard, with thousands used each day. Now, the use of automated robotic systems with marching learning cores is a norm and new standard.

Historically, the military has developed technologies that were initially for military pur-

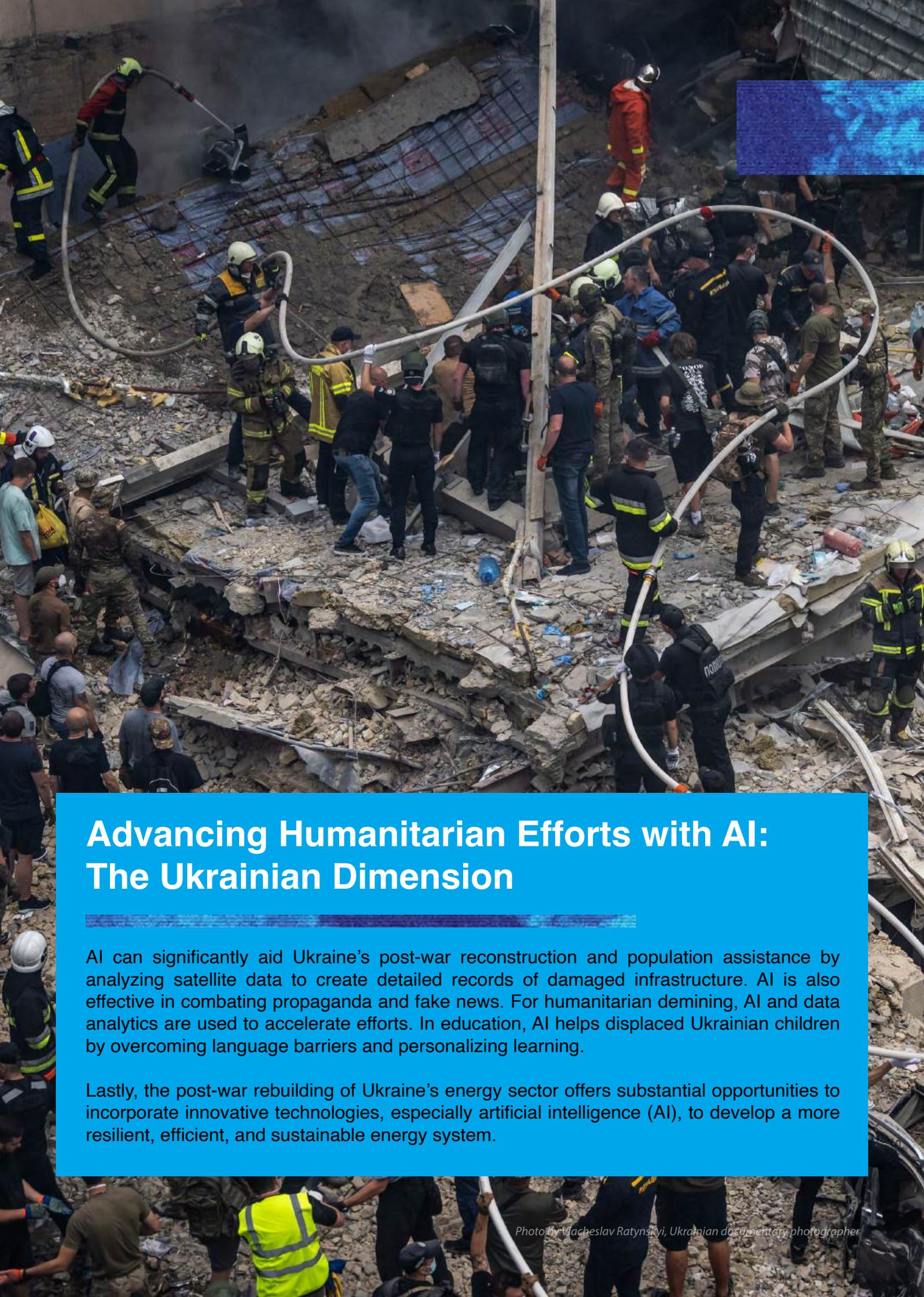
poses but later found civilian applications. It happened with the internet, GPS, digital photography, etc. It is essential to place these technologies under the control of humanistic ideals again.

Although we are just beginning to harness AI for societal good, strong initiatives are already emerging. Global efforts like Microsoft's AI for Good Lab and the AI for Good Global Summit are pioneering the vision of using AI to enhance the well-being of societies worldwide.

As Ukraine embarks on its post-war reconstruction, it presents an opportunity to test hypotheses and ideas in the field of AI for good, addressing various challenges such as assessing destruction, combating misinformation, demining, education, effective governance, and energy management.

By harnessing the power of AI for humanitarian purposes, we can contribute to the reconstruction of Ukraine while advancing the ideals of humanism and shaping a better future for all.

Although the application of AI and emerging technologies can be much broader and cover such areas as medicine, environmental protection, poverty and inequality, the financial sector, and even good governance, this article identifies five main areas that will likely emerge as the most important out of the potential ones.



Advancing Humanitarian Efforts with AI: The Ukrainian Dimension

AI can significantly aid Ukraine's post-war reconstruction and population assistance by analyzing satellite data to create detailed records of damaged infrastructure. AI is also effective in combating propaganda and fake news. For humanitarian demining, AI and data analytics are used to accelerate efforts. In education, AI helps displaced Ukrainian children by overcoming language barriers and personalizing learning.

Lastly, the post-war rebuilding of Ukraine's energy sector offers substantial opportunities to incorporate innovative technologies, especially artificial intelligence (AI), to develop a more resilient, efficient, and sustainable energy system.

ASSESSMENT OF DESTRUCTION SCALE IN UKRAINE FOR FUTURE RECONSTRUCTION USING AI AND ML

According to a detailed analysis of satellite data conducted by The New York Times in collaboration with leading scientists, more buildings have been destroyed in Ukraine than if every building in Manhattan were destroyed four times over. Parts of Ukraine, hundreds of miles apart, resemble Dresden or London after World War II.

The analysis revealed that over 900 schools, hospitals, churches, and other institutions have been damaged or destroyed, despite these facilities being explicitly protected by the Geneva Conventions. Specifically, 106 hospitals, 109 churches, and 708 schools were affected. [16]

These estimates are conservative as they do not include Crimea and parts of western Ukraine where accurate data was unavailable. The actual scale of destruction is likely even greater and continuing to grow.

Assessment of Destruction Consequences in Ukraine Using AI: Analysis of Modern Methods and Results. Opportunities for Reconstruction.

The war in Ukraine has resulted in extensive infrastructure and housing damage across the country. Advanced AI and data analysis technologies are increasingly being used to assess the scale of this destruction and plan for reconstruction. Let's review the main methods and findings of such analysis based on available sources.

Methods for Assessing Destruction

1. Satellite Image Analysis

One of the primary methods involves analyzing radar satellite images using AI. Researchers from the City University of New York and Oregon State University analyzed over 10,000 images from the European Space Agency's Sentinel-1 satellite, comparing images before and during the war. This allowed them to identify changes in built-up areas indicating building damage.

2. Machine Learning and Big Data Scanning

The United Nations Development Program (UNDP) in Ukraine applies machine learning algorithms and scans large datasets to detect damaged infrastructure quickly. This method allows for processing large volumes of information from various sources. [17]

3. Use of Drones

Unmanned aerial vehicles (UAVs) are increasingly employed for detailed inspections of specific objects and territories, capturing high-quality images from close distances.

Key Assessment Results

Researchers estimate that over 210,000 buildings in Ukraine have been damaged due to combat operations. Approximately half of the damaged buildings are located in Donbas. Significant destruction has also occurred in cities like Mariupol, Kharkiv, Irpin, and others.

Satellite image analysis enables the dynamics of destruction to be tracked over time. For example, a significant increase in damage was observed in certain cities in northeastern Ukraine in May 2024.

Advantages of AI Methods:

- Ability to rapidly process large data volumes
- Detection of changes imperceptible to the human eye
- Real-time monitoring of the situation
- The use of AI and data analysis provides an unprecedentedly detailed picture of the destruction in



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Combating Propaganda and Fake News Using AI in Ukraine

Propaganda and the spread of fake news have become serious issues in Ukraine, especially amidst Russian aggression. These informational attacks aim to misinform the public, undermine trust in official sources, and exacerbate societal divisions. However, advancements in AI have introduced new tools to combat these concerns.

AI-driven systems can now help identify, flag, and counteract disinformation at scale, enabling faster response times to emerging falsehoods. Additionally, machine learning algorithms can analyze social media patterns and detect coordinated disinformation campaigns, supporting Ukraine's efforts to protect its citizens from psychological warfare.

Detecting Propaganda and Fake News Using AI

One effective method to counter misinformation is utilizing AI algorithms to detect propaganda and fake news. These algorithms can analyze text, images, and videos for signs of manipulation, bias, or false information. For instance, companies like NewsGuard use AI to assess the credibility of online publications, assigning them appropriate ratings. [18]

Moreover, AI can assist in identifying bots and trolls spreading propaganda on social media. By analyzing user behavior patterns, algorithms can pinpoint suspicious activity and alert relevant authorities.

Automated Fact-Checking

Another application of AI in combating misinformation is automated fact-checking. Algorithms can verify claims against reliable data sources and detect inconsistencies or inaccuracies. This helps in swiftly responding to the dissemination of false information and correcting it.

AI-powered fact-checking systems can operate continuously, allowing them to handle the high volume of content generated daily across social media and news platforms. By analyzing text, images, and even videos, these systems can detect manipulated media and misleading narratives, providing essential support to human fact-checkers and helping to maintain an informed public.

Promoting Media Literacy

In addition to technological solutions, enhancing public media literacy is crucial to combating propaganda and fake news. AI can contribute by creating interactive educational programs that teach people to critically evaluate information and recognize manipulation tactics.

The application of artificial intelligence technologies opens new possibilities for effectively combating propaganda and fake news in Ukraine. Detecting misinformation, automated fact-checking, and promoting media literacy are key areas where AI can play a decisive role. However, it's important to remember that these technologies are not singular solutions and should be used in conjunction with other measures, such as strengthening legislation and fostering international cooperation [19].

The full-scale Russian invasion of Ukraine has caused a massive humanitarian crisis, resulting in millions of Ukrainian children being forced to leave their homes and temporarily relocate to other regions of the country or abroad. According to the Center for Economic Strategy (CES), approximately one million school-aged Ukrainian children and another one million preschoolers are currently abroad [20]. Only one in three Ukrainian children currently lives at home, with the rest displaced to other regions or abroad due to the war. Overall, there are around six million Ukrainian refugees outside the country. [21]

Ukrainian children abroad face a range of challenges, including language barriers, differences in educational curricula, psychological trauma from war, and more. Some countries, such as Italy, dedicated the past academic year to integration and language learning, postponing the full integration of Ukrainian children into the educational system until September 1, 2023.

In this context, the implementation of AI technologies in the educational process can become an effective solution to overcome the challenges faced by Ukrainian students and educators both within Ukraine and beyond its borders.

Advantages of AI in Education

The World Economic Forum's report "Shaping the Future of Learning" highlights the role of AI in personalized learning and reducing administrative tasks for teachers.

Personalized language models (PLMs) can tutor students in a language they understand while creating more time for student-teacher interaction. [22]

Artificial intelligence can help personalize learning by providing an individualized approach to each student based on their needs, knowledge level, and learning style. AI systems can analyze vast amounts of data to understand each student's strengths and weaknesses and provide personalized recommendations for learning resources and activities.

Furthermore, AI can provide instant feedback to students, helping them quickly correct mistakes and learn from them. Traditional teaching methods often rely on delayed feedback, such as assignments or exams, which can demotivate students. In contrast, AI systems can offer immediate feedback, allowing students to adjust and learn from their errors promptly.

AI can also help teachers improve their teaching methods and professional development. For instance, AI systems can analyze student data to identify areas where teachers may need additional training or support. This can enhance teaching quality and ensure that teachers have the necessary skills and knowledge to help their students succeed.

Applications of AI for Ukrainian Students and Educators

For Ukrainian students abroad, AI can help overcome language barriers and facilitate integration into a new educational environment. AI systems can provide translations of educational content and instructions into the student's native language, as well as support in learning the new language.

For example, an AI assistant can help Ukrainian students practice conversational skills in the new language, providing feedback and pronunciation correction. Such systems can also adapt educational content according to the student's language proficiency level, ensuring gradual progression and knowledge retention.



Photo by Viacheslav Ratynskyi, Ukrainian documentary photographer

For teachers working with Ukrainian students, AI can streamline lesson planning and the creation of personalized educational content. AI systems can analyze students' needs and knowledge levels, and then generate appropriate learning materials and exercises.

Moreover, AI can help teachers save time on administrative tasks such as grading assignments and maintaining documentation. This allows them to focus on direct teaching and interaction with students, enhancing the effectiveness of the educational process.

Ethical Considerations and Challenges

Despite numerous advantages, AI implementation in education requires careful consideration of ethical issues and potential risks. It is important to ensure that AI systems are safe, fair, unbiased, do not discriminate against students based on any characteristics, and respect their confidentiality.

Additionally, AI's potential impact on students' social and emotional development must be taken into account. While AI can be a valuable

supplement to traditional learning, it should not completely replace human contact and interaction with teachers and peers.

Overview: AI for Education in Ukraine

Artificial intelligence can play a crucial role in overcoming the challenges faced by Ukrainian students and educators amidst war and forced displacement. AI can provide personalized learning, instant feedback, language support, and alleviate administrative burdens on teachers.

However, the implementation of AI in education requires careful planning, adherence to ethical norms, and consideration of potential risks. It is essential to ensure the safety, fairness, and impartiality of AI systems, while balancing their use with human contact and interaction.

Overall, AI has the potential to be a powerful tool for enhancing the quality and accessibility of education for Ukrainian students, helping them overcome the consequences of war and continue learning in a supportive and personalized environment.

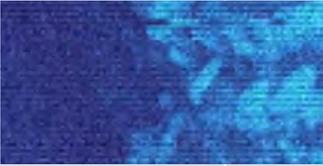


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THE SIGNIFICANCE OF AI FOR HUMANITARIAN DEMINING IN UKRAINE

Humanitarian demining is a crucial step in Ukraine's recovery following the full-scale Russian invasion. Since the conflict's onset, significant areas of the country have been contaminated with mines and other explosive devices, posing serious threats to the lives and health of the population and hindering economic development and infrastructure recovery.

Beyond the immediate physical dangers, these explosive remnants of war also prevent the safe return of displaced residents, restrict access to essential agricultural land, and create long-term obstacles to rebuilding efforts. Effective demining operations are essential not only for restoring safety but also for fostering a sense of security, enabling community resilience, and supporting sustainable peace in the region.

Current Situation

According to the Ukrainian Ministry of Economy, over 270 Ukrainians, including 14 children, have died due to mines and other explosive devices. In total, 156,000 square kilometers of territory are potentially contaminated, putting the lives of over six million Ukrainians at risk.

Since the beginning of the full-scale invasion, sappers have neutralized over 470,000 explosive devices and cleared more than 1,170 square kilometers of land. However, this process is extremely labor-intensive and time-consuming, requiring significant resources, and is dangerous with high rates of casualties.

Collaboration with Technology Companies

To expedite the demining process, Ukraine has signed an agreement with the American technology company Palantir. This agreement involves using artificial intelligence for humanitarian demining. According to the Ministry of Economy, digitization of demining operations and automation of processes, as outlined in the National Mine Action Strategy of Ukraine until 2033, are key aspects of this collaboration. [23]

Palantir's platform will utilize data from local and regional authorities, ministries, agencies, and previous sappers' work to assess and prioritize risks in contaminated regions. This will enable

advising sappers on the most effective measures in a specific area, such as the use of drones or traditional demining methods.

Innovative Demining Methods

According to CNN, the Ukrainian Armed Forces have developed an effective and relatively inexpensive method for detecting and neutralizing Russian minefields. This tactic involves using drones equipped with thermal imaging cameras to locate mines. [24]

These cameras can detect the thermal signatures emitted by mines heated by sunlight during the day. This information helps sappers accurately locate and efficiently neutralize the mines.

International Assistance

In addition to the collaboration with Palantir, Ukraine is receiving significant international assistance in the form of training and equipment for demining. For example, the United States donated over one million dollars in demining equipment to the Ukrainian State Special Transport Service in February 2024.

Humanitarian demining is a vital stage in Ukraine's recovery, requiring substantial effort and resources. Collaboration with technology companies like Palantir and international aid helps accelerate this process, saving lives and promoting faster recovery of the country.



Photo by Viacheslav Ratynskiy, Ukrainian documentary photographer

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ENERGY INFRASTRUCTURE AND THE POTENTIAL OF EMERGING TECHNOLOGIES FOR RECOVERY

Ukraine's energy infrastructure has faced unprecedented damage due to Russia's targeted attacks during the ongoing war. The staggering losses encompass direct infrastructure damages, operational losses, and a significant reduction in generation capacity. However, the post-war reconstruction of Ukraine's energy sector presents significant opportunities for integrating innovative technologies, particularly artificial intelligence (AI), to create a more resilient, efficient, and sustainable energy system.

Direct Infrastructure Damages:

- As of May 2024, direct damages to Ukraine's energy infrastructure amount to \$16.1 billion, including the destruction of electricity generation facilities like thermal and hydropower plants, transmission lines, substations, and oil/gas infrastructure.

- The electric power industry incurred around \$11.4 billion in direct damages, while the oil and gas sector sustained \$3.3 billion in damages. [25]

Operational Losses:

- Operational losses in Ukraine's energy sector are estimated at \$40.1 billion, primarily from lost revenues due to disrupted operations and reduced electricity/fuel production.

- The electric power industry alone suffered \$18.3 billion in operational losses, with the oil and gas sector incurring \$18.4 billion.

Capacity Losses:

- Russian Strikes have caused up to an 85% loss of the generation capacity of Ukraine's thermal power plants and up to 50% of its overall electricity production capacity due to Russian strikes.

- Between March 22 and May 8, 2024, the Ukrainian power system lost about 9 GW of generation capacity, a significant portion of which cannot be repaired before next winter.

The Potential of Emerging Technologies for Recovery

The reconstruction of Ukraine's energy sector is not just about rebuilding what was lost but also

integrating advanced technologies to ensure resilience and sustainability. Here are some key areas where AI can play a crucial role:

1. Damage Assessment and Reconstruction Planning:

AI can assist in assessing war-related damages to energy infrastructure and planning reconstruction efforts. By analyzing satellite imagery and other data sources, AI can help prioritize repairs and optimize resource allocation.

2. Predictive Maintenance:

AI-driven predictive maintenance systems will be crucial for Ukraine's reconstructed energy infrastructure. These systems can analyze sensor data and performance metrics to forecast equipment failures before they occur, preventing unexpected downtime and reducing repair costs. These analytics are particularly important for maintaining the resilience of newly rebuilt power plants and transmission networks.

3. Energy Demand Forecasting:

Accurate energy demand forecasting will be vital for Ukraine's recovering economy. AI algorithms can analyze consumption patterns, weather conditions, and other relevant factors to predict future energy needs. This will enable more efficient planning and operation of power plants, helping to balance supply and demand in a potentially volatile post-war environment.

4. Renewable Energy Optimization:

Ukraine's post-war energy strategy emphasizes the development of renewable energy sources. AI can enhance the integration and management

of these intermittent energy sources by analyzing weather patterns and consumption data to optimize their operation. This will be crucial for achieving Ukraine's goals of energy independence and sustainability.

For example, AI helps in selecting optimal locations for solar farms by analyzing large amounts of geographical and environmental data. This ensures the selection of the sites with the best solar resources and conditions, facilitating easier connection with existing grid infrastructures and ideal positioning for future development.

5. Building Energy Management:

As Ukraine rebuilds its cities and infrastructure, AI-powered building energy management systems can play a significant role. These systems can dynamically adjust heating, cooling, and lighting based on occupancy and weather conditions, improving energy efficiency in both residential and commercial buildings.

6. Cybersecurity for Energy Infrastructure:

Given the ongoing security concerns, AI can enhance the cybersecurity of Ukraine's rebuilt energy infrastructure. AI-powered systems can detect and respond to potential cyber threats in real time, protecting critical energy assets from attacks.

The integration of AI and other emerging technologies offers a pathway for Ukraine to not only rebuild its energy infrastructure but also to create a more resilient, efficient, and sustainable energy system. Leveraging these technologies aligns with Ukraine's goals of modernization, European integration, and energy independence, while robust international support and collaboration will be essential in realizing this vision and ensuring a secure and prosperous energy future for Ukraine.



Leveraging AI for Ukraine's Recovery and Global Impact

While using the latest technologies at this stage of the war is critical for Ukraine, it also provides an advantage in the face of a total shortage of conventional weapons. The main actors should use AI not only for war but also for good. The Ukrainian state and civil society count on supporting leading organizations in this field, such as the Microsoft AI for Good Lab and the UN's AI for Good Summit, to effectively rebuild Ukraine and overcome the consequences of war, poverty, and inequality. Providing Ukrainian citizens with the latest technologies will facilitate their post-war adaptation and recovery. It is important to note that artificial intelligence can play a key role in solving several critical problems. For example, AI can help optimize infrastructure reconstruction, improve medical services, manage resources, and ensure security.

In cooperation with international partners, Ukraine can set an example for other countries facing similar challenges. The introduction of advanced technologies will help create new jobs, develop education, and improve the quality of life of Ukrainian citizens. Thus, artificial intelligence will not only help Ukraine overcome the consequences of the war but also contribute to sustainable development in the future, aligning with the UN's Sustainable Development Goals, benefiting not just Ukraine but the world as well.

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https://data.unhcr.org/en/situations/ukraine?_gl=1*v6eh6v*_rup_ga*MTU4ODIwOTQwMy4xNzlwOTcxMTE4*_rup_ga_EVDQJTJ4LjA5MTcyMDk3MTE4Ny4xLjA5MTcyMDk3MTE4Ny42MC4wLjA5

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7. Ukraine's 'Secret Weapon' Against Russia Is a Controversial U.S. Tech Company.

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8. D3 military tech accelerator is to launch in Ukraine. Ex-Google CEO Eric Schmidt is among the LPs. AIN-Tech.

<https://ain.capital/2023/05/11/d3-military-tech-accelerator-is-to-launch-in-ukraine-ex-google-ceo-eric-schmidt-is-among-the-lps/>

9. The first-ever NATO-Ukraine Defense Innovators Forum took place in Krakow.

Brave 1. https://www.linkedin.com/feed/update/urn:li:activity:7204868141099720704/?updateEntityUrn=urn%3Ain%3Afs_updateV-2%3A%28urn%3Ain%3Aactivity%3A7204868141099720704%2CFEED_DETAIL%2CEMPTY%2CDEFAULT%2Cfalse%29

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