



Chance for Science Conference 2022

Conference for academics affected by the war in Ukraine

UNIVERSITÄT
LEIPZIG

State Organization “Institute for Economics and Forecasting
of NAS of Ukraine”

INDUSTRY 4.0 TECHNOLOGIES TO COUNTER MILITARY THREATS

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*The competitor should be a drone fighter plane
that's remote controlled by a human, but with its
maneuvers augmented by autonomy.*



*It's not that I want the future to be this. That's just
what the future will be.*

*The fighter jet era has passed. Yeah, the fighter jet
era has passed. It's drones.*



Premises of the research:

Relevance

The Russian invasion of Ukraine is not a non-accidental phenomenon, it is a long hybrid war continuing. Today, the war is causing huge losses: human sufferings and catastrophic socio-economic cracks, which could intervene in economic progress not only in Ukraine and the whole world.

War threats countering depends on the state's capacity ensures the security of the population and the territory integrity, where a powerful industrial complex plays the main role. And even in the face of an attack by a much more powerful and resourceful aggressor, the Industry 4.0 technologies proliferation is strengthening the country's defense capabilities

The purpose of the article

is to justify priorities for structural transformation of industrial development mindful of the increasingly important role played by the Industry's 4.0 technologies for counter military threats.

Objectives of the article

-to analyze the opportunities of Industry 4.0 technologies to defense, such as that allows to monitor the enemy vehicles movement, to record information about war crimes, to conduct search and rescue operations to prevent the penetration of hostile equipment into the territory, to counter cyber attacks and to protect people from hard injuries and place production;
-to propose policy recommendations concerning the main vector and tools of stimulating adaptation of Ukrainian manufacture to the challenges of Industry 4.0.

Subject of the article

theoretical, methodological and applied aspects of the impact of Industry 4.0 technologies on transformation processes in manufacturing for strengthening protection against military aggression.

4.0 technologies to counter military threats

The research methodology derived from:

- 1.The basic principles for predicting the future characteristics of useful machines, procedures or working methods;
- 2.Methods of integrated assessment - a system of indicators for calculating a complex multiplier or integrated indicator;
- 3.The European methodology, the questionnaire is the right method to identify sentiments, trends and needs of manufacturers what becomes a ground for technological upgrading ;
- 4.Index method based on positioning in rating systems using the relevant indices of information and communication technology development, readiness for network economy, e-commerce, e-government, informatization of society

Industry 4.0 technologies provide new opportunities to defense



Protection from cyberattacks

- Network Security Monitoring tools;
- Encryption Tools;
- Web Vulnerability Scanning tools;
- Network Defence Wireless Tools;
- Packet Sniffers;
- Antivirus Software;
- Firewall;
- PKI Services;
- Managed Detection Services;
- Penetration Testing.



Better management of combat

- Improving the Impact by Including Synthetic Data and Augmented Reality;
- Reduce Time and Complexity in Decision-Making with Machine Learning;
- Providing machines with data allows them to create algorithms for identifying objects;
- These algorithms can be used to scan photos, videos, and audio data to look for survivors/victims;



Combat operations to destroy enemy

- Infiltrate or disrupt adversary actions or conduct surveillance using
- massive swarms (UAVs) at sea, on land or in the air.
- Automatically defend unarmoured or lightly armoured vehicles or individuals from a variety of incoming threats via automatic countermeasures systems;

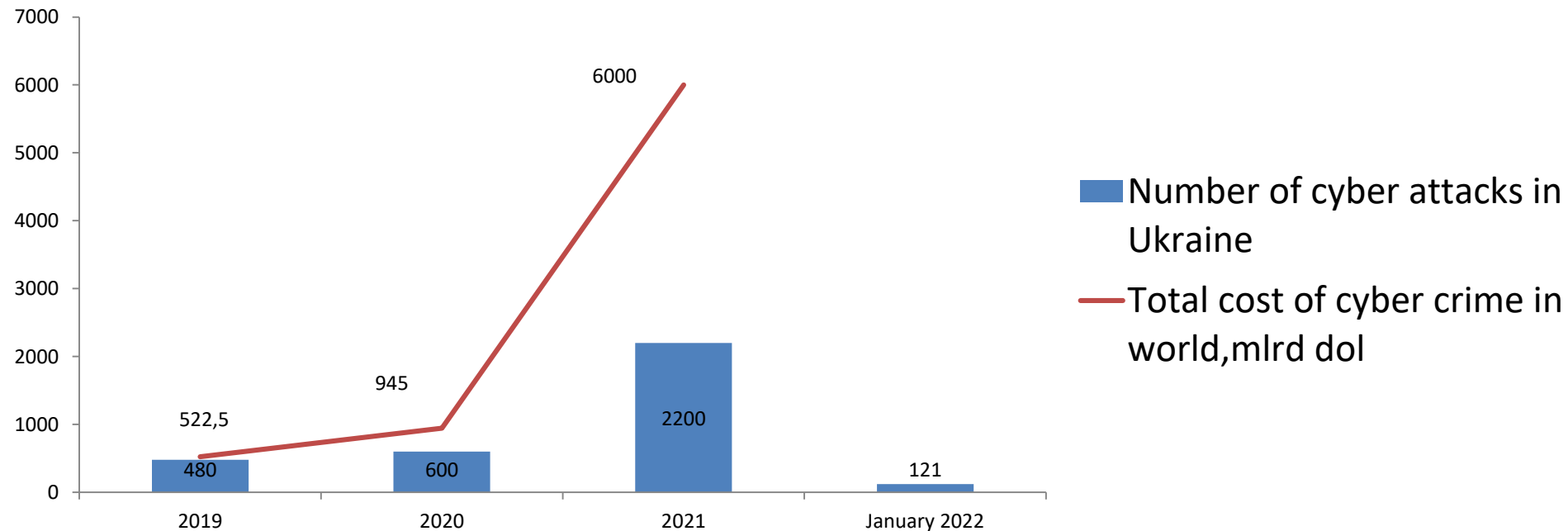


Bioinformatics and Biosensors to protect people from hard injuries

- Augmentation: The use of genetic modifications, pharmacological agents, electro-mechanical devices, or neurological interfaces to increase human physiological and neurological performance beyond normal limits;
- Medical Countermeasures and Technologies: The development of new diagnostics, therapeutics and vaccines (employing bioinformatics, genetic engineering and biosensors) to support predictive diagnostics;
- Synthetic Biology: The deliberate design, engineering and creation of novel synthetic or modified biological components or systems

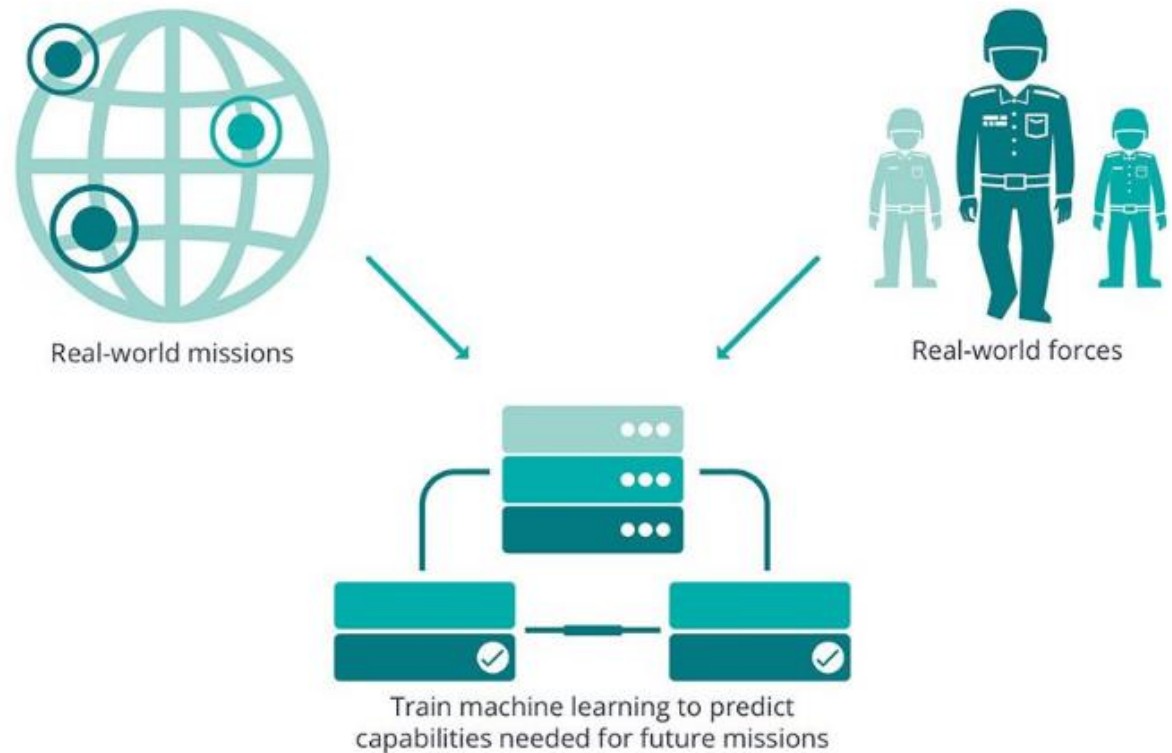
Industry 4.0 for Cyber security

- control over critical infrastructure facilities (power plants, heat and water supply systems);
- theft and collection of intelligence, including information with restricted access (related to security and defense sector, government agencies);
- informational and psychological influence;
- blocking information systems.



Industry 4.0 to improve combat management

- Improving the Impact by Including Synthetic Data and Augmented Reality;
- Reduce Time and Complexity in Decision-Making with Machine Learning;
- Providing machines with data allows them to create algorithms for identifying objects;
- These algorithms can be used to scan photos, videos, and audio data to look for survivors/victims;



Industry 4.0 to prevent invasion by armies

➤ Using the unscrewed combat aircraft designed to fly at high-speed alongside fighter jets, armed with missiles, surveillance and electronic warfare technology can provide a battle-winning advantage over hostile forces;



➤ As of March 29, 2022, Bayraktar TB2 destroyed 57 units -7% of the destroyed equipment of the Russian Armed Forces. These are 2 trains with fuels and lubricants; 7 152-mm howitzers "Msta-B" (2 more damaged); 2 Ka-52 (together with artillery) and 7 helicopters of unrecognized type (together with artillery); 10 SAMs of various types; 18 army trucks of various brands (2 more damaged), 220-mm BM-27 "Hurricane", 1 MT-LB with ZU-23 and 3 vehicles of unrecognized type, communication station of unrecognized type, KamAZ-5350 with excavator.

Industry 4.0 for land mine detection and chemical protection



➤ Using robots for land mine detection and chemical protection. Robots that can seek out chemical agents, so that humans and machines can now share the burden of detecting and report dangerous chemicals over large areas. That allows personnel to monitor and manage the test incident scene from a safe distance, away from potential harm;



➤ Amphibious vehicles gather vital information such as the depth and flow of the water, the distance between both banks and their respective heights, and the ground-bearing capacity of the nearby land.

Bioinformatics and Biosensors to protect people from hard injuries

THE FUTURE SOLDIER



The Army could use the **electronic textiles** to power sensors; collect data on the wearer and his or her environment; and transmit that data back to headquarters. The fibers could also warn the wearer of dangers ahead—like chemical weapons attacks—and mark the wearer's location for the rest of the team, plus other nearby friendly forces.

Ukraine belongs to the group of countries whose achievements far exceed expectations, as its economy is growing faster

3

The ratio of the number of teachers to the number of students

14

Population with high level education

1

Useful models by origin

9

Export of ICT services in the trade balance

117

Security of investors and creditors;
Energy intensity when creating a unit of GDP

123

Political stability

122

Investments

109
Rule of Law

113
Establishment of joint ventures and alliances with foreign investment

**Ukraine:
45th place
among 131
countries in the
world
according to the**

Global

innovation

index in 2020

71st place - a general assessment of a group of indicators of the conditions for the realization of innovation potential (**Innovation Output**)

33rd place - a general assessment of the group of indicators performance factors (**Innovation Input**)

Conceptual framework for stimulating the Industry 4.0 implementation of the Ukrainian manufacturing



THANKS FOR ATTENTION

STOP WAR
IN UKRAINE

