RUSSIAN WAR AGAINST UKRAINE

LESSONS LEARNED

CURRICULUM GUIDE

RUSSIAN WAR AGAINST UKRAINE
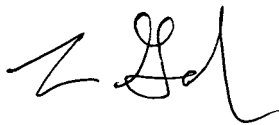## LESSONS LEARNED
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FOREWORD

Russia's war of aggression against Ukraine undermines Euro-Atlantic and global security and is a blatant violation of international law. NATO stands in unwavering solidarity with the government and people of Ukraine in the heroic defence of their sovereignty, territorial integrity, and our shared values. The Alliance fully supports Ukraine's inherent right to self-defence as enshrined in Article 51 of the United Nations Charter. NATO Allies will continue to support Ukraine for as long as it takes.

NATO and Ukraine are long-standing and close partners. Our relations go back more than thirty years, when Ukraine gained independence in 1991. Following Russia's illegal and illegitimate annexation of Crimea in 2014, our cooperation deepened and broadened to address their security challenges. Since Russia's fully-fledged invasion of Ukraine in February 2022, NATO Allies have provided more than a hundred billion dollars of humanitarian, financial and military support to ensure Ukraine's enduring freedom and the security of the Euro-Atlantic. Putin's illegal aggression means NATO-Ukraine relations are closer than ever.

Throughout the war, the Ukrainian armed forces have learned valuable lessons that can improve the warfighting capabilities not just of Ukraine, but NATO Allies and partners. This open-source publication, based on primary sources provided by Ukraine, contains significant insights for general warfare and specific warfighting components across the land, maritime, air, and cyber domains. The Guide aims to serve as a reference for military education institutions in Allied nations and partner countries, drawing directly on Ukraine's frontline experience. It contains lessons in twenty vital areas and is an important resource for armed forces as they educate and train future leaders at all levels.

Our sincere thanks to all of those who have generously contributed their time and expertise, especially during this difficult period in Ukraine's history. By sharing knowledge and situational awareness, we become stronger, more resilient, and better prepared to work together during times of crisis in the future. This guide makes an important contribution to promoting peace and security across the Euro-Atlantic, and to helping deter future conflicts.

Tom Goffus
Assistant Secretary General
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Lieutenant General Oleksandr Pavliuk
First Deputy Minister of Defence
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ABOUT THIS DOCUMENT

This curriculum guide contains lesson plans for use in professional military education (PME) institutions to address lessons learned from the ongoing Russian War Against Ukraine. The concept to jointly develop lessons learned from the ongoing conflict originated with the leadership of the National Defence University of Ukraine and the NATO International Staff. Twenty general warfare and specific warfighting topics were identified, and their associated 25 lesson plans were jointly developed by a combined NATO-Ukrainian team of expert military academics based upon assessment of subjects that would be of significant interest for defence education institutions. All lesson plan team authors were recognized by their schools as experts with professional backgrounds in the topics they were asked to assess.

The Ukrainian experts developed source data through interviews, personal combat experiences, and a review of available Russian and Ukrainian documents. NATO nation experts collaborated over eight days with their Ukrainian counterparts at a 15-22 July 2023 conference hosted by the Polish Naval Academy of the Heroes of Westerplatte in Gdynia, Poland. The NATO International Staff and the George C. Marshall Center's Partnership for Peace Consortium supported the conference.

Working in small working groups over the course of the conference, the combined NATO-Ukraine expert team developed detailed lesson plans, with supporting PowerPoint presentations and accompanying Talking Papers to support delivery. They are specifically designed to facilitate adaptation by a given school or course to instruct a given subject at the strategic, operational, or tactical levels of conflict. These supporting PowerPoint presentations and accompanying Talking Papers are accessed through links included in this Curriculum Guide.

TABLE OF CONTENTS

USING THIS GUIDE

The 25 lesson plans and their supporting slides and related Talking Papers are intended to be adaptable. The Selected Bibliography provides supplementary materials to aid in lesson development. Just as the conflict and how it is fought will change over time, so must the related education designed to support assessment by students and instructors in a classroom. This means that the Curriculum Guide's lesson plans, slides, and supporting Talking Papers should only be considered as starting points for institutional curriculum development. Each lesson plan contains the purpose and scope statement, learning objectives, and proposed readings, to include embedded links to associated briefing slides and a Talking Paper developed to allow a school instructor to deliver the slides with an explanation for each one. The lesson plan also includes a background and discussion of the topic, to include the identification of key definitions. Finally, as applicable, each lesson plan recognizes significant lessons learned derived from the war on that topic. The PowerPoint briefing slides and their aligned Talking Papers at a minimum cover the information in the lesson plan. In some cases, they provide an even broader examination of the topic. They are a means of conveying information but should not be viewed as an end to themselves. The Questions for Consideration at the end of the lesson plan can help draw out the learner's critical thinking analysis skills.

The school must ensure that any adaptation is aligned to the specific needs of its faculty and student learning objectives. This could change as significant events of the conflict and how they are approached by the forces on or in the battle space change. If so, updates will be made by the Defence Education Enhancement Programme (DEEP) to the corresponding lesson plans, briefing slides, and Talking Papers. All NATO and NATO partner schools will be notified of the changes and will be given access to the annotated documents of the lesson(s) in question.

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LESSON 1:
THE CHANGING CHARACTER OF WAR

1. PURPOSE AND SCOPE

This two-hour lesson provides a framework for understanding changes in the character of Russia's war against Ukraine since 2014. This framework derives from Clausewitz's model of war's nature and character which is familiar to most NATO professional military educators and students. In general terms, war's nature consists of those elements all wars have in common: hostility, chance/probability, and political influence; whereas war's character reduces to "who fights" (social composition of armed forces) "how they fight" (weaponry and techniques) and "why" (motivations and objectives). The lesson serves as an introduction to a suite of other lessons which examine critical aspects of Russia's war against Ukraine in greater detail (e.g., Ukrainian National Resilience, Cybersecurity, etc.). The lesson can also be a) delivered alone, b) as part of an historical survey of the changing character of war, or c) included in an appropriate course as a case study. This lesson is invaluable to understanding current and future conflicts. Upon its completion, students will a) understand the difference between war's nature and character, b) be able to relate their understanding to the changing character of the Russian-Ukrainian War since 2014 and c) be able to identify factors relevant to deterring or winning a future conflict.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. EXPLAIN Clausewitz's principal thoughts on war's nature and character, and the advantages and disadvantages of applying them as an analytical framework to the Russian-Ukrainian War as it has evolved since 2014.

B. IDENTIFY how the components of war's character—the social composition of the armed forces, the weaponry and techniques employed, and the motivations and objectives—of the Russian-Ukrainian War have changed (or not) since 2014.

C. DETERMINE how specific characteristics of the Russian-Ukrainian War, such as the participation of Ukrainian citizens in the fighting (who fights) or the employment of long-range fires and various types of drones (how they fight) or Russian-Ukrainian goals (motivations and objectives) might shape future conflicts and how to deter or win them.

3. READINGS AND OTHER SOURCES

A. General Overview

The briefing slides and associated Talking Paper should be considered required readings. All other readings should be employed on a selective basis as determined by the teaching faculty.

1) Oleksandr Lisovyi, "The Changing Character of War," PPT Briefing, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19072_download&client_id=DEEP

2) Oleksandr Lisovyi, "The Changing Character of War," Talking Paper, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19071_download&client_id=DEEP

3) Aleksy Borowka, Liubov Zharova, "The Ninth Year of the Russo-Ukrainian War", INE ana- lysis. Institute of New Europe, 2023. https://ine.org.pl/en/the-ninth-year-of-the-russo-ukrainian-war-ine-analysis/

4) Joshua Askew, "Ukraine War: A Month by Month Timeline of the Conflict so Far," Euronews, updated July 7, 2023. https://www.euronews.com/2023/01/30/ukraine-war-a-month-by-month-timeline-of-the-conflict-in-2022

5) RESEARCH: The Changing Character of War: What is War Today? Changing Character of War Center, University of Oxford. https://www.ccw.ox.ac.uk/what-is-war-today

B. Strategic Level

1) Andrew Eversden, "US Army Secretary: 5 Lessons from the Ukraine Conflict," *Breaking Defense*, June 01, 2022. https://breakingdefense.com/2022/06/us-army-secretary-5-lessons-from-the-ukraine-conflict/

2) Michael Hirsh, "How AI Will Revolutionize Warfare," *Foreign Policy*, April 11, 2023. https://foreignpolicy.com/2023/04/11/ai-arms-race-artificial-intelligence-chatgpt-military-technology/

C. Operational Level

1) Brad Lendon, "Three Weapons that Changed the Course of Ukraine's War with Russia", CNN, February 25, 2023. https://edition.cnn.com/2023/02/25/europe/ukraine-war-three-key-weapons-intl-hnk/index.html

2) Riley McCabe, Alexander Palmer, and Joseph S. Bermudez Jr., "The Impact of the Kakhovka Dam Breach on the New Ukrainian Counteroffensive," Center for Strategic and International Studies, June 16, 2023. https://www.csis.org/analysis/impact-kakhovka-dam-breach-new-ukrainian-counteroffensive

D. Tactical Level

1) Galen Peterson, "War in Ukraine: Understanding the Tactical Situation", Veterans Breakfast Club. https://veteransbreakfastclub.org/war-in-ukraine-understanding-the-tactical-situation/

2) John Psaropoulos, "All of Ukraine is a Battlefield': Lessons about Modern War," Al Jazeera, February 22, 2023. https://www.aljazeera.com/news/2023/2/22/all-of-ukraine-is-a-battlefield-lessons-about-modern-war

E. Recommended Podcasts

1) Ryan Evans, Gen. James Hecker, and Air Marshall Johnny Stringer, "Ukraine and Lessons Learned for Airpower and Spacepower," in *War on the Rocks* (audio podcast), June 29, 2023. https://warontherocks.com/2023/06/ukraine-and-lessons-learned-for-airpower-and-spacepower/

2) Michael Kofman and Rob Lee, "Ukraine Struggles to Scale Offensive Combat Operations," in *War on the Rocks* (audio podcast), July 20, 2023. https://warontherocks.com/2023/07/ukraine-struggles-to-scale-offensive-combat-operations/

3) Michael Kofman and Aaron Stein, "Assessing Ukraine's Three Axes of Advance," in *War on the Rocks* (audio podcast), July 11, 2023. Assessing https://warontherocks.com/2023/07/assessing-ukraines-three-axes-of-advance/

4. BACKGROUND AND DISCUSSION

A. General Overview

The Russian-Ukrainian War is a realization of the politics of the Russian federation by military means, aiming to regain spheres of influence lost as a result of the collapse of the USSR. The moment properly considered the launching of the Russian-Ukrainian war is the 20 February 2014, when Russians began the operation to annex Ukraine's Autonomous Republic of Crimea. On the 21 February 2022 the Kremlin recognized the so-called Donetsk People's Republic and the Luhansk People's Republic as independent entities, opening the way to their annexation by the Russian Federation. The next stage of the war began three days later with a full-scale invasion of Ukraine by the Russian Armed Forces, aimed at restoring Russia's political influence over the country. This lesson provides analysis of the historical, political, military, and civil aspects that impact at different stages on the character of the Russian-Ukrainian War.

B. Definitions

1) **War** is a situation in which two or more countries or groups of people fight against each other over a period of time (Oxford Dictionary).

2) **Conflict** is an armed struggle or clash between organized groups within a nation or between nations in order to achieve limited political or military objectives. Although regular forces are often involved, irregular forces frequently predominate. Conflict often is protracted, confined to a restricted geographic area, and constrained in weaponry and level of violence. Within this state, military power in response to threats may be exercised in an indirect manner while supportive of other instruments of national power. Limited objectives may be achieved by the short, focused, and direct application of force (U.S. Department of Defense Dictionary of Military and Associated Terms, Joint Publication 1-02).

C. A Framework for Analysis

1) As we focus on what war is and why it is fought, we need to address the changing Character and enduring Nature of War. The Nature of War is unchanged (it's constant, characterized by violence, guided by some purpose, a fog with uncertainty, and always with friction).

2) The Character of War deals represents the soul of a nation, its strengths, capabilities, values, and ethics. Every age has its own kind of war, with limiting conditions, and its own peculiar preconceptions. Each period, therefore, would have held to its own theory of war.

3) Strategies and Technologies Change

a. The Russian strategy changed from the very beginning of the invasion, from the initial blitzkrieg to the Russian withdrawal from the North, the Kharkiv region, and the right bank of the Dnieper river near Kherson in the South. These changes came about because of the impact of new technologies and change in the Character of War (e.g., precision guided munitions, UAVs, etc.).

D. Changing Character of War in Ukraine

1) The character of the Russian-Ukrainian War has evolved during its different stages from 2014 till the present. In each case, multiple factors influence each change and the lessons that should be learned (examples: Russian way to conduct war, strategic goals, and how strategic goals change during different phases of war).

E. Armed Forces of Ukraine Doctrinal and Organizational Changes

1) Multiple factors influence changes in the Character of War. That includes changes in doctrine (attack the flank rather than head on) and force structure (employment of stealth aircraft or UAVs). All of which are also influenced by the promulgation of policy and the creation of strategies for specific scenarios.

F. Case Study: June 2023 Ukraine Counter offensive

1) A case study to demonstrate the difficulty in assessing the changing character of warfare is the Ukrainian counter-offensive launched in June 2023. While Ukraine's partners had supported the armed forces with new equipment and training, the counter-offensive was still faced with historically difficult Russian defences that were many kilometres deep and laden with mines and pre-targeted fires. The result was a very slow campaign rather than the hoped for one relying on speed and manoeuvre.

G. Features of Future Wars

1) Shift to precision-guided munitions (High Mobility Artillery Rocket System (HIMARS).

2) Reduction in the importance of mass (smaller but more lethal manoeuvre units).

3) Asymmetric methods of combat action (offensive cyber operations).

4) Information Technology as a decisive factor in war (mass dissemination of intelligence).

5) Airpower as more important than ground forces (more lethal fixed and rotor wing aircraft).

6) Robotic systems instead of human-operated systems to destroy the enemy (armed UAV).

7) Irregular formations (militia, proxies, mercenaries) operating with regular forces.

8) Hybrid warfare (focus to shift from the physical to the psychological domain, at least in the first stage).

5. QUESTIONS FOR CONSIDERATION

A. What are the basic differences between nature and character of war?

B. What is the nature of the Russian-Ukrainian War?

C. What are the principal differences between the character of the Russian-Ukrainian War in 2014 and that since Russia's full-scale invasion of Ukraine in 2022? Were the changes rapid or gradual?

D. How does the character of the Russian-Ukrainian War compare to the character of NATO's intervention in Afghanistan (2001-2021) or the invasion of Iraq in 2003 by Coalition forces?

E. From your perspective, which characteristics of Russia's war against Ukraine since 2014 will most likely affect the character of future wars and why?

F. From your perspective, what lessons from the Russian-Ukraine War would you offer to NATO or other international organizations (EU, UN) to prevent or deter a similarly violent conflict in the future?

G. From your perspective, which instruments of national power might be/were most useful in bringing the Russian-Ukrainian War to an end? Explain how to employ them.

Photographer: Eduard Kryzhanivskyi

LESSON 2:
HISTORICAL ROAD TO WAR — THE UKRAINIAN PERSPECTIVE

1. PURPOSE AND SCOPE

This lesson focuses on the Ukrainian perception of the drivers and the basic assumptions that led to the Russian-Ukrainian war. It provides students with an overview of mistakes and successes at the strategic and operational levels leading up to the war. This overview lesson gives students an introduction to the history of the origins of Modern Russia and Ukraine, as well as an understanding of the historical background of the relations between the two nations from the Ukrainian perspective. It is suitable for audiences studying any of the three levels of conflict (strategic, operational, tactical) and can be explored in varying detail, especially at the strategic level. This lesson is closely related to the lesson "Russian Policy Toward Ukraine." After completing this lesson, the student will have a deeper understanding of the development of the Russian and Ukrainian nations and the manipulation of history used to justify the Russian invasion of February 2022. More broadly, students will become familiar with the use of historical narratives to mobilise the population and justify aggression on the international stage.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE the historical background of relations between Ukrainians and Russians.

B. IDENTIFY the manipulation of history used to justify the Russian invasion and continuation of the war.

C. APPLY understanding of historical narratives during the "Strategy Toward Russia" recommendation development

3. READINGS

A. General Overview

All identified readings should be considered to be required readings. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Yurii Punda, "Historical Road to War: The Ukrainian Perspective," PPT Briefing, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19076_download&client_id=DEEP

2) Yurii Punda, "Historical Road to War: The Ukrainian Perspective," Talking Paper, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19075_download&client_id=DEEP

3) Jarosław Wiśnicki, "History as an Information Weapon in Russia's Full-Scale War in Ukraine," DISINFO, 14 July 2023, https://euvsdisinfo.eu/?s=History+as+an+Information+Weapon+in+Russia%E2%80%99s+Full-Scale+War+in+Ukraine

4) Timothy Snyder, "What We Need to Know on the Ukraine's History: Professor Timothy Snyder on the Radio Davos Podcast," World Economic Forum, 29 July 2022, https://www.weforum.org/agenda/2022/07/timothy-snyder-ukraine-history/

5) Joshua Kroeker, "A War of Narratives: Russia's Disinformation Abuses History," New Eastern Europe, 23 January 2023, https://neweasterneurope.eu/2023/01/23/a-war-of-narratives-russias-disinformation-abuses-history/

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson provides a Ukrainian view on the interrelationship between the states and peoples that existed on the territory of modern Ukraine and Russia. It also shows some of the consequences of Russian control over the Ukrainian territories and the historical roots of Ukrainian resilience. It further addresses the origins of Russian and Ukrainian political cultures and value systems. In addition, it describes the role of historical narratives and the manipulation of historical facts as a

rhetorical justification for the invasion of Ukraine. Students will have the opportunity to identify and analyse the manipulation of historical narratives, which can be useful in developing a strategy toward Russia.

B. Starting Points

1) Russia and Ukraine share some historical origins but followed different paths.

2) Russia rejects the legitimacy of Ukrainian identity, argues Ukraine is part of Russia and Russian history.

3) Ukraine emphasizes its own historical development and separate cultural/political identity.

C. Common Origins

1) Kyivan Rus was one of the biggest countries in the Europe in the 10th-12th centuries.

2) Kyiv was centre of the East Slavic world and tightly integrated with Europe, the Near East, and other regions.

3) Belarus, Russia, and Ukraine all self-identify as Kyivan Rus successor states.

4) Kyivan Rus fell to Mongols (1241).

5) In the 13th-15th centuries the western and southern lands of the former Kyivan Rus became part of the Grand Duchy of Lithuania and the Kingdom of Poland, which later merged into the Polish-Lithuanian Commonwealth.

6) Under Mongol rule, Moscow emerged as a rival power centre with a centralized monarchy.

7) Moscow, Poland-Lithuania, and Ukrainian Cossacks struggled for control of Ukrainian lands; by the 18th century, Moscow absorbs bulk of Ukraine, abolishes Cossack institutions.

8) Ukrainians fought for liberation in World War I, but Ukraine was partitioned between the Soviet Union and Poland in 1921.

9) Stalinist repression targeted Ukrainian intellectuals, while collectivization and famine (Holodomor) decimated the peasantry.

10) Ukraine and WW II: Ukraine was fully integrated into the Soviet Union, but Ukrainian resistance continued for almost 20 years without external support.

D. Conclusions

In summary, it can be noted that the history of relations between state entities with centres in Kyiv and Moscow is a history of constant confrontation.

1) Every "reunification" with Russia brings enormous suffering for Ukrainians, regardless of the form of government in Moscow. Struggling with Ukrainian independence, Moscow governments throughout history have taken repressive, barbaric measures. Bucha, Irpin, Mariupol, and other destroyed settlements were a shock for Western societies but a predictable consequence of the Russian invasion for Ukrainians.

2) Ukrainians and Russians have a different historical trajectory and values. Ukrainian values have a European direction, while Russians are more inclined to the Eastern style of statehood. The main source of Ukrainian resistance is the protection of the values of a free people and complete rejection of Russia's imperial ambitions and fundamental foundations of the Russian state and society.

5. QUESTIONS FOR CONSIDERATION

A. What is the nature of the historical relationship between the Russian and Ukrainian peoples?

B. How has Russia manipulated the historical narrative about the Russian-Ukrainian relationship?

C. How did arguments about history contribute to Russia's invasion of Ukraine?

D. How did arguments about history contribute to Ukrainian resistance to the invasion?

E. What has Ukraine done to counteract Russia's manipulation of history?

F. How is Ukraine's experience countering Russian historical manipulation relevant to NATO allies and partners?

LESSON 3:
THE EVOLUTION OF RUSSIAN POLICY TOWARD UKRAINE

1. PURPOSE AND SCOPE

This lesson focuses on analysing Russian political actions and statements toward Ukraine under Putin. The lesson gives students an introduction to Russia's use of multiple instruments of national power for establishing control over Ukraine. It provides general information about dominant political doctrine in Russia and gives students the opportunity to understand the general direction of Russian foreign and defence policy, as well as the impact of Russia's economic situation, limitations on rights, and regional disparities. It is suitable for audiences studying any of the three levels of conflict (strategic, operational, tactical) and can be explored in varying detail, delving into the operational and especially the strategic level. It can also be taught as part of a group of lessons to create a foundation for understanding the origins of current Russian policy toward Ukraine. This lesson is closely related to the lesson "Historical Road to War: The Ukrainian Perspective." After completing this lesson, the student will understand the longer-term political drivers of the Russian invasion in February 2022 and become familiar with the Russian techniques of using multiple power instruments in Russian foreign policy.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE the current doctrinal foundation of Russian foreign and defence policy.

B. IDENTIFY the longer-term political drivers of the Russian invasion in February 2022.

C. EXPLAIN the techniques of using multiple power instruments in Russian foreign policy.

3. READINGS

A. General Overview

All identified readings should be considered to be required readings. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Yurii Punda, "The Evolution of Russian Policy Toward Ukraine," PPT Briefing, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19074_download&client_id=DEEP

2) Yurii Punda, "The Evolution of Russian Policy Toward Ukraine," Talking Paper, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19073_download&client_id=DEEP

3) Peter Dickinson, "Putin's New Ukraine Essay Reveals Imperial Ambitions," Atlantic Council, 15 July 2021, https://www.atlanticcouncil.org/blogs/ukrainealert/putins-new-ukraine-essay-reflects-imperial-ambitions/

4) Jonathan Masters, "Ukraine at the Crossroads of Europe and Russia, Council on Foreign Relations, 14 February 2023, https://www.cfr.org/backgrounder/ukraine-conflict-crossroads-europe-and-russia

5) EUvsDISINFO Podcast, "Twelve Myths About Russia's War in Ukraine Exposed," 20 February 2023, EUvsDISINFO, https://euvsdisinfo.eu/twelve-myths-about-russias-war-in-ukraine-exposed/

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson provides an overview from the Ukrainian perspective of the drivers behind Russia's February 2022 invasion of Ukraine. It emphasizes the doctrinal, political, and ideological trends in Russia that played a role in the decision to invade. It draws on lessons about the conflict over Russian and Ukrainian identity to suggest that the Kremlin's manipulation of history and histor-

ical narratives is central to Russian assumptions and decision making in the initial stages of the war.

B. Starting Points

1) Putin's policy toward Ukraine is based on pre-existing ideas and assumptions.

2) Russia never fully accepted Ukrainian independence after 1991.

3) Russian foreign policy prioritizes reintegrating territory of the former Soviet Union.

C. Development of Russian Policy

1) Some Russian officials called for annexing Crimea and controlling Ukraine in the 1990s, when Russia was still weak.

2) Russian attempts to manipulate Ukrainian politics backfired; Ukraine began to elect pro-Western governments in 2004.

3) The Yanukovych regime (2010-14) accepted Russian assistance, promoted close integration with Russia, to include rejection of the EU association agreement and supported Ukraine's participation in the Russian-led Customs Union.

4) Yanukovych lost legitimacy, triggering the Revolution of Dignity (2013-14) that resulted in his ouster.

5) Russia responded by annexing Crimea and invading Donbas; European leaders sought to freeze the conflict through the Minsk Agreements.

6) Russia violated the Minsk Accords and continued hostility.

7) After the 2019 election, Zelensky made an attempt to improve relations with Russia and settle the conflict in Donbas, including the possibility of holding local elections.

8) Russia continued using proxies to destabilize Ukraine; attempts to settle conflict failed.

9) Russia invaded in February 2022 believing Ukrainians would welcome "liberation" but without understanding the strength of Ukrainian national identity and commitment to resist.

D. Lessons Learned

1) Russia both practically and symbolically demonstrates that it inherited the geopolitical ambitions of the Russian empire and the Soviet Union. The basic assumption should be the Russian expansionist goal of foreign and military policy.

2) Russia builds its statehood and society on values that are opposed to the democratic values of Western societies, and its state mechanisms operate on a completely different basis than the state mechanisms of democratic countries. It is necessary to consider the different relative value of resources, especially human resources.

3) Russia is and gravitates towards authoritarian regimes. For strategic analysis, the subjective views and beliefs of key individuals must be understood to understand the direction of the Russian state's policies.

4) Russia is a multinational state in which the titular nation occupies a privileged position in relation to national minorities. For a long time, Ukrainians were one of, if not the largest, national minority in the Russian empire and felt firsthand the typical policy of St. Petersburg, and then Moscow-based regimes in relation to national minorities. Other national minorities have their own historical experience of relations with Russians, to include their own contradictions with them, which can become more acute under certain conditions.

5) In general, Russia is not as monolithic of a state as it tries to position itself, and taking into account these lessons can contribute to building an effective strategy in relation to Russia and reducing the level of the "Russian threat" in the long term.

5. QUESTIONS FOR CONSIDERATION

A. How did Russian attitudes and policy toward Ukraine evolve between 1991 and 2022?

B. What indicators of Russia's coming invasion were, or should have been, evident before February 2022?

C. How does Russia's political system affect its appetite for war and decision to invade?

D. Why did Russia misunderstand Ukrainian willingness to fight and resilience to invasion?

E. What broader lessons can we take from Russia's failure to comprehend Ukrainian willingness to resist?

Photographer: Eduard Kryzhanivskyi

LESSON 4:
RUSSIAN AND UKRAINIAN STRATEGIC AND OPERATIONAL LEVEL PERSPECTIVES

1. PURPOSE AND SCOPE

The purpose of this lesson is to provide students with the fundamentals of Russian and Ukrainian strategic and operational perspectives for the military conflict. This overview is an introductory lesson for students to the strategic and operational situation before and after the invasion of 24 February 2022 and the results achieved by both sides into 2023. The students will understand the lessons learned associated with how Russia and Ukraine planned to fight before the invasion. They will be able to explain how strategy and operational art have evolved and evaluate their successes and failures. The student will also be able to relate that understanding to future situations to identify relevant aspects for addressing other threats to the international system.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE Russia's strategic aims before 24 February 2022, the results achieved by Russia after the invasion, and the evolution of the strategic goals developed by Russia.

B. EXPLAIN Ukraine's strategic aims before February 24, 2022, the strategic results of the Ukraine defence and counter-offensive, and the evolution of Russia's strategy for Ukraine.

C. IDENTIFY the successes and failures experienced by both sides after the 24 February invasion and evaluate how NATO countries can apply these lessons.

  1) Russia: Land bridge to Crimea, sustained occupation of territories, significant damage inflicted (casualties, infrastructure, economy)

  2) Ukraine: Mass mobilization, liberation of territory; effective use of security sector society-wide resilience; international support and assistance and UKR use of resources

  3) NATO: Improved security education for NATO societies, mobilization systems, NATO interoperability

D. RELATE AND IDENTIFY the implications of the war for existing thought on operational art to the doctrinal and operational challenges facing NATO and partner militaries in preparing for current and future threats.

3. READINGS

A. General Overview

The briefing slides and associated Talking Paper should be considered required readings. All other readings should be employed on a selective basis as determined by the teaching faculty. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Pavlo Slisar, "Russian and Ukrainian Strategic and Operational Level Perspectives," PPT Briefing, National Defence University of Ukraine, 2023, https://deepportal.hq.nato.int/ilias/goto.php?target=file_19079_download&client_id=DEEP

2) Pavlo Slisar, "Russian and Ukrainian Strategic and Operational Level Perspectives," Talking Paper, National Defence University of Ukraine, 2023, https://deepportal.hq.nato.int/ilias/goto.php?target=file_19080_download&client_id=DEEP

B. Strategic and Operational Concepts

1) Russian Strategic Initiative, Russian Military Doctrine: RSI Primer, Spring 2022, https://oe.tradoc.army.mil/wp-content/uploads/2022/06/RSI-Russian-Military-Doctrine-Primer-Final-single-page-04282022.pdf

2) Ukrainian Strategy Decree of the President of Ukraine N° 392/2020 On the Decision of the National Security and Defence Council of Ukraine of 14 September 2020 "On the National Security Strategy of Ukraine" https://www.president.gov.ua/documents/3922020-35037

3) NATO Glossary of Terms and Definitions, AAP-06 2021, https://wcnjik.wp.mil.pl/u/AAP-6_2021_ANG.pdf

C. Other Publications

1) Isabelle Khurshudyan, "To Defeat Russia, Ukraine's Top Commander Pushes to Fight on His Terms," *The Washington Post*, July 14, 2023, https://www.washingtonpost.com/world/2023/07/14/ukraine-military-valery-zaluzhny-russia/?fbclid=IwAR2FavxFD8IvdzzFdGJTG9sEpotZyGNEtxgtjen9nZIcGVjcy5I_fkD4t_M

2) Antony J. Blinken, Speech: "Russia's Strategic Failure and Ukraine's Secure Future," Helsinki, Finland, 2 June 2023, https://www.state.gov/russias-strategic-failure-and-ukraines-secure-future/

3) Jose Miguel Alonso-Trabanco, "The Evolution of Russia's Ukraine Strategy," Geopolitical Monitor, 30 June 2023, https://www.geopoliticalmonitor.com/the-evolution-of-russias-ukraine-strategy/

4) Seth G. Jones, et al, Ukraine's Offensive Operations: Shifting the Offense-Defense Balance, Centre for Strategic and International Studies, 9 June 2023, https://www.csis.org/analysis/ukraines-offensive-operations-shifting-offense-defense-balance

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson provides students with an overview of the strategies and operational art employed by Ukraine and Russia during and after the invasion of 24 February 2022. Students will be exposed to the lessons learned related to how Ukraine and Russia approached the conflict at the strategic and operational levels of war, how each country adapted, and the strengths and weaknesses of both strategic and operational approaches.

B. Definitions

1) Russian

a. <u>Strategy (Military)</u>: A constituent part of the art of war, its highest field, which includes the theory and practice of military activity of the state. The provisions of the military strategy are based on the results of the assessment of the state and directions of development of the politico-military situation, scientifically substantiated goals, principles, directions and tasks, objective needs and real possibilities of the functioning and development of the military organization of the state, https://encyclopedia.mil.ru/encyclopedia/dictionary/details.htm?id=14383@morfDictionary

b. <u>Operational Art</u>: A component part of the art of war, covering the theory and practice of the preparation and conduct of military actions on an operational scale (operations, battles, strikes) by associations of branches and branches of the armed forces, https://encyclopedia.mil.ru/encyclopedia/dictionary/details.htm?id=13724@morfDictionary

2) Ukrainian

a. <u>Strategy (Military)</u>: A component of the art of war, which studies the nature of modern military conflicts and ways to prevent them, prepares the state and armed forces to repel possible aggression, forms and methods of warfare in general and military operations on a strategic scale. Encyclopedia of Modern Ukraine, https://esu.com.ua/article-27379

b. <u>Operational Art</u>: A component of military art, which includes the theory and practice of preparing and conducting joint and independent operations (combat operations) by groups of troops (forces) created on the basis of associations (unions) of types of the Armed Forces, individual branches of the military with the involvement of forces and means of other components of the defence forces. Encyclopedia of Modern Ukraine, https://esu.com.ua/article-75549

  i. Conceptually, operational art is the orchestration of tactical actions in time, space, and purpose in order to achieve theatre strategic goals at acceptable risk.

  ii. The theatre strategic goals are those milestones that are judged necessary to achieving the policy and strategy goals for which the military was deployed.

  iii. Successful execution of tactics is the responsibility of tactical level commanders.

  iv. The arrangement of these tactics in order to arrive at the theatre strategic goals is the domain of operational art.

3) NATO

a. <u>Strategy (Military):</u> That component of national or multinational strategy, presenting the manner in which military power should be developed and applied to achieve national objectives or those of a group of nations. (NATO Glossary of Terms and Definitions, AAP-06, 2021)

b. <u>Operational Art:</u> The employment of forces to achieve strategic and/or operational objectives through the design, organization, integration and conduct of strategies, campaigns, major operations, and battles. (NATO Glossary of Terms and Definitions, AAP-06, 2021).

C. Focus Areas

To be addressed sequentially:

1) Strategies and Operations of Both Countries Before the 24 February 2023 Invasion: Russia had long tried to dominate Ukraine. Russia decided to "demilitarize and denazify" Ukraine, capture Ukraine, and ensure its neutral status. Ukraine had planned for a comprehensive defence in all multiple security dimensions (ground, sea, air, information, and cyberspace).

2) Strategies and Operations of Both Countries After the Invasion: Russia takes and defends the occupied territory of Ukraine as much as possible, preparing their defences in Bryansk, Kursk, and Belgorod regions, increases efforts for an offensive operation in the Kharkiv region, and from the territory of Belarus. Ukraine oriented on the liberation of territory occupied by Russia, including the Donetsk and Luhansk regions and Crimea, defence of the North and East of Ukraine, and counter-offensive operations in the South and East of Ukraine.

3) Areas in Which Both Countries Achieved their Goals or Failed to Do So, and Why:

a. <u>Russia:</u> Accomplished its goals of taking and holding a land bridge to Crimea, the sustained occupation of a substantial amount of Ukrainian territory, and the infliction of significant damage upon Ukraine in terms of casualties, destruction of infrastructure, and economic costs. Russia also mobilized hundreds of thousands of troops and began to use auxiliaries including the Wagner Group and Chechen forces. Russia failed to achieve a decapitation strike on the capital and the government, as it was believed to have planned, and sustained very high losses in the spring of 2023. The brutality of Russian occupation forces helped to fuel international support for Ukraine, as well as Ukrainian resilience and mass mobilization. Russia slowly lost ground to Ukraine during the 2023 counter-offensive. Factors contributing to Russian successes include the initial lack of readiness of the Armed Forces of Ukraine (AFU); preponderance of forces in the initial invasion; exploitation of intelligence, and local divisions in some regions. Factors contributing to Russian failures include the use of poorly trained and led troops in the initial invasion, particularly on the Belarus-Kyiv axis; poor intelligence; inadequate logistics and maintenance results in the inability to supply invasion forces; poor command and control in the lack of coordination of multiple axes and lines of effort, and in terms of difficulty coordinating between different branches of the Russian military, Wagner Group, and the Chechen forces.

b. <u>Ukraine:</u> Succeeded in repelling the seizure of Kyiv and then in liberating territories in the northeast in the summer and fall of 2022, the mass mobilization of its society including within the military, the effective use of the whole of society, the cultivation of international support, and the integration of new capabilities, platforms, and internationally trained personnel and units into its military. Ukraine failed to repel the invasion; it did not conduct the counter-offensive as rapidly as had been anticipated by international allies and some elements of the Ukrainian leadership. Factors contributing to Ukrainian success include very high societal resilience, rapid adaptation of the AFU, ability to incorporate new ways of fighting (doctrine, platforms), and morale. Factors contributing to Ukrainian failure include lack of experience with combined arms manoeuvre, and inadequate equipment to fight according to NATO doctrine (limited air defence and lack of air superiority).

D. Identified Lessons Learned

There are a number of significant lessons learned that have emerged from the experience of Russian and

Ukrainian strategic and operational perspectives for the military conflict.

1) Mechanisms will be required by NATO and partner nations to develop resources and be able to mobilize across the entire security sector at the strategic national level. This will be needed to ensure proper trained active and reserve forces, and large amounts of weapons systems and ammunition will be available for the conduct of a large conventional conflict.

2) A strong deterrent and warfighting force will be needed on NATO's eastern flank. This will require development and deployment of new military capabilities.

3) NATO staff and operational headquarters will need to be prepared for rapid and extensive high intensity conflict. NATO staff /headquarters exercises should be significantly expanded at the strategic and operational levels (especially on the Alliance's eastern flank).

4) Curricula in the Professional Military Education (PME) system in NATO member schools should be reformed to include preparation for full scale interstate military conflict as an Alliance (especially at the strategic and operational levels).

5) Strategic communication with the citizens of NATO countries must ensure the societies are well-informed on all security sector issues; key for any kind of political-military success.

5. QUESTIONS FOR CONSIDERATION:

A. What were the primary strategies of both countries prior to the 24 February 2022 invasion?

B. How did Russian and Ukrainian approaches to strategy and operations change after the invasion?

C. What are the strategic and operational areas in which both countries achieved their goals or failed to do so, and why?

D. How should NATO militaries apply the operational lessons of the Ukrainian defence to current and future threats?

LESSON 5:
RUSSIAN AND UKRAINIAN PERSPECTIVES ON THE OPERATIONAL LEVEL OF WAR

1. PURPOSE AND SCOPE

This two-hour lesson describes the lessons learned related to the Russian and Ukrainian conduct of military operations at the operational level of war since the initial Russian invasion in February 2022. The lesson evaluates how the experience of the Ukrainian military confirms and refutes aspects of existing military thought on operational art in interstate warfare. It is suitable for audiences who are concerned with the practice of war at the operational level. When delivered alone it provides an overview of the subject. It can also be delivered as part of a group of lessons to provide the background and foundation for further discussions regarding these concepts. In particular, this lesson can be delivered in conjunction with the lesson on the strategic level of war lessons learned addressed in this Guide. Where a shorter lesson is desired, or a lesson for a student body less familiar with the topics, elements of the readings and questions can be curated accordingly. Upon completion of this lesson, the student will understand the lessons learned related to how the Armed Forces of Ukraine (AFU) were able to implement operational art in both offensive and defensive roles against the Russian military since February 2022.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. EXPLAIN the elements of operational art according to doctrine and identify how Ukraine and Russia appear to have practiced operational art in the invasion of 24 February 2022 and the ensuing war.

B. IDENTIFY how the war suggests schools of thought on operational art that remain relevant, appear obsolete or in need of revision, and are underexplored:

  1) What aspects of current thinking on operational art seem validated by events of the war?

  2) What aspects of current thinking on operational art

seem contradicted by events of the war?

  3) What aspects of current thinking on operational art are underdeveloped in light of events of the war?

C. DEMONSTRATE how well Russian campaigning reflects the Gerasimov Doctrine or New Generation/Hybrid Warfare/Grey Zone Conflict concepts.

D. RELATE the implications of the war for existing thought on operational art to the doctrinal and operational challenges facing NATO and partner militaries in preparing for current and future threats.

3. READINGS

A. General Overview

The briefing slides and associated Talking Paper should be considered required readings. All other readings should be employed on a selective basis as determined by the teaching faculty.

1) Pavlo Slisar, "Russian and Ukrainian Operational and Strategic Perspectives," PPT Briefing, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19077_download&client_id=DEEP

2) Pavlo Slisar, "Russian and Ukrainian Operational and Strategic Perspectives," Talking Paper, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19078_download&client_id=DEEP

B. General Overview of Operational Art

1) M. B. Matheny, The Roots of Modern American Operational Art, 2001, https://indianstrategicknowledgeonline.com/web/modern_operations1.pdf

2) A. Buckel, A New Look at the Theories of Operational Art, 2021, pp 8-11, 21-29, https://apps.dtic.mil/sti/pdfs/AD1160662.pdf

C. Attrition and the Fight for Bakhmut

1) Malkasian, *A History of Modern Wars of Attrition*, 2002, pp 1-12.

2) C. Petersen, "Clearing the Air - Taking Manoeuvre and Attrition Out of Strategy", *Infinity Journal*,

Volume 2, Issue No. 3, Summer 2012, https://www.militarystrategymagazine.com/article/clearing-the-air-taking-manoeuvre-and-attrition-out-of-strategy/

3) K. Stepanenko, The Kremlin's Pyrrhic Victory in Bakhmut: A Retrospective on the Battle for Bakhmut, May 2023, https://www.understandingwar.org/sites/default/files/A%20Retrospective%20on%20Bakhmut%20PDF.pdf

4) C. Morris, Ukraine War: A Fight to the Death in Bakhmut with Both Sides Bogged in the Spring Thaw, March 2023, https://theconversation.com/ukraine-war-a-fight-to-the-death-in-bakhmut-with-both-sides-bogged-in-the-spring-thaw-201251

D. Kharkiv, Kherson, and the Creation of Dilemmas

1) S. Gady, and M. Kofman, "Ukraine's Strategy of Attrition," Survival, 65, no. 2 (2023): 7-22. https://www.tandfonline.com/doi/pdf/10.1080/00396338.2023.2193092

2) K. Stepanenko et al, "Russian Offensive Campaign Assessment, 11 September 2022," https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-september-11

3) Dylan et al, "The Kherson Ruse: Ukraine and the Art of Military Deception," https://mwi.westpoint.edu/the-kherson-ruse-ukraine-and-the-art-of-military-deception/

4) J. Detsch, "Ukraine Pushes Russia Out of Kherson, the Biggest Liberation Yet," https://foreignpolicy.com/2022/11/09/ukraine-pushes-russia-out-of-kherson-biggest-liberation-war/

E. New Domains and Unconventional Warfare

1) B. P. Fleming, "The Hybrid Threat Concept: Contemporary War, Military Planning and the Advent of Unrestricted Operational Art," 2011, pp 29 - 38, 60 - 69. https://apps.dtic.mil/sti/pdfs/ADA545789.pdf

2) J. Watling et al, Preliminary Lessons from Russia's Unconventional Operations During the Russo-Ukrainian War, February 2022–February 2023, https://rusi.org/explore-our-research/publications/special-resources/preliminary-lessons-russias-unconventional-operations-during-russo-ukrainian-war-february-2022

3) O. Liebermann, How Ukraine is Using Resistance Warfare Developed by the U.S. to Fight Back Against Russia, https://edition.cnn.com/2022/08/27/politics/russia-ukraine-resistance-warfare/index.html

4) J. Yerushalmy, "Belgorod: The Russian Region Now Part of Putin's War on Ukraine," Guardian, 23 May 2023, https://www.theguardian.com/world/2023/may/23/belgorod-the-russian-region-being-dragged-into-putins-war-on-ukraine

F. Approaches to Mobilization and Force Readiness

1) Sanders, "Ukraine's Third Wave of Military Reform 2016–2022 – Building a Military Able to Defend Ukraine Against the Russian Invasion," Defense & Security Analysis, 2023, https://www.tandfonline.com/doi/pdf/10.1080/14751798.2023.2201017

2) M. Zaniewicz, "Ukraine's New Military Security Strategy," May 2021, https://pism.pl/upload/images/artykuly/85fad0d2-d278-4d1e-b8da-4374f9956a7b/1620221156892.pdf

3) Antonis Kamaris, "Lessons Learned from a Year of War in Ukraine: a Greek Reading," June 2023, https://www.eliamep.gr/wp-content/uploads/2023/06/Policy-paper-137-Kamaras-.pdf

G. Gerasimov Doctrine/New Generation/Hybrid Warfare/Grey Zone Conflict:

1) R. Dalsjo et al, "A Brutal Examination: Russian Military Capability in Light of the Ukraine War," 2022, https://www.tandfonline.com/doi/pdf/10.1080/00396338.2022.2078044

2) J. Berzins, "The Theory and Practice of New Generation Warfare: The Case of Ukraine and Syria," 2020, https://www.tandfonline.com/doi/pdf/10.1080/13518046.2020.1824109

3) J. Derleth, "Russian New Generation Warfare: Deterring and Winning the Tactical Fight," 2020, https://www.armyupress.army.mil/Portals/7/military-review/Archives/English/SO-20/Derleth-New-Generation-War.pdf

4) Minic, "How the Russian Army Changed its Concept of War, 1993–2022," 2023, https://www.tandfonline.com/doi/pdf/10.1080/01402390.2023.2199445

4. BACKGROUND AND DISCUSSION

A. General Overview

NATO defines the operational level of war:

> *"as the level at which campaigns and major operations are planned, conducted, and sustained to accomplish strategic objectives within theatres or areas of operations. The operational level links strategic objectives to tactical level operations. At the operational level and within a designated joint operation area (JOA), armed forces are deployed and employed in accordance with a strategy to achieve military-strategic objectives. Without this link, it is unlikely that tactical actions will lead to attaining the desired end state. Therefore, the commander decides on how tactical activity is generated to achieve those strategic objectives. This is described as 'operational art' and is defined as the employment of forces to achieve strategic and/or operational objectives through the design, organization, integration and conduct of strategies, campaigns, major operations and battles." (Allied Joint Doctrine for the Conduct of Operations, AJP-3, February 2019)*

Conceptually, operational art is the orchestration of tactical actions in time, space, and purpose in order to achieve theatre strategic goals at acceptable risk. The theatre strategic goals are those milestones that are judged necessary to achieving the policy and strategy goals for which the military was deployed. Successful execution of tactics is the responsibility of tactical level commanders. The arrangement of these tactics in order to arrive at the theatre strategic goals is the domain of operational art.

Historically, early traces of operational art can be seen in the pre-Napoleonic thought on moving and fighting large armies. The beginning of formal thought on operational art dates to the 1920s with the early Soviet thinkers, who were themselves the products of reforms in the late Imperial Russian Army in the aftermath of the loss of Crimean War. Some of their work explicitly linked combined arms manoeuvre with economic, social, and political concerns. More broadly, though, 20th century thought on operational art - the major schools being Soviet thought in the interwar and Cold War period, US thought in the Cold War, and German thought in the interwar period and the Second World War - have been concerned predominantly, and sometimes exclusively, with the engagement of conventional military forces. More recently, thinking about operational art has embraced more perspectives on conflict and the operating environment, including the economic, social, and political dimension. Broadly, analysing the operating environment as a complex system has become more common.

Without access to plans for this war, and without a clear understanding of Russia's long term strategic goals, it is impossible fully to study operational art in this war. Despite this, examining the events of the war, as well as a range of statements from both Russian and Ukrainian officials, we can draw some conclusions about areas in which existing thought on operational art appears to be validated, and also where it appears to be overtaken by events.

B. Attrition and Manoeuvre

One of the oldest debates in formal operational art is between exhaustion and annihilation, or whether it is better to destroy the will of the enemy to fight, or to destroy their military (or their military capability.) The fundamental question of how to apply lethal force appears again in a number of different forms, including in the debate around population-centric vs force-centric counterinsurgency, and in the debate in the 1990s about manoeuvre vs attrition as the basis for conventional warfighting. These are usually false dichotomies, as the optimal response for a given situation will be specific to a specific conflict and can also change. Rather than discussing in the abstract whether it is better to operate at one end of the spectrum or another, it can be more fruitful to consider under what circumstances a given approach is more appropriate. Much conventional wisdom currently holds that attrition is not an appropriate way to fight, but the defence of Bakhmut by Ukraine in the early months of 2023 is an example of attrition warfare, or positional warfare, that may in fact be successful in the pursuit of the broader theatre strategy.

C. Deception, Dilemmas, and Interior Lines

Operational art and strategy have both relied extensively upon the creation of dilemmas for the enemy, in which all possible options available to him are disadvantageous. Often, this exploits deception, and the advantages of interior lines. In the summer of 2022, Ukrainian actions and statements created the perception that they were about to stage a counteroffensive to retake Kherson. Instead, the AFU retook Kharkiv City and the occupied region in the northeast, up to the Donbas. However, had Russia not allocated forces to Kherson, the AFU was positioned to take the southern city as well, as it intended to retake both Kherson and Kharkiv by the

end of 2022. This was not a feint, in which Russia was lured into taking a disadvantageous position; it was the creation of a dilemma, in which they had to commit forces either to Kherson or to Kharkiv, or to divide their force between the cities, which were at the opposite ends of the front. In any case, Ukraine was positioned to exploit an advantage. Some recent discussion of 21st century warfighting has suggested that the transparency of the battlefield makes deception impossible, and the creation of dilemmas correspondingly more difficult; the campaign plan in the fall with respect to Kharkiv and Kherson illustrates that this may not be the case.

D. Unconventional Warfare

In the 1990s and the early 21st century, SOF were often used as a central tool for achieving strategic goals, particularly in aspects of Counterinsurgency (COIN) and counterterror in the Global War on Terror (GWOT). Often, these effects were not coordinated appropriately with other efforts, both military and civil. The war in Ukraine has seen a return to the use of SOF for preparatory and supporting efforts to conventional manoeuvre. While Ukraine has used SOF to complement conventional operations, and to achieve strategic effects against Russia, Russia's attempts to use unconventional warfare since the 24 February invasion have often failed to be exploited by conventional forces. Each country has taken a different approach to integrating unconventional operations and new domains into its conventional warfighting plans.

E. Mobilization

The consensus of most NATO forces after the 1973 Yom Kippur War was that major state-on-state warfare would be a "come as you are" war, with intense fighting that started and ended relatively quickly. This was a contrast to the world wars, in which a relatively slow build up allowed months for mobilization and then prolonged fighting. The early months of the Ukraine war suggest that 21st century conventional war will be a blend of both; forces will need to be prepared for intense and immediate conflict, while the military will also need the capability to mobilize and train large new forces. This changes the relationship of operational art to time and increases the importance of force flow as a planning factor. It also emphasizes the importance of integrating the conduct of operational art with national strategic and policy leadership, who will be responsible for the policies and resources essential to mobilization.

F. New Generation/Hybrid Warfare/Grey Zone Conflict

The so-called Gerasimov Doctrine (or new generation/ hybrid warfare/grey zone conflict) laid out an approach to the use of the military as a largely supporting, rather than supported, instrument of national power. Many would argue that until 2022 Russia used variations on this doctrine with much success. The conventional invasion of Ukraine signaled a departure from many elements of this doctrine. At the same time, Ukraine's defence and counteroffensive include elements associated with the Gerasimov Doctrine, which the Ukrainian commander-in-chief has identified as an influence. The practice of new generational warfare as a form of operational art by both Ukraine and Russia deserves consideration, both for understanding this conflict and for identifying potential trends in warfare more broadly.

G. Lessons Identified

A number of lessons relevant to operational art have been identified from the conflict so far. It remains to be seen to what extent these lessons are specific to Ukraine and Russia in this interval or are more broadly applicable. Among these preliminary lessons identified are the following:

1) National Resolve and Resilience as Factors in Operational Art: The mobilization of the population, including through the rapid expansion of the Ukrainian ground forces, was essential to the defence of Ukraine and the counteroffensive, and depended upon national resolve and resilience. Force flow and the generation of forces into the fight was part of operational art in the world wars, and in planning for major conflict until the Yom Kippur War of 1973. The fighting in Ukraine suggests that operational art and doctrine should again devote more attention to the factors that contribute to resolve and resilience, as well as the factors involved in mobilizing the population and deploying it in support of both defensive and offensive operations.

2) Complexity of Logistics/Interoperability of Systems: This conflict has highlighted the importance of logistics, particularly but not only with respect to munitions. The necessity of adapting to a range of donated platforms has also indicated that interoperability among NATO equipment and platforms increases the complexity of logistics. This has

implications not only for conflicts in which many NATO countries donate equipment, but also for future NATO operations. The connection with operational art is with the limitations created by logistical needs, and the reduced ability to treat units as fungible if they have incompatible platforms.

3) Manoeuvre and Attrition: Related to the need to mobilize for prolonged fighting, the conventional wisdom on manoeuvre as the superior approach to warfare is cast into doubt by the conflict in Ukraine. The costs of ceding particular cities or landmarks, the necessity of buying time for mobilization and training, and the effect of attrition on enemy forces when casualty exchange ratios are favourable have all led to the decision of the AFU to use attrition in specific circumstances.

4) Information Operations and Deception: The role of information operations in shaping Ukrainian, Russian, and international public opinion has proven vital to Ukraine's campaigns. Campaign planners must consider not only traditional military objectives, but also their effect upon domestic and international support for Ukraine. Ambiguity or deception about major lines of effort and strategic priorities are also important considerations not only for military effectiveness but for their role in the information domain.

5) Echelons Involved in Conventional Contact: While previous campaign planning for major conventional operations focused on engagement at the division and corps level, it appears that much of the fighting in the counteroffensive has been at the brigade and battalion levels, and in some cases at the company level. This has implications for campaign planning and operational art, as well as the teaching and practice of mission command and planning at lower echelons.

5. QUESTIONS FOR CONSIDERATION

A. What is the most important aspect of the activity of operational art as it has related to the Russian war against Ukraine?

B. How do the events of the first ~16 months of the war influence your thinking about the balance between attrition and manoeuvre in conventional interstate warfare?

C. Classical operational art is concerned primarily with the arrangement of tactical actions in time, space, and purpose, and with the management of risk, logistics, and force flows. What elements of this seem relevant to the war in Ukraine? Do any seem superfluous? What is lacking?

D. What does this war reveal about the coordination of unconventional warfare and actions in new domains with conventional combined arms manoeuvre?

E. What are the planning and strategic implications of the necessity in Ukraine to fight a conventional war with existing troops while also mobilizing over many months?

F. How well does Russia appear to be executing New Generation/Hybrid Warfare/Grey Zone Conflict concepts in its war on Ukraine? What weaknesses in the theory are suggested?

LESSON 6:
INTERNATIONAL MILITARY ASSISTANCE FOR UKRAINE

1. PURPOSE AND SCOPE

This lesson describes the lessons learned associated with the international military assistance effort that Ukraine has received and benefited from since the initial Russian invasion in February 2022. This overview lesson provides students an introduction to the lessons learned derived from the evolution of assistance, training of military personnel abroad, and repair of arms and military equipment for the Armed Forces of Ukraine. Upon completion of this lesson, the student will understand the lessons learned related to how the international assistance effort evolved for maximum support, how the training of Ukrainian military personnel abroad is orchestrated, and how the repair and maintenance of arms and military equipment have been developed following the Russian invasion in February 2022.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. EXPLAIN the lessons learned associated with the overall military assistance effort provided by the international community for the Armed Forces of Ukraine evolved prior to and since the Russian invasion in February 2022.

B. DESCRIBE how the lessons learned related to the organization of this effort evolved from prewar conditions through the course of the war.

C. SUMMARISE the lessons learned associated with the need for and how the establishment of a training network has been developed outside of the nation's borders in support of the Armed Forces of Ukraine.

D. DEMONSTRATE the lessons learned of how the repair and maintenance of arms and military equipment is being developed by and in different allied countries.

3. READINGS

A. General Overview

All identified readings should be considered to be required readings. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Roman Tkachuk, "International Military Assistance," PPT Briefing, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19036

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4. BACKGROUND AND DISCUSSION

A. General Overview

The focus of this lesson is on the lessons learned associated with the provision of international military assis-

tance to the Armed Forces of Ukraine. Emphasis will be on three areas:

1) Organization of assistance

2) Training of military personnel abroad

3) Repair of arms and military equipment

B. Definitions

1) The lesson should begin with addressal of two definitions:

   a. International Military Assistance: For purposes of this lesson and its support for the Armed Forces of Ukraine, International Military Assistance is defined as the provision of armaments and other equipment, training of military personnel abroad, and repair of arms and military equipment.

   b. Arms and Military Equipment: This includes the spectrum of arms and military equipment provided by foreign donors in chronological stages to Ukraine: to include small arms, anti-tank weapons, man-portable air defence weapons, mortars, armoured transport vehicles and trucks, artillery, missiles, tanks, and fighter and rotor wing aircraft. As appropriate, associated ammunition for each would also be included.

C. Focus Areas

To be addressed sequentially:

1) Evolution of assistance (provision of armaments and other equipment)

   a. Three stages of assistance:

   - Stage 1: During the initial stages of assistance, Allies provided support with equipment and armaments designed for a defensive role such as anti-tank guided missile (ATGM) and corresponding man-portable air defence systems. Designed for small tactical units, these weapons provided an ability to take advantage of urban areas and terrain where vehicle manoeuvre was limited. ATGMs played an important role in stopping enemy armoured vehicle columns on the outskirts of Ukrainian cities.

     An even more important role was played by the Stinger man-portable air defence sys-

tems. The early days of the war featured massive Russian air attacks. Dozens of helicopters and aircraft were manoeuvring in and around the Kyiv region and other cities to seize airports and other key objects. By early April, Ukraine had received a total of about 1,500 man-portable air defence systems. This changed the situation in the skies with an increase in Russian aircraft losses.

The provision of the Bayraktar TB2 UAV played a large role for the development of intelligence and targeting data, as well as an ability to strike Russian convoys. The first real expansion of assistance came with former Soviet S-300 air defence systems from Slovakia, as well as a certain number of spare parts needed to restore MiG-29 aircraft.

- Stage 2: The second grouping of military assistance, initiated in April 2022, contained multiple air defence system deliveries of the British short-range air defence system, Alvis Stormer, MIM-23 HAWK, the French Crotale, the German Iris-T, and the U.S. NASAM system. These systems helped Ukraine transition from defensively focused operations to those resulting in the liberation of occupied territory. In fact, since April, the nature of the assistance changed dramatically when 40 Allied nations met in Germany to discuss Ukraine's long-term security needs.

Owing to the strategic partnership, Ukraine received technologically advanced weapons to include the provision of munitions for their original Soviet-produced armaments as well as the first deliveries of modern NATO armoured vehicles and artillery systems. A determination was made at the end of April for the United States, Canada, and Australia to supply 100 x 155 mm M777 howitzers. This decision opened the door to other, more modern long-range NATO-standard artillery systems, such as the French CAESAR self-propelled howitzer, the German Panzerhaubitze 2000, the Slovakian Zuzana, the Czech Republic DANA, the U.S. M109, and the Polish Krab. These weapons allowed for targets to be engaged at longer ranges than in the past.

The most significant military assistance event

of the summer was the transfer of the U.S. HIMARS and UK M270 multiple launch rocket systems to Ukraine. The HIMARS system counter-battery capability significantly weakened the Russian army's ability to conduct massive artillery attacks. The Ukrainian armed forces also began to use HIMARS and M270 systems to destroy Russian ammunition depots and command posts, which significantly slowed down the Russian offensive. By August 2022, after the HIMARS delivery, Russia's daily munition expenditure in eastern Ukraine had been reduced from nearly 12,000-15,000 rounds to around 5,000-6,000.

Many Russian ammunition depots, military bases, and command posts were destroyed during this period. Ukraine gained a significant advantage at a distance of 40-80 kilometres from the front line, where Russia no longer has a significant advantage in the number of systems. Most importantly, Russian MLRS cannot be compared to Western models in terms of accuracy and effectiveness.

- Stage 3: In early 2023, the third grouping of international military support began to arrive. This stage of assistance featured international support with two Patriot and other NASAMS air defence systems. Patriot has been key for the destruction of X-47 Kinzhal hypersonic missiles. Ukraine also began receiving modern tanks - German Leopard 1 and 2, British Challenger 2, and American Abrams (in the process of being delivered). In total, several hundred tanks are expected.

The UK has also sent long-range Storm Shadow missiles and the U.S. has decided to furnish cluster munitions. The third milestone is the transfer of F-16 fighter jets to Ukraine (probably in the fall of 2023). Preparations are currently underway for the start of training for Ukrainian pilots.

Of note for accounting and reporting on the utilization of provided resources, the Armed Forces of Ukraine have started using an electronic logistics report system to inform partners. Logistics Report (LOGREP), a tool of the Logistics Functional Area Services (LOGFAS) software package designed to support NATO

logistics, is designed to keep this process more transparent.

2) Training of military personnel abroad

a. The ability to train military personnel without the fear of being hit by ballistic missiles is a very important factor in increasing the combat capability of the Armed Forces of Ukraine. A number of countries are hosting training support, to include the UK with a programme to administer and provide three weeks of general infantry, first aid, cybersecurity, and counter explosive tactics training to 10,000 Ukrainian soldiers every four months. 10,000 Ukrainian troops participated in this training during 2022, with an additional 20,000 to be trained in 2023.

b. Nearly all individual European countries and the EU as an organization are supporting various Ukrainian military training programmes, to include the EU Military Assistance Mission in support of Ukraine (EUMAM Ukraine). The aim of the mission is to contribute to enhancing the military capability of Ukraine's Armed Forces to effectively conduct military operations to allow Ukraine to defend its territorial integrity within its internationally recognised borders, effectively exercise its sovereignty, and protect civilians. EUMAM Ukraine has been providing individual, collective, and specialised training to Ukraine's Armed Forces, including to their Territorial Defence Forces, and coordination and synchronisation of member states' activities supporting the delivery of training. This training has featured infantry combat, assault, artillery support, demining, providing medical aid, and fighting in urban conditions.

c. Real steps have been taken to accelerate the training of pilots, technicians, engineers, and combat control officers for fourth-generation fighters, including but not limited to the F-16. Eight (8) EU countries (Great Britain, the Netherlands, Poland, Denmark, Sweden, Belgium, Portugal and France) and the U.S. have already confirmed they will provide training for Ukrainians pilots.

d. Latvia and Lithuania have been conducting training for Ukrainian NCOs (e.g., Squad Leader and Instructor courses). Lithuania has also been training Ukrainian military personnel to maintain M113 tracked armoured personnel carriers and PzH 2000 self-propelled howitzers.

e. Nearly 20,000 personnel were trained in 17 countries during 2022.

3) Repair of arms and military equipment

a. Ukraine's closest neighbours (Poland, the Czech Republic, Romania, and Slovakia) have become hubs for supplying weapons to Ukraine and repairing NATO weapons damaged in combat. The largest repair bases are located in these countries. Poland also launched a large-scale repair campaign to return damaged Ukrainian artillery and armoured vehicles to the battlefield. Hundreds of people are working around the clock to restore equipment. The German arms manufacturer, Rheinmetall, is building a hub in Romania, and potentially a future one in Germany, for the maintenance of Western military equipment used by the Armed Forces of Ukraine.

b. The hubs will service self-propelled howitzers, as well as main battle tanks such as the Leopard 2, the Marder infantry fighting vehicles, and other military equipment. The service hubs would play a central role in maintaining the operational readiness of western combat systems in use in Ukraine and ensuring the availability of logistical support.

c. The Czech Republic's company VOP CZ together with a Ukrainian company signed an agreement to fix and maintain old T64 tanks that were donated by several countries. They have been in storage for decades and need to be completely dismantled, many spare parts replaced, and combat capability restored.

d. The Ukrainian company, Ukroboronprom, will produce and develop heavy weapons and military equipment together with at least six other European countries. This agreement provides for the production of military equipment; increase in the production of ammunition of various calibres; development of service hubs for maintenance and repair of weapons and equipment; and cooperation in the field of high technologies, in particular, the creation of joint research centres.

e. The Allied Contact Group for the Defense of Ukraine (also known as the Ramstein Group) has been coordinating immediate support needs and responding to the changing situation on the battlefield, as well as supporting Ukraine's long-term defence capabilities. The leader of the Group, U.S. Secretary of Defense, Lloyd Austin, believes it important to ensure that the Ukrainians have the ability to restore damaged equipment, repair it when possible, and send it back to the front line.

D. Identified Lessons Learned

There are a number of significant lessons learned that have emerged from the experience of International Military Assistance for the Armed Forces of Ukraine.

1) For logistics, only ground lines of communication (LOC) can be employed because sufficient security cannot be maintained for sea and air LOCs. The result is that rail and roads must be the primary logistics transport means. But movement by rail is a time-consuming process because of differing rail gauges between European countries and Ukraine; a legacy from the former Soviet Union.

2) Ground LOCs and maintenance hubs are a security risk because they are targetable by Russian surface-to-surface missiles. This requires the dispersal and frequent underground siting of the hubs in western Ukraine to increase the difficulty for Russian targeting. But the deployment to the west does increase the delivery time to units in the east.

3) The incredibly high usage of Western-provided ammunition and other equipment has significantly impacted the ability to employ weapons (e.g., most artillery) for extended periods of time. Also, ammunition storage close to artillery firing positions are vulnerable to drone attack. If available, the result is an attempt to change artillery barrels in field conditions. For ammunition storage vulnerability, improvised steel nets are hung above the positions so that the drone will impact on the nets rather than the ammunition or a towed artillery emplacement. In addition, the M982 Excalibur 155mm guided artillery ammunition has been vulnerable to EW jamming of its GPS guidance signal. The solution must be to directly counter Russian EW jamming. UAVs have also been found to be vulnerable to EW jamming. The solution is the same, find a way to directly counter the EW jamming.

4) The high usage of artillery shells resulted in shortages (e.g.,155 mm artillery ammunition). In 2023, 143,000 artillery rounds are typically used by Ukrainian forces on a monthly basis. The only solution is to conserve them or provide more. As an example, high precision ammunition is only

employed upon target confirmation. Also, Western and other supporting nations do not normally produce enough artillery rounds to both fully replenish Ukrainian stocks and maintain their own artillery reserve needs.

5) There are challenges with the need to combine or mount Western armaments on former Soviet Union/Russian produced aircraft (e.g., UK Storm Shadow missile, GBU-15). Ukrainian aircraft mounting systems were adjusted.

6) The following were found to be key lessons learned for success in any type of 21st century warfare.

   a. The required large amounts of weapons, rockets, and cannon artillery, including high-precision munitions must be available. The same is true for tanks, infantry fighting vehicles, air defence and aviation assets., and anti-ship missiles.

   b. Well-trained military personnel that can employ the provided equipment are fundamental for any kind of success.

   c. A secure and uninterrupted supply of ammunition, fuel, maintenance and repair of equipment, creation and the replenishment of relevant stocks must be planned for and implemented.

5. QUESTIONS FOR CONSIDERATION

A. What is your definition of military assistance?

B. What countries provided support prior to the February 2022 Russian invasion?

C. How did the support expand after February 2022? Why did it expand in that manner for the provision of weapons systems, training, and repair?

D. Why did a training network have to be established outside of Ukraine's borders? What type of training was provided to officers and NCOs?

E. How has the system of repair and maintenance for arms and military equipment been organized? Which countries are serving as hosts for the repair effort?

F. What were the challenges created by the wide spectrum of arms and military equipment, both NATO and former Soviet Union-produced, that were provided to the Armed Forces of Ukraine? For training, repair, and maintenance?

LESSON 7:
STRATEGIC COMMUNICATIONS AND THE RUSSIA-UKRAINE WAR

1. PURPOSE AND SCOPE

A. This lesson provides the fundamentals of Ukrainian Strategic Communications (SC) and its adaptations with the experience of 18 months of the Russian attack. Its aim is to describe the concept and practice of SC in addressing various target audiences at the strategic, operational, and tactical levels. As a stand-alone lesson it gives an overview of the subject but it can also be useful for the generation of further in-depth questions and approaches to wartime SC. In a broader context this lesson can also be combined with other subjects such as National Resilience and Countering Russian Information Operations/Propaganda.

B. Upon completion of this lesson the student will **understand** the basic features of the Ukrainian SC concept and practice as well as its effects and continuing challenges. The student will also be able to **apply** this knowledge and understanding in a different context to **identify** relevant fields of action to prepare for.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. EXPLAIN the Ukrainian approach to Strategic Communications as a means to support the restoration of the territorial integrity of the unitary state of Ukraine.

B. SUMMARISE how the Strategic Communications evolved from the situation prior to 24 February 2022 through the course of the war:

C. APPLY this new knowledge and understanding in future conflicts.

3. READINGS

A. General Overview

The briefing slides and associated Talking Paper should be considered required readings. All other readings should be employed on a selective basis as determined by the teaching faculty. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Iryna Izhutova, "Strategic Communications and the Russia-Ukraine War," PPT Briefing, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19081_download&client_id=DEEP

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4) Understanding Strategic Communications, May 2023. https://stratcomcoe.org/pdfjs/?file=/publications/download/Terminology-Report-No3-DIGITAL.pdf?zoom=page-fit (recommended reading that offers comprehensive information on SC terminology and its usage).

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4. BACKGROUND AND DISCUSSION

A. General Overview

The focus of this lesson is on the lessons learned associated with Ukrainian SC within the framework of the Russian war against Ukraine. It addresses development of the Ukrainian SC infrastructure prior to the 24 February 2022 Russian attack and then focuses on its evolution after the full-scale invasion. The core piece of the lesson is on new experience and lessons learned within the Ukrainian SC establishment. Important topics are:

1) Enormous complexity of the war theatre that SC has to cope with.

2) Crucial function of proactive strategic messaging that out competes simple responses to hostile information operations.

3) Requirement to balance consistent time pressure on SC measures and the criticality of accurate messages on the Ukrainian side (with a priority on accuracy).

4) Need to empower SC personnel with the latitude for self-initiated action if the situation requires it ("mission command approach").

5) Continuous necessity to educate and train SC personnel.

6) The lesson offers the theoretical basis of Ukrainian SC concept as well as much empirical material to explain in a practical exercise.

B. Definitions

1) <u>NATO</u> defines **Strategic Communications** as "the integration of communication capabilities and information staff functions with other military activities, in order to understand and shape the information environment, in support of NATO strategic aims and objectives" (Allied Joint Publication for Strategic Communications, AJP 10, last updated 15 June 2023).

2) <u>Ukraine</u> defines **Strategic Communications** as "coordinated and proper use of the state's communication capabilities – public diplomacy, public relations, military relations, informational and psychological operations, measures aimed at promoting the state's goals" (Information Security Strategy of Ukraine, 2021).

C. Ukrainian Approach to Strategic Communications

D. Ukrainian SC Development Prior to the Russian Attack

1) Establishment of an SC infrastructure after the 2014 Russian aggression in Crimea and the Donbas.

E. Ukrainian SC Development After the Full-Scale Invasion

1) Immediate adaptation and further development of the post 24 February 2022 structure.

F. New Experiences and Lessons Learned

1) There are multiple and complex challenges to wartime Strategic Communications.

2) There needs to be a focus on strong, consistent narratives (messages).

3) Accuracy must be prioritized, especially in a time sensitive situation where there is great pressure to get the word out.

4) Attention should be paid to the gap between traditional peacetime and war-time procedures; related to guidance, coordination, cooperation, etc.

G. Future Outlook for Ukrainian Strategic Communications

1) Strengths:

   a. Public diplomacy

   b. Superb speakers

2) Challenges:

   a. Peace-war time procedures gap (guidance, coordination, cooperation, etc.)

   b. Training for Strategic Communications personnel

   c. Developing communication strategies for Ukrainians in Donetsk and Luhansk oblasts, and Crimea during and after the occupation

5. QUESTIONS FOR CONSIDERATION

A. What are the fundamental features of Ukrainian SC efforts?

B. What are the essential lessons that the Ukrainian SC establishment has drawn from the war?

C. What are the continuing challenges for the Ukrainian SC establishment?

D. What is your takeaway from this lesson regarding your own country's SC infrastructure efforts?

E. Based on your own experience, what recommendations would you give to the Ukrainian colleagues to further develop their SC capabilities?
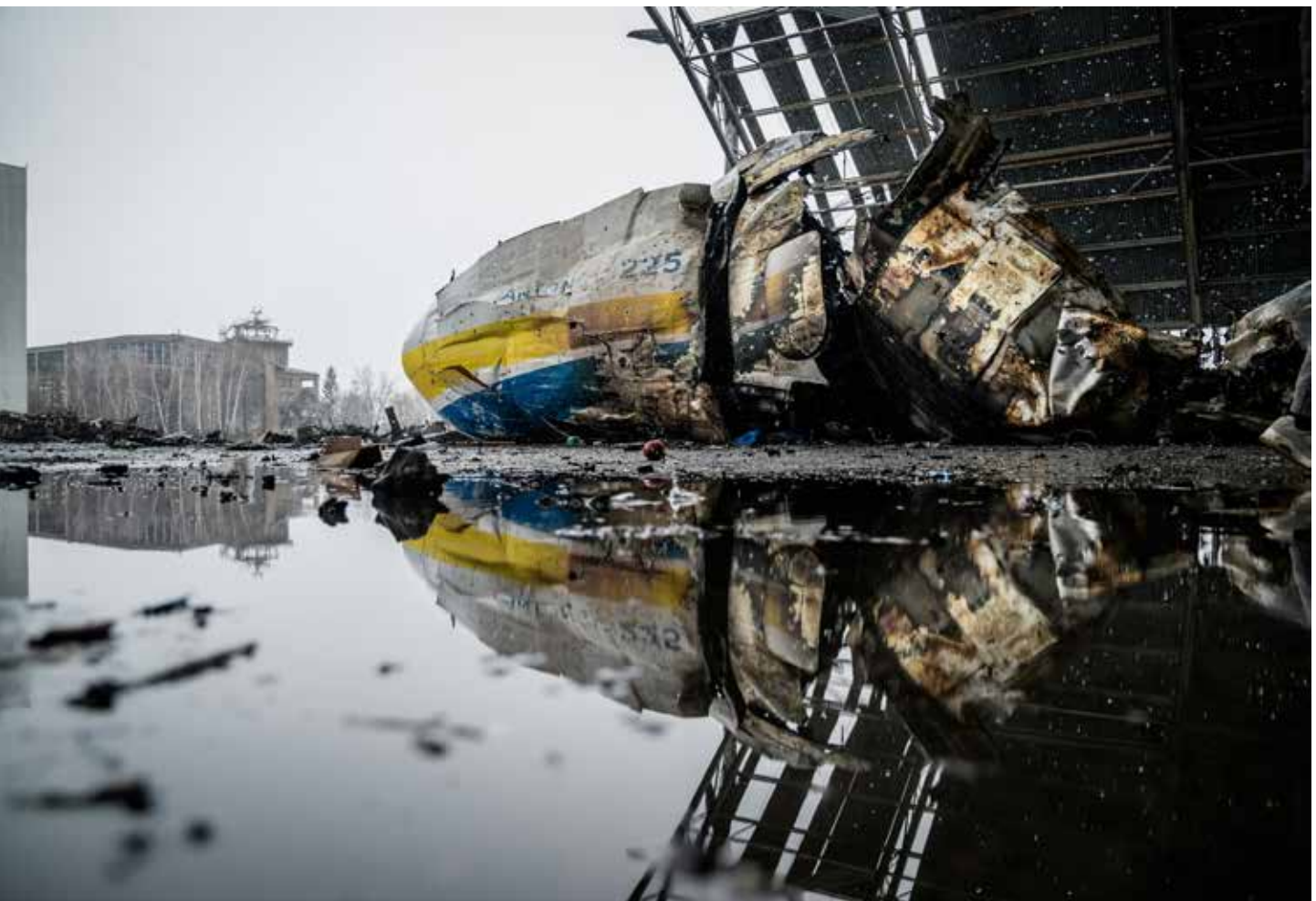
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LESSON 8:
RUSSIAN INFORMATION OPERATIONS

1. PURPOSE AND SCOPE

A. The purpose of this lesson is to understand the essence of Russian information operations as an integral part of a military operation in the context of the Russian-Ukrainian war. It will allow us to summarise the lessons learned in order to respond to Russian goals, approaches, methods, and tools for carrying out Information Operations (InfoOps) against Ukraine. These lessons learned could be applicable within the students 'areas of responsibility.

B. After completing this lesson, you will acquire the ability to identify the specific characteristics of Russian information operations at strategic, operational, and tactical levels with the focus on lessons learned.

C. Using case examples, the lesson will demonstrate Ukrainian approaches to identify signs of threatening enemy actions in the information environment toward different target audiences, and tools for analysing and assessing the levels of threat. The case examples will allow recognition of lessons learned, to facilitate recognition of principles, methods, and tools to respond to them.

D. The lesson is designed for a wide range of audiences, both InfoOps experts and other personnel to enhance generic awareness. The lesson could also be related to topics such as Strategic Communications.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE the conceptual apparatus and Russian InfoOps structure.

B. SUMMARISE the Ukrainian responses to the goals, approaches, methods, and tools for carrying out information operations during the Russian war against Ukraine.

C. EXPLAIN methods for identifying indications of the enemy's information and psychological impact on target audiences.

D. DEMONSTRATE how the Ukrainian experience and lessons learned can be applied in other fields of expertise.

3. READINGS

A. General Overview

The briefing slides and associated Talking Paper should be considered required readings. All other readings should be employed on a selective basis as determined by the teaching faculty. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

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6) Paul, Christopher and Miriam Matthews, The Russian "Firehose of Falsehood" Propaganda Model. Why It Might Work and Options to Counter It (Российская модель пропаганды «Пожарный шланг с потоками лжи»: Почему это работает и каковы способы ей противостоять), RAND Corporation, 2016, https://www.rand.org/pubs/perspectives/PE198.html

7) Roache, Madeline, et.al., Russia-Ukraine Disinformation Tracking Center: 386 Websites Spreading War Disinformation and the Top Myths They Publish, NewsGuard, updated: 08 August 2023, https://www.newsguardtech.com/special-reports/russian-disinformation-tracking-center/

8) Wesolowski, Kathrin, "Fake News Further Fogs Russia's War on Ukraine," Deutsche Welle, 28 April 2022, https://www.dw.com/en/fact-check-fake-news-thrives-amid-russia-ukraine-war/a-61477502

4. BACKGROUND AND DISCUSSION

A. General Overview

The focus of this lesson is on the lessons learned associated with the conduct of Russian information operations. It should begin with a description of the conceptual apparatus and the Russian InfoOps structure. Definitions of the term "information operations" should be provided, highlighting the Russian approach as a constant form of warfare within the information domain.

B. Definitions of the Term "Information Operations"

1) <u>US Definition:</u> "Information operations are the integrated use of information capabilities during military operations, along with other means of operations, to influence, destroy, inflict damage, capture the decision-making process of the enemy or potential enemy in protecting their own" (Information Operations of the U.S. Armed Forces, Joint Publication 3-13, 27 November 2012)

2) <u>NATO Definition:</u> "A staff function to analyse, plan, assess and integrate information activities to create desired effects on the will, understanding, and capability of adversaries, potential adversaries, and audiences in support of mission objectives." (Allied Joint Doctrine for Information Operations, AJP-10.1., updated 31 July 2023)

3) <u>Ukraine Definition:</u> "Information operations is a set of coordinated and interrelated activities for the purpose, tasks, objects, place, and sometimes simultaneous and consistent measures of information influence, carried out according to a single plan by the forces and means of the Armed Forces of Ukraine, involving the capabilities of the information infrastructure of the state, in cooperation with other military formations and law enforcement agencies in order to create favourable conditions for the use of troops (forces), violation of the functioning of the enemy's information infrastructure, his decision-making processes, and the management of troops (forces) while simultaneously protecting his own information space" (ВКП 1-00(01).01, 2020) https://archive.org/details/slovnyk2020/page/14/mode/1up

4) <u>Russia Definition (Russian documents use the term "Information Warfare" and not "Information Operations."):</u> "Information warfare - a struggle between two or more states in the information space to damage information systems, processes, resources, critical and other structures, to undermine political, economic, and social systems. Massive psychological treatment of the population is conducted to destabilize society and the state, as well as to force the state to make decisions in the interests of the opposing party. (Conceptual Views on the Activities of the Armed Forces of the Russian Federation in the Information Space, Defence Ministry of the Russian Federation, 2011)

C. Key Characteristics of Russian information warfare:

1) Escalation

2) Dominance

3) Speed

4) Momentum

5) Deception

("Analysis of Russia's Information Campaign Against Ukraine," NATO Strategic Communications Center of Excellence, Riga, 2015)

6) Information and psychological impact carried out in the **methods** of propaganda, information, and psychological operations, and actions, mass gatherings (rallies, pickets), humanitarian actions, etc. The basis of the technology of information and psychological impact is misinformation, manipulation, intimidation, incitement to hatred.

7) Information and psychological impact is carried out through such **tools/channels** as television, the internet, broadcasting, periodicals, leaflets, rumours, etc.

D. Structure and Actors

The main InfoOps structures of Russia are: the Federal Security Service, units of the Information Operations forces of the Ministry of Defence which conduct the general management of the information and psychological struggle, units of the Main Intelligence Directorate of the General Staff and Special Operations Forces, public and political figures, Russian political organizations and parties, as well as pro-Russian collaborators in Ukraine.

E. Identified Lessons Learned

1) InfoOps will continue to be a component of new forms of warfare (hybrid war). It is likely to have a central role for both Russia and Ukraine.

2) It will be a necessity for nations with a significant Russian minority to monitor those groups and carefully observe them during peacetime. Monitoring and analysing such audiences will be critical to operational success. ("Foreign Policy Concept of the Russian Federation," 1 December 2016) http://www.mid.ru/en/foreign_

3) Disinformation campaigns should be integrated into military exercises.

4) The response to Russian activities of informational and psychological impact should be immediate, adequate, and credible to deny negative and broad impact. Early recognition and reaction are key for success. If certain threats (harmful broadcasting) cannot be eliminated immediately due to certain precautions (legal, moral, customary, or other reasons), acceptable solutions should be found that will eliminate the threat.

5) Awareness, creating, and sustaining narratives should only be conducted through constantly controlled media by experts and professional institutions.

6) Russia is exploiting a recognized lack of knowledge and awareness of opponent societies or target groups and sometimes individual personnel. Education of media users must be widely provided to support information resilience and resistance to information threats (media literacy with critical thinking allowing to recognize disinformation).

7) Information security is the sum of information resistance of an individual, small groups, and society as a whole.

F. Summary

The Ukrainian responses to the goals, approaches, methods, and tools for carrying out information operations during Russian aggression against Ukraine are:

1) Identify signs of Russian information and psychological impact on friendly audiences.

2) Counter Russia goals and approaches to restore empire and domination.

3) Understand and counter Russian methods and tools of implementation of strategic-level InfoOps.

4) Counter the impact of Russian InfoOps and PSYOPS on Ukrainian, regional, and world stability and security.

5) Strategic Level Examples (Russia-Ukraine War:

cases, target audiences, tools)

a. Russian InfoOps against Ukraine's military and political leadership

   i. President Zelenskyi - disinformation about leaving Ukraine.

   ii. General Zaluzhnyi (Commander-in-Chief of the Armed Forces) - the fake news about Zaluzhnyi's death.

   iii. Major General Budanov (Chief of Military Intelligence) - the fake news about being 'airlifted' to a German hospital or his death.

b. Ukrainian strategic international InfoOps aims:

   i. Oppose false claims that NATO and EU are in war with Russia.

   ii. Oppose fake news about US-funded bioweapons laboratories in Ukraine.

   iii. Oppose fake news that Ukraine will destroy a nuclear power plant - nuclear threat.

   iv. Oppose fake news about false Ukrainian government corruption.

   v. Oppose fake news about illegal arms trade by Ukrainian authorities.

   vi. Oppose fake news describing the grain agreement as a goodwill from Russia, accusation toward Ukraine, etc.

6) Operational Level Examples (Russia-Ukraine War: cases, target audiences, tools)

a. Destroyed Kakhova reservoir dam.

b. Sinking of the cruiser "Moscow"

c. Battle for Bakhmut

7) Tactical Level Examples (cases of information and psychological influence of Russians on target audiences)

a. Examples of early/preventive responses to information threats (SMS mailing, leaflets, content in local chats, and groups in social networks etc.).

5. QUESTIONS FOR CONSIDERATION

A. What channels/tools of the enemy's dissemination

of hostile information operations will you choose to monitor the information environment in your area of responsibility? According to what principles?

B. What tools for assessing informational threats do you consider the most effective in your area of responsibility?

C. Can you provide examples of information operations against your focused group/organization/state at the strategic, operational, and tactical levels?

D. How do you view the system of detecting enemy actions in the information environment?

E. What decisions would you take to organize countermeasures when signs of the enemy's information operation are detected? Give examples of threats and suggestions for response.

Photographer: Eduard Kryzhanivskyi

LESSON 9:
INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE

1. PURPOSE AND SCOPE

A. This lesson highlights how the Russia-Ukraine War has mandated a need to adapt and innovate the fundamentals of Intelligence, Surveillance and Reconnaissance (ISR). The lesson overview provides students with an introduction to the changes in ISR that have occurred since December 2021.

This lesson is suitable for audiences at the strategic, operational, and tactical levels. When delivered alone it provides an overview of the dissemination, employment methodologies, and role of ground forces in ISR operations.

B. It can also be delivered as part of a group of lessons to provide the background and foundation for further discussions regarding these concepts. The lesson has linkages to the Ground War, Special Operations Forces, and Unmanned Aerial Vehicle lessons. Upon completion of this lesson, students will understand the functions, implications, and changes in ISR following the February 2022 Russian invasion. Students will also be able to apply these considerations to other strategic and operational contexts. This Lesson Plan may also serve as source material to be adapted by curriculum developers for incorporation into their own curriculum.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DEMONSTRATE how ISR declassification and expedited dissemination provided crucial information for alerting the international community to Russia's intent to invade Ukraine.

B. ILLUSTRATE how innovation and adaptation in ISR is being employed during the Russia-Ukraine War.

C. RELATE how Russian Ground Forces conducted surveillance and reconnaissance operations.

D. Be able to APPLY the Ukrainian approach to another operational situation.

3. READINGS

A. General Overview

The briefing slides and associated Talking Paper should be considered required readings. All other readings should be employed on a selective basis as determined by the teaching faculty. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Valerii Kachanov, "Intelligence, Surveillance, and Reconnaissance," PPT Briefing, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19087_download&client_id=DEEP

2) Valerii Kachanov, "Intelligence, Reconnaissance, and Surveillance," Talking Paper, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19088_download&client_id=DEEP

3) President Joe Biden, "Press Conference" 18 February 2022, https://edition.cnn.com/2022/02/18/politics/joe-biden-russia-ukraine/index.html

4) Mykhaylo Zabrodskyi, et al, Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February–July 2022, Royal United Services Institute, 30 November 2022, pp. 7-12, https://www.rusi.org/explore-our-research/publications/special-resources/preliminary-lessons-conventional-warfighting-russias-invasion-ukraine-february-july-2022

B. Strategic Level

1) General Sir Jim Hockenhull, "How Open Source Intelligence Has Shaped the Russia-Ukraine War," Royal United Services Institute, Webinar, 7 November 2022, https://www.gov.uk/government/speeches/how-open-source-intelligence-has-shaped-the-russia-ukraine-war

2) Jack Watling, et al, Preliminary Lessons from Russia's Unconventional Operations During the Russo-Ukrainian War, February 2022–February 2023. Royal United Services Institute, 29 March 2023, pp. 1-19, https://www.rusi.org/explore-our-research/

publications/special-resources/preliminary-lessons-russias-unconventional-operations-during-russo-ukrainian-war-february-2022

3) Mykhaylo Zabrodskyi, et al, Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February–July 2022, Royal United Services Institute, 30 November 2022, pp. 24-43, 53-65, https://www.rusi.org/explore-our-research/publications/special-resources/preliminary-lessons-conventional-warfighting-russias-invasion-ukraine-february-july-2022

4) Seth G. Jones, et al, Combined Arms Warfare and Unmanned Aircraft Systems: A New Era of Competition, Center for Strategic and International Studies, 10 November 2022, pp. 17–18, https://www.csis.org/analysis/combined-arms-warfare-and-unmanned-aircraft-systems

C. Operational Level

1) Jack Watling, et al, Preliminary Lessons from Russia's Unconventional Operations During the Russo-Ukrainian War, February 2022–February 2023. Royal United Services Institute, 29 March 2023, pp. 20-37, https://www.rusi.org/explore-our-research/publications/special-resources/preliminary-lessons-russias-unconventional-operations-during-russo-ukrainian-war-february-2022

2) Seth G. Jones, et al, Combined Arms Warfare and Unmanned Aircraft Systems: A New Era of Competition, Center for Strategic and International Studies, 10 November 2022, pp. 19-24, https://www.csis.org/analysis/combined-arms-warfare-and-unmanned-aircraft-systems

D. Tactical Level Example

1) Seth Jones, et al, Ukrainian Innovation in a War of Attrition, Center for Strategic and International Studies, 27 February 2023, https://www.csis.org/analysis/ukrainian-innovation-war-attrition

2) Mykhaylo Zabrodskyi, et al, Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February–July 2022, Royal United Services Institute, 30 November 2022, pp. 44-52, https://www.rusi.org/explore-our-research/publications/special-resources/preliminary-lessons-conventional-warfighting-russias-invasion-ukraine-february-july-2022

4. BACKGROUND AND DISCUSSION

A. Definitions

1) The lesson should begin with addressal of three definitions:

a. Intelligence, Surveillance, and Reconnaissance (ISR): An activity that synchronizes and integrates the planning and operation of sensors, assets, and processing, exploitation, and dissemination systems in direct support of current and future operations. This is an integrated intelligence and operations function. (Joint and National Intelligence Support to Military Operations, U.S. Armed Forces Joint Publication 2-01, 5 July 2017).

b. Open-Source Intelligence (OSINT): Relevant information derived from the systematic collection, processing, and analysis of publicly available information in response to known or anticipated intelligence requirements. (Joint Intelligence, U.S. Armed Forces Joint Publication 2-0, 22 October 2013)

c. Human Intelligence (HUMINT): A category of intelligence derived from information collected and provided by human sources. (Joint Intelligence, U.S. Armed Forces Joint Publication 2-0, 22 October 2013)

B. General Overview

1) The Russia-Ukraine War has demonstrated that a number of factors are shaping the role of ISR in modern warfare. Among these is the declassification and dissemination of critical intelligence information, the employment of nontraditional ISR assets, and the skilled use of ground force reconnaissance. The lesson highlights the implications of the rapid disclosure of U.S. intelligence analysis to galvanize the international community against Russian armed aggression. Additionally, the lesson examines the innovative use of open source and human intelligence (HUMINT) to fuse a cohesive intelligence common operating picture. The lesson also illustrates and provides examples of the challenges of employing ground force reconnaissance. It highlights how Open-Source Intelligence (OSINT) and HUMINT helped the U.S. administration identify the invasion start date, expose Russian operational plans, and unify international partners.

2) Additionally, the lesson examines the implications of the US disclosure of information and how this affected OSINT, HUMINT, Anticipatory Intelligence, and shifted public confidence on the validity of what they were being told by government sources. The result was that the declassification of intelligence assisted in informing and shaping public opinion. The lesson also demonstrates how this disclosure disrupted Russian false flag operations in February 2022 and enabled the Ukrainian employment of crowdsourcing and chat bots to lift the fog of war and misinformation.

3) Another key point the lesson illustrates is how OSINT and HUMINT have changed the characteristics of war. This will include how OSINT from commercial assets informed and continues to inform operational and tactical actions. This is exemplified in the initial invasion period and how OSINT leveraged commercial satellites, mass media, and social networks to provide the international community with evidence of Russian atrocities in Bucha.

4) The lesson then transitions to an examination of Russian ground force ISR employment vulnerabilities, such as failure to conduct tactical reconnaissance and how the Russian command did not use their Special Operation Forces (SOF) to conduct strategic and operational level special reconnaissance. In addition to this, the lesson addresses Russian overreliance on unskilled proxy units and Wagner private military company (PMC) mercenaries instead of professionally trained reconnaissance units. Additionally, the lesson illustrates how the Russians employed unmanned aerial vehicles (UAV) as a part of their reconnaissance strike complex. The lesson will also address the significance of HUMINT in enhancing the precision and timeliness of strikes against Russian forces and how Russian use of HUMINT resulted in latency and inaccurate strikes contributing to civilian casualties and unnecessary collateral damage.

5) The final section of the lesson reviews overarching lessons learned involving U.S. disclosure of critical information, the adaptive and innovative use of nontraditional commercial assets for ISR, and the Russian failure to properly employ ISR.

C. Lessons Learned

1) <u>Strategic Level:</u>

a. Necessity to rapidly declassify intelligence on enemy troop deployments prior to war. (U.S. and UK government success in alerting the world prior to February 2022 invasion).

b. Disclosure of intelligence analysis prior to an event taking place can have a definite political advantage. (The U.S. administration public disclosure of information helped to unify the focus of NATO and secure United Nations condemnation).

c. Modern ISR can substantiate atrocities. (Use of forensic ISR helped to substantiate the validity of evidence of Russian war crimes in Bucha).

2) <u>Operational Level:</u>

a. SOF should be employed on their two major missions (direct action and special reconnaissance). (Russian SOF focused on direct action missions and neglected special reconnaissance requirements, with a resulting limitation on intelligence collection) .

b. HUMINT prior to an event is key to determine enemy intentions. (Russian HUMINT failed to properly assess Ukraine's will to fight).

c. UAV-derived targets have become key for indirect fire support. (Russian employment of UAVs serve that role as part of their reconnaissance strike complex).

3) <u>Tactical Level:</u>

a. ISR organizational framework must be designed to support the operational commander. (Employment of Russian Battalion Tactical Group's ISR is not aligned with the doctrinal concept of operations).

b. A friendly civilian population can be a great HUMINT source. (Skillful use of Ukrainian civilian population for HUMINT).

5. QUESTIONS FOR CONSIDERATION

A. How has the role of Intelligence in modern warfare changed since 2022?

B. Was the timing of the US disclosure of classified information effective?

C. What was the role of commercially available intelligence collection-related services?

D. What should be done in order to outpace the adversary? Why?

E. What was the impact of open-source information?

F. What was the role of open source for revealing Russian war crimes in Bucha?

G. In what way did the scale of data influence Open-Source Intelligence?

H. What are the future considerations for Open Source and Human Intelligence?

I. In what way did Russian forces use their Human Intelligence network in Ukraine and why?

J. What are the missions of Russian Special Operation Forces?

K. Are there any differences between the typical missions of Russian Special Operation Forces and their performance on the battlefield?

L. What are the future considerations for Russian Special Operation Forces?

M. How did the Russian command fail to properly employ Ground Forces reconnaissance?

N. What are the future considerations for Russian Ground Forces' reconnaissance?

O. How are Russian first echelon forces ("disposable" infantry) used?

P. How did Russia employ units from the "Luhansk and Donetsk People Republics" ("LDNR")?

Q. How effective was the Russian use of "human wave" tactics?

R. In what way did Russian employ their UAVs on the battlefield?

S. What are the future considerations for employing UAVs on the battlefield?

T. What is the Russian reconnaissance strike complex?

U. What are the future considerations for Intelligence, Surveillance and Reconnaissance?

LESSON 10:
NATIONAL RESILIENCE, MOBILIZATION, AND TERRITORIAL DEFENCE

1. PURPOSE AND SCOPE

This two-hour lesson provides an overview of the fundamentals of Ukrainian National Resilience. It provides students an introduction to Ukrainian defence strategy and lessons learned for national resilience, mobilization, and Territorial Defence Forces (TDF). The Ukrainian approach to resilience from 2014 onward was confirmed as effective upon the outbreak of the 2022 invasion. Lessons learned from the Ukrainian implementation of its comprehensive defence approach demonstrated the effectiveness of integrating civilian/volunteer forces into its overall military structure and strategy. The activation and employment of the TDF provided excellent lessons learned on how to implement a national resilience concept associated with national identity and volunteerism to meet Ukraine's physical and psychological security needs. Modifications to these concepts after the war's outbreak provide lessons learned for other countries for the development and implementation of a national resilience concept or strategy. This lesson is suitable for audiences that study at any of the three levels of conflict (strategic, operational, tactical). It can also be delivered as part of a group of lessons to provide additional background for further discussions. There are multiple lessons that link to national resilience. These include but are not limited to The *Changing Character of War, Strategic Communications, Special Operations Forces, Ground War Tactical, International Military Assistance, Logistics, and Cybersecurity Operations*. Upon completion of this lesson, the student will be able to **describe** the functions, effects, and challenges of Ukrainian national resilience following the February 24, 2022, invasion. This includes the Ukrainian mobilization process, focusing on the establishment and operations of the territorial defence force (TDF). The student will also be able to **apply** that understanding to a different national situation to **identify** relevant aspects. This notional Lesson Plan may also serve as source material to be adapted by curriculum developers for incorporation into their own curriculum.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE the Ukrainian approach to national resilience.

B. EXPLAIN the Ukrainian comprehensive defence concept and mobilization process.

C. EXPLAIN the two-level model (Brigade and Battalion) of the TDF structure.

3. READINGS

A. General Overview

All identified readings are supplemental readings to enhance student background. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper. To access these, click on the links below.

1) Viktor Derevianko "National Resilience, Mobilization, and Territorial Defence" PowerPoint slides. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19092_download&client_id=DEEP

2) Viktor Derevianko "National Resilience, Mobilization, and Territorial Defence" Talking Paper. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19090_download&client_id=DEEP

B. Strategic Level

1) A Route to National Resilience. Building Whole-of-Society Security in Ukraine, Teperik, Dmitri; Jermalavičius, Tomas; Senkiv, Grigori; Dubov, Dmytro; Onyshchuk, Yevhen; Pokalchuk, Oleh; Samus, Mykhailo Project director: Teperik, Dmitri. Publication date: April 2018 https://icds.ee/en/a-route-to-national-resilience-building-whole-of-society-security-in-ukraine/

2) Otto C. Fiala, "Resilience and Resistance in Ukraine," *Small Wars Journal*, Dec 2022. https://smallwarsjournal.com/jrnl/art/resilience-and-resistance-ukraine

C. Operational Level

1) Korostelina, Karina V. "National Resilience to Pro-

tracted Violence in Ukraine," *Peace and Conflict Studies:* Vol. 27: No. 2, Article 4. (2020) https://nsuworks.nova.edu/pcs/vol27/iss2/4/

2) Ivo Juurvee, Civil Defence in Ukraine: Preliminary Lessons from the First Months of War. https://icds.ee/en/autor/ivo-juurvee-en/ Key reading to understand the operational impact of this example of societal resilience in the conflict.

3) Caroline Field and Daniel Gunn, Resilience: What can be learnt from the national response in Ukraine? 24 August 2022. https://www.openaccessgovernment.org/resilience-what-can-be-learnt-from-the-national-response-in-ukraine/142319/

D. Tactical Level

1) Olena Kupenko, Andriana Kostenko, Larysa Kalchenko, Olena Pehota and Oleksandr Kubatko. "Resilience and vulnerability of a person in a community in the context of military events." *Problems and Perspectives in Management*, 21(1), 154-168. 2023. https://www.businessperspectives.org/index.php/journals?controller=pdfview&task=download&item_id=17673

2) Mykola Bielieskov and Anton Muraveinyk, Generalization an Assessment of Territorial Defense Forces Application Experience in 2022 (NGO "Come Back Alive!", Kyiv, 2023) https://savelife.in.ua/en/materials/research-en/generalization-and-assessment-of-territo-en/

4. BACKGROUND AND DISCUSSION

A. General Overview

"Resilience in a NATO context refers to the capacity to prepare for, resist, respond to and quickly recover from shocks and disruptions. Strengthening resilience is primarily a national responsibility, but individual Allies' efforts also make the Alliance stronger as a whole. Allies can enhance their resilience through the development of their national defence capacity, assured access to critical infrastructure and the development of back-up plans in the event of crises. To deter, counter or recover from threats or disruptions in the civilian sector, effective action requires clear plans and response measures that are defined ahead of time and exercised regularly."

https://www.nato.int/cps/en/natohq/topics_132722.htm

NATO identified seven baseline requirements for national resilience in 2016. Although this on Ukrainian national resilience does not address all seven, they do represent the broader context of national resilience in the 21st century. The seven areas are:

1) Assured **continuity of government** and critical government services: for instance, the ability to make decisions and communicate with citizens in a crisis.

2) Resilient **energy supplies**: ensuring a continued supply of energy and having back-up plans to manage disruptions.

3) Ability to deal effectively with the **uncontrolled movement of people** and to de-conflict these movements from NATO's military deployments.

4) Resilient **food and water resources**: ensuring resilient supplies that are safe from disruption or sabotage.

5) Ability to deal with **mass casualties and disruptive health crises**: ensuring that civilian health systems can cope and that sufficient medical supplies are stocked and secure.

6) Resilient **civil communications systems**: ensuring that telecommunications and cyber networks can function even under crisis conditions, with sufficient back-up capacity. This also includes the need for reliable communications systems including 5G, robust options to restore these systems, priority access to national authorities in times of crisis, and the thorough assessments of all risks to communications systems.

7) Resilient **transport systems**: ensuring that NATO forces can move across Alliance territory rapidly and that civilian services can rely on transportation networks, even in a crisis. https://www.nato.int/cps/en/natohq/topics_132722.htm

B. Ukrainian Resilience Formula

1) The Ukrainian national system of resilience identifies six elements that are essential to the nation's comprehensive defence strategy. This lesson stresses

the role of security forces in defending Ukraine and sustaining resilience through the employment of the TDF and VFTC. The argument is that security forces such as the TDF and VFTC enhance resilience through physical resistance to the Russian invader.

a. Government stability (includes mobilization and employment of national and volunteer security forces)

b. Protection of critical infrastructure

c. Civil Defence

d. Responses to mass displacement of citizens

e. Resistance to enemy information influences

f. Financial and economic stability

2) The four challenges of Ukrainian national defence are similar to the Israeli security doctrine framework.

a. Demographics

b. Must win mentality - existential threat.

c. Defend key terrain and critical infrastructure.

d. Capacity for movement and sustainment

3) Critical intangible elements of national resilience include beliefs, national identity, and trust.

4) Lessons Learned regarding the significant elements of Ukrainian national resilience.

a. Societal unity coalesced around defending common human values and belief in victory.

b. Trust in the Armed Forces of Ukraine, the TDF, presidential power, and governmental reforms enhanced national resilience.

c. National Identity and **patriotism** are crucial elements of Ukrainian resilience and resistance. (The Special Operations Forces lesson addresses the Resistance Movement in more detail)

C. Military Security – Comprehensive Defence - Mobilization

1) Legal framework to include Law of Ukraine "About

Mobilization Preparation and Mobilization."

2) Mobilization process to include key actors, the four mobilization phases, and selection priorities.

3) Lessons Learned regarding the significant elements of mobilization.

4) National unity and solidarity – resilience

5) Strategic communication and readiness

6) Role of international support

D. Territorial Defense Forces (TDF)

1) Legal framework and organizational structure of the TDF

2) TDF mission changes and adaptation after the invasion

3) Innovative training initiatives and lessons learned.

4) Lessons learned regarding the TDF experience after the invasion.

5) Citizen-soldiers provided the needed ground forces to halt the Russian invasion.

6) Current TDF model is optimal for current and future security operations (significant benefits for the investment). The TDF manning model provides necessary training of reservists.

E. Conclusion

1) Definitions

a. National Resilience—the ability of the state and society to effectively resist threats of any origin and nature, to adapt to changes in the security environment, to maintain stable functioning, to quickly recover to the desired balance after crisis situations. (Decree of the President of Ukraine N°. 479/2021 "On the introduction of the national sustainability system".)

b. National system of resilience - a complex of purposeful actions, methods, and mechanisms of interaction of state authorities, local self-government bodies, enterprises, institutions, organizations, civil society institutes, which guarantee the preservation of safety and continuity of functioning of the main spheres of life of society and the state before, during

and after the onset of a crisis. (Decree of the President of Ukraine No. 479/2021 "On the introduction of the national sustainability system".)

c. Comprehensive Defence – a set of measures that emphasizes preventive actions and systemic resistance to the aggressor. (For more see: Strategy of Military Security of Ukraine. "Military Security - Comprehensive Defence," Decree of the President of Ukraine, March 25, 2021, N° 121/2021)

d. Volunteer of the Territorial Defence Forces of the Armed Forces of Ukraine – "a citizen of Ukraine or a foreigner or a stateless person who has been in Ukraine on legal grounds for the past five years and is voluntarily enrolled for service as part of a voluntary formation of the Territorial Defence Forces of the Armed Forces of Ukraine." https://sprotyv.mod.gov.ua/zakon-ukrayiny-pro-osnovy-natsionalnogo-sprotyvu/ The Law of Ukraine on the Foundations of National Resistance.

e. Voluntary Formation of a Territorial Community (VFTC) – "a paramilitary unit formed on a voluntary basis from citizens of Ukraine living within the territory of the relevant territorial community, which is intended to participate in the preparation and execution of territorial defence tasks within the territory of the relevant territorial community." https://sprotyv.mod.gov.ua/zakon-ukrayiny-pro-osnovy-natsionalnogo-sprotyvu/ The Law of Ukraine on the Foundations of National Resistance.

2) Strategic Level

a. Ukraine's Comprehensive Strategy is the foundation for a resilient national defence.

b. TDF integration into the AFU demonstrated the power of a motivated and committed population.

c. The National Mobilization Process allowed for the integration of volunteer forces into the "whole of society" approach to security.

3) Operational Level

a. TDF operations supplementing the AFU helped ensure success in halting the Russian invasion and in subsequent defensive operations.

b. The VFTC integration provided broader support to military and civilian requirements across the whole of Ukraine.

4) Tactical Level

a. TDF combat support ranged from defending critical facilities/infrastructure, supporting roadblocks, and organization of rapid response teams as well as supporting echelon defence.

5. QUESTIONS FOR CONSIDERATION

A. What is your definition of national resilience and how does it compare to the Ukrainian definition?

B. What is the relationship between national resilience and resistance (SOF and Resistance Movement)?

C. What are the critical lessons learned from Ukraine's total defence system?

D. What role has the Ukrainian Territorial Defence Force played? Has it been successful? Why or why not?

E. How relevant or applicable is Ukraine's total defence system to the needs of your nation or the security needs of other countries?

F. What lessons did you learn regarding the arming of civilians (VFTC) in support of Ukrainian National Defence?

G. What were the critical lessons learned in the mobilization process in accordance with the Ukrainian mobilization law?

H. What are some future considerations for sustaining national resilience?

Photographer: Eduard Kryzhanivskyi

LESSON 11:
ECONOMIC RESILIENCE, VOLUNTEERS, AND HUMANITARIAN ASSISTANCE ISSUES

1. PURPOSE AND SCOPE

This two-hour lesson provides additional aspects of the fundamentals of Ukrainian National Resilience. This lesson specifically addressed lessons learned associated with economic/financial adaptations, sections of the energy infrastructure, transportation (Rail), volunteerism, and humanitarian issues to include refugees/IDPs and private/commercial support to the war effort. Lessons learned from these efforts include governmental policy changes and innovative ways to address humanitarian needs. Modifications to this concept provide lessons learned for the development and implementation of a resilience concept within other countries. This lesson is suitable for audiences that study at any of the three levels of conflict (strategic, operational, tactical). When delivered alone, it provides a foundational overview of the subject. It can also be delivered as part of a group of lessons to provide additional background for further discussions. Given the breadth of the national resilience concept, there are multiple lessons that link to the topic. These include but are not limited to strategic *communications, logistics, character of war, violations of international law*, and *cyber operations*. Upon completion of this lesson, the student will be able to identify lessons learned involving the Ukrainian economic infrastructure, volunteerism, and support to humanitarian aid. This Lesson Plan may also serve as source material to be adapted by curriculum developers for incorporation into their own curriculum.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE the Ukrainian approach to non-military elements national resilience.

B. EXPLAIN the Ukrainian approaches and associated lessons learned regarding economic and critical infrastructure resilience.

C. DESCRIBE the impact and lessons learned associated with volunteerism and humanitarian aid in Ukraine's approach to resilience.

3. READINGS

A. General Overview Example

All identified readings are supplemental readings to enhance student background. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper. To access these, click on the links below.

1) Viktor Derevianko "Economic Resilience, Volunteers, and Humanitarian Assistance Issues." PowerPoint slides. https://deepportal.shq.nato.int/ilias/goto.php?target=file_19089_download&client_id=DEEP

2) Viktor Derevianko "Economic Resilience, Volunteers, and Humanitarian Assistance Issues" Talking Paper. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19091_download&client_id=DEEP

B. Strategic Level Example

1) *A Route to National Resilience. Building Whole-of-Society Security in Ukraine*, Authors: Teperik, Dmitri; Jermalavičius, Tomas; Senkiv, Grigori; Dubov, Dmytro; Onyshchuk, Yevhen; Pokalchuk, Oleh; Samus, Mykhailo Project director: Teperik, Dmitri. Publication date: April 2018 https://icds.ee/en/a-route-to-national-resilience-building-whole-of-society-security-in-ukraine/

2) Dowd, Anna M. and Cynthia R. Cook. "Bolstering Collective Resilience in Europe." *Center for Strategic and International Studies* (CSIS), 2022. https://www.csis.org/analysis/bolstering-collective-resilience-europe

C. Operational Level Example

1) Korostelina, Karina V. "National Resilience to Protracted Violence in Ukraine," *Peace and Conflict Studies*: Vol. 27: No. 2, Article 4. (2020) https://nsuworks.nova.edu/pcs/vol27/iss2/4/

2) Tomas Jermalavičius, Veli-Pekka Tynkkynen, | Andrian Prokip, Christian Egenhofer, Edoardo Righetti, Arūnas Molis, Priit Mändmaa, Tony

Lawrence, and Oleksandr Suk hodolia. "War And Energy Security Lessons for the Future," *International Centre for Defence and Security May 2023*. https://icds.ee/en/war-and-energy-security-lessons-for-the-future/

D. Tactical Level Example

1) Olena Kupenko, Andriana Kostenko, Larysa Kalchenko, Olena Pehota and Oleksandr Kubatko (2023). "Resilience and vulnerability of a person in a community in the context of military events." *Problems and Perspectives in Management*, 21(1), 154-168. doi:10.21511/ppm.21(1).2023.14 https://www.businessperspectives.org/index.php/journals?controller=pdfview&task=download&item_id=17673

2) Shannon Houck, "Psychological Capabilities for Resilience," (Dec 2022) https://warontherocks.com/2022/12/psychological-capabilities-for-resilience/

4. BACKGROUND AND DISCUSSION

A. General Overview

The focus is on lessons learned from a national response to a national crisis. This lesson provides students an introduction regarding how Ukraine addressed wartime challenges within the economic/critical infrastructure sphere of resilience. It also addressed the lessons learned from the significant role volunteers have played in enhancing Ukrainian resilience. Lastly, it recognizes the importance of foreign and domestic humanitarian aid organizations and activities that provide essential services and support to those affected by war to include children, refugees, and IDPs.

1) **Economic and Energy Resilience**

   a. The cost of war.

   b. Macroeconomics, GDP, Inflation, and Currency Valuation.

   c. Energy and adaptive responses to Russian targeting. Oil and gas solutions to access and shortages.

   d. Refugees and internally displaced persons (IDPs). Transportation challenges within the rail network and lessons learned.

e. Lessons Learned regarding the significant elements of Ukrainian national resilience to include:

f. Fixed exchange rate and war bonds held inflation rates.

g. Distributed energy systems using powerful generators increased energy system resilience.

h. Rapid reorientation of oil & gas logistical support to the armed forces.

2) **Volunteerism**

   a. Volunteerism as a measure of national resilience.

   b. Volunteer support to military units in the rear and in combat zones

   c. Direct support to the Territorial Defence Force (TDF) to include supplying weapons and combat support items.

   d. Lessons learned regarding the impact of volunteers on the Ukrainian war effort and national resiliency. to include:

   e. Volunteer organizations are a viable source for increased funding for Armed Force capabilities and demonstrate significant support of citizens for the armed forces.

   f. Private funding initiatives supported the Army and a fleet of drones, satellites, and intelligence software that enhanced defence innovation and effectiveness.

   g. Volunteer organizations represented a unified and cohesive society that actively participated in defence initiatives - key factors of RESILIENCE.

3) **Humanitarian Aid**

   a. The main objectives of humanitarian aid are saving human life, supplying basic human needs (water, food, accommodation), and providing basic hygiene and medical care.

   b. Types of humanitarian aid.

   c. Foreign and domestic donors.

   d. Results of humanitarian aid efforts through February 2022.

4) Lessons learned regarding humanitarian aid efforts to include

a. Coordination and collaboration among humanitarian organizations is essential to national resilience.

b. Local actors are crucial to the success of the humanitarian response.

c. Protection of civilians must be a priority.

d. Accountability and transparency are essential.

e. Sustainability is critical to long term resiliency and success.

5) Conclusion

B. Definitions

1) National Resilience—the ability of the state and society to effectively resist threats of any origin and nature, to adapt to changes in the security environment, to maintain stable functioning, to quickly recover to the desired balance after crisis situations. (Decree of the President of Ukraine N°. 479/202 "On the introduction of the national sustainability system").

2) National system of resilience - a complex of purposeful actions, methods, and mechanisms of interaction of state authorities, local self-government bodies, enterprises, institutions, organizations, civil society institutes, which guarantee the preservation of safety and continuity of functioning of the main spheres of life of society and the state before, during and after the onset of a crisis. (Decree of the President of Ukraine N°. 479/2021 "On the introduction of the national sustainability system").

3) Volunteerism - Volunteer activity is a voluntary, socially oriented, non-profit activity carried out by volunteers through the provision of volunteer assistance. (Decree of the President of Ukraine N°. 479/202 "On the introduction of the national sustainability system").

C. Strategic Level

1) Critical Infrastructure resilience strategies.

2) Economic resiliency.

3) Volunteerism as a means of national resilience and national security.

D. Operational Level

1) Lessons learned in rail network resiliency.

2) Integration of volunteer organizations in support of national humanitarian needs.

E. Tactical Level

1) Volunteer organization support to rear and combat areas.

5. QUESTIONS FOR CONSIDERATION

A. What are the most useful lessons learned from the Ukrainian approach to economic, energy, and transportation resilience efforts?

B. What are the critical lessons learned from Ukraine's integration of volunteer and private organizations within its national resiliency efforts?

C. Why is Humanitarian Assistance so significant to Ukraine's comprehensive defence strategy?

D. How relevant or applicable are Ukraine's lessons learned regarding economic resilience, volunteerism, and humanitarian aid to your nation's resilience strategy?

E. What are other considerations for national resilience?

LESSON 12:
RUSSIA'S VIOLATIONS OF THE LAW OF ARMED CONFLICT

1. PURPOSE AND SCOPE

This two-hour lesson provides an overview of how civilian organizations, institutions, and objects in Ukraine have been the object of Russian attacks which violate the Law of Armed Conflict (LOAC). It introduces the concept of forensic awareness, a concept closely related to situational awareness. Forensic awareness is an appreciation of the potential evidentiary value of information available across operating systems at the tactical, operational, and strategic levels. It further suggests actions which soldiers, leaders, and units can take to ensure the preservation of such information for eventual use by investigators, prosecutors, and tribunals seeking to hold individuals criminally liable in national or international tribunals for LOAC violations. It also suggests ways by which strategic communication may be employed to garner support for national actions taken to pursue accountability for LOAC violations. It is suitable for audiences studying any of the three levels of conflict (strategic, operational, or tactical.) Upon the completion of this lesson, the student will be able to describe the nature of LOAC violations which have occurred in Ukraine since February 2022, and which may occur in other large scale conventional conflicts. The student will also be able to demonstrate actions which can be taken to secure, gather, and/or preserve potential evidence of LOAC violations pending actions by formally designated investigative or prosecutorial authorities. The student will also be able to outline actions which can be taken to enhance strategic communication to garner international support of strategic national priorities. This Lesson Plan may also serve as source material to be adapted by curriculum developers for incorporation into their own curriculum.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE the nature, scope, and scale of representative Russian attacks on civilian infrastructure and objects in Ukraine.

B. DEMONSTRATE actions which can be taken to secure, gather, and/or preserve potential evidence of LOAC violations pending action by formally designated investigative or prosecutorial authorities.

C. OUTLINE actions which can be taken to enhance strategic communication to garner international support of strategic, national priorities.

3. READINGS

All identified readings are required to enhance the student's background on the subject. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper. To access these, click on the links below.

A. Required readings

1) Iryna Serheieva, "Violations of the Law of Armed Conflict" PowerPoint slides. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19093_download&client_id=DEEP

2) Iryna Serheieva, "Violations of the Law of Armed Conflict" Talking Paper. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19094_download&client_id=DEEP

3) Lauren Sanders, "Accountability and Ukraine: Hurdles to Prosecuting War Crimes and Aggression" Articles of War, Lieber Institute, U.S. Military Academy. (2022) https://lieber.westpoint.edu/accountability-ukraine-hurdles-prosecuting-war-crimes-aggression/

4. BACKGROUND AND DISCUSSION

A. General Overview

The armed forces of the Russian Federation initiated a full-scale ground invasion of Ukraine on 24 February 2022. This combined arms operation is the largest conventional war in Europe since the end of World War II in May 1945. While Russia expected to quickly overwhelm the armed forces of Ukraine and rapidly overthrow the country's government, stiff Ukrainian resistance has thus far stymied Russian hopes and prevented the achievement of Russian strategic objectives. Nevertheless, Russian forces continue to fight and have achieved limited operational and tactical gains.

From the outset, Russian forces have employed long range fires in the form of a variety of cruise missiles, ballistic missiles, and unmanned aerial vehicles (UAVs). Such attacks have frequently featured mass use of these weapons. They have also routinely included strikes on civilian objects, including homes, apartment blocks, schools, hospitals, churches, and other civilian infrastructure - objects which are protected under LOAC. The results of such strikes provide many useful examples of violations of LOAC through either the deliberate or indiscriminate targeting of civilian objects. Ukrainian authorities have also discovered glaring evidence of LOAC violations in areas which have been occupied by Russian forces and subsequently liberated by Ukrainian forces. These include apparent murder and summary executions. There have also been indications that Russian forces have committed LOAC violations against Ukrainian soldiers Russia holds as prisoners of war.

Instructors or developers should use this plan to 1) illustrate contemporary LOAC violations committed by Russia in Ukraine in order to demonstrate the reality that such violations have occurred there and can be expected to occur in similar conflicts and 2) informed by Ukrainian practices and lessons learned, introduce the concept of forensic awareness among learners. In doing so, the instructor should attune learners to the importance of recognizing and capturing operational information of potential evidentiary value. This plan is **NOT** intended as training or education for military lawyers, legal advisors, military police, or other personnel formally tasked and trained as investigators. It is instead designed to increase forensic awareness among military personnel operating in other functions. Further, this plan is **NOT** a substitute for basic instruction in LOAC, a subject which should already be addressed in detail in the standing curricula of national professional military education and in other standard training.

Successful learners will be able to describe the nature, scope, and scale of representative Russian attacks on civilian infrastructure and objects in Ukraine; demonstrate actions which can be taken to secure, gather, and/or preserve potential evidence of LOAC violations pending action by formally designated investigative or prosecutorial authorities; and outline actions which can be taken to enhance strategic communication in order to garner international support of strategic, national priorities.

B. Definitions

1) Situational awareness: The knowledge of the elements in the battlespace necessary to make well-informed decisions. AAP-6 NATO Glossary of Terms and Definitions.

2) Forensic awareness: An appreciation of the potential evidentiary value of information available across operating systems at the tactical, operational, and strategic levels. This is a term of art created by the developers of this lesson plan.

3) International Criminal Court (ICC): An international tribunal seated in The Hague, Netherlands. It is a permanent international court established by treaty (the Rome Statute) and has jurisdiction to prosecute individuals for the international crimes of genocide, crimes against humanity, war crimes, and the crime of aggression. 123 nations are signatories to the Rome Statute (notable exceptions include both Russia and the United States.) Rome Statute of the International Criminal Court, https://legal.un.org/icc/statute/99_corr/cstatute.htm

C. Strategic Level Lessons Learned

1) The importance of publicizing the fact of ongoing violations of the LOAC to garner international support in opposition to Russia's aggression.

2) Take active measures to counter Russian disinformation about the objects it strikes in Ukraine.

3) Such efforts can be facilitated through forensic awareness of the data available in operational records, demonstrating that objects which are struck were not legitimate military targets.

4) Seek the assistance of the International Criminal Court or similar entities to raise the profile of ongoing LOAC violations.

5) Advocate the intervention by other nations to hold those responsible for LOAC violations criminally responsible. As to Ukraine, engaged nations now include Estonia, Latvia, Lithuania, Sweden, Norway, Germany, Poland, Slovakia, Romania, Switzerland, and Spain - all of which have announced that they are willing to exercise universal jurisdiction to bring LOAC violators to justice.

D. Operational Level Lessons Learned

1) Recognize that military forces gather information in the regular course of operations which can be forensically important. For example, sensor (e.g., radar) data regarding the origin, type, trajectory, and point of impact of enemy missiles and other ordnance. Orders, logs, situational reports, and similar data can help account for the location and activities of friendly forces and hence help demonstrate that they were not at or near civilian objects which were targeted and struck.

2) Recognize that information gathered at impact sites about the ordnance employed can be forensically important. Data gathered by ordnance, intelligence, or other personnel, can help confirm the nature of guidance systems and support a conclusion that, given the technology employed, the strike involved the intentional targeting of civilian objects.

3) Rapidly exploit open intelligence to document enemy actions. As an example, Ukraine acquired imagery from commercial satellites which depicted the presence and position of the bodies of murdered civilians in the streets of Bucha (a suburb of the capital, Kyiv) as well as the time and date range when the bodies appeared in the imagery. This enabled Ukraine to counter Russian assertions that the bodies had been planted by Ukrainian forces after those forces had retaken Bucha.

E. Tactical Level Lessons Learned

1) Recognize the need to secure the scene of LOAC violations to preserve its forensic value. As the tactical situation permits, and without disturbing the scene, small units should take immediate action to secure scenes, photograph the general situation, identify, and record the identities of potential witnesses and preserve this data for transmission to trained investigators. As an example, Ukrainian soldiers videoed the scene where bodies were found in Bucha as they approached and arrived at the site.

2) Make timely reports of suspected LOAC violations to the next higher headquarters to facilitate engagement by forensically trained personnel.

5. QUESTIONS FOR CONSIDERATION

A. Based on what you have learned about Russian actions in Ukraine, and your prior training, describe Russian actions which you think are LOAC violations.

B. Based on the same considerations, describe why you think the conduct constituted LOAC violations.

C. Demonstrate your understanding of forensic awareness by describing examples of operational records or other data which would likely contain information or evidence relevant to the future prosecution of those responsible for LOAC violations.

D. What are some actions you or your unit could take in a combat situation which would help secure, gather, and/or preserve potential evidence of LOAC violations before trained investigators could become engaged?

E. Outline some actions senior leaders might take at the strategic level to encourage allies to assist in bringing LOAC violators to justice.

LESSON 13:
LESSONS LEARNED FROM A RUSSIAN PERSPECTIVE

1. PURPOSE AND SCOPE

The purpose of this two-hour lesson is to assess Russian Lessons Learned from their operations in the areas of air, maritime and riverine, and ground warfare, including their key successes and failures. The lesson accomplishes this by examining case studies in Russia's effort to gain air superiority, block naval ports, counter drones, enhance tactical ground operations, and improve logistics. It also provides students an introduction to Russia's military strategy, characteristics of command and control at the strategic and operational levels, and the basic organization (structure) of the Russian ground element which has undergone a level of transformation. This lesson is suitable for audiences that study any of the three levels of conflict (strategic, operational, tactical). When delivered alone it provides an overview of the subject. It can also be delivered as part of a group of lessons to provide the background and foundation for further discussions regarding these concepts. (See related lessons in the *Changing Character of War; Russian and Ukrainian Operational and Strategic Perspectives; Ground War at the Tactical Level; Intelligence, Surveillance, and Reconnaissance; The Russia-Ukraine War at Sea in 2022; Unmanned Systems: Maritime Robotic and Aerial Vehicles; the Air War; Air Defence; and The Impact of Logistics on the Russia-Ukraine War).* Upon completion of this lesson, the student will **understand** the functions, effects, and challenges of Russian air, land and maritime/riverine operations following the Russian invasion of Ukraine in February 2022. The student will also be able to **relate** that understanding to a different national situation to **identify** relevant aspects. This Lesson Plan may also serve as source material to be adapted by curriculum developers for incorporation into their own curriculum.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

1) EXPLAIN how the war in Ukraine has facilitated Russia's re-evaluation of its *air* offensive priorities as they relate to aviation assets, missiles, and drones.

2) DESCRIBE the evolution of Russia's *ground* war tactics, techniques and procedures following its invasion of Ukraine, specifically regarding Battalion Tactical Groups (BTG), tactical defensive operations, and logistics.

3) DISCUSS how the Russia-Ukraine war has transitioned Russia's Black Sea *maritime* assets to a predominately defensive posture despite the broader role they play in blocking Ukraine's harbours.

4) DESCRIBE how UAS, including drones, have significantly transformed Russian offensive and defensive operations in the air, land, maritime and riverine environments.

5) APPLY one or more of Russia's Lessons Learned to another national situation.

3. READINGS

The following is a list of publications helpful to understand Russian Lessons Learned, including Russian strategy, doctrine, and tactics related to the pre- and post-invasion periods. Readings 1-10 of the General Overview section are required. For the remaining three sections, the student should select three readings from each.

A. General Overview

1) Volodymyr Khmil, "Lessons Learned from a Russian Perspective," NDUU Talking Paper, https://deepportal.hq.nato.int/ilias/goto.php?target=file_19095_download&client_id=DEEP

2) Volodymyr Khmil, "Lessons Learned from a Russian Perspective," NDUU PowerPoint slides, https://deepportal.hq.nato.int/ilias/goto.php?target=file_19096_download&client_id=DEEP

3) Changing Character of War…

4) Russian and Ukrainian Operational and Strategic Perspectives…

5) Ground War at the Tactical Level…

6) Intelligence, Surveillance, and Reconnaissance…

7) The Russia-Ukraine War at Sea in 2022…

8) Unmanned Systems: Maritime Robotic and Aerial Vehicles…

9) The Air War…

10) Air Defence…

11) The Impact of Logistics on the Russia-Ukraine War…

12) Stefan Hedlund, "The collapse of the Russian military machine". Failed reforms, Reassessing Russia, GIS Reports, 2 May, 2022. https://www.gisreportsonline.com/r/russian-military-power/

13) Denys Davydenko, Margaryta Khvostova, Dmytro Kryvosheiev, Olga Lymar "Lessons for the West: Russia's military failures in Ukraine", European Council on Foreign Relations, 11 August 2022. https://ecfr.eu/article/lessons-for-the-west-russias-military-failures-in-ukraine/

14) Mark Galeotti, Pavel Baev, and Graeme P. Herd, "Militaries, Mercenaries, Militias, Morale, and the Ukraine War", Russia's Formal Chain of Command, European Center for Security Studies George C. Marshall, November 2022. https://www.marshallcenter.org/en/publications/clock-tower-security-series/strategic-competition-seminar-series-fy23/militaries-mercenaries-militias-morale-and-ukraine-war

B. Strategic Level

1) Mason Clark, Karolina Hird, George Barros, Russian Offensive Campaign Assessment, 11 April 2022. Special Edition: Army General Aleksandr Vladimirovich Dvornikov. https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-april-11

2) Jorge L. Rivero, "The Russian Military's Failure in Ukraine Is No Surprise," The National Interest, 12 December 2022 https://nationalinterest.org/blog/buzz/russian-military's-failure-ukraine-no-surprise-206016.

3) Aleksandr Golts, "Russia's Military Failures in Ukraine: Causes and Consequences", SCEEUS, 3 March 2023. Military Adventurism, P. 2-4., Serdyukov's Reform P. 6-8. https://sceeus.se/en/publications/russias-military-failures-in-ukraine-causes-and-consequences/

4) Simmone Shah, "The Russian Military's 4 Biggest Mistakes in Ukraine", Time, World, 24 February 2023 https://time.com/6258141/ukraine-russia-war-putin-military-mistakes/

5) Dr Jack Watling, Oleksandr Danylyuk, Nick Reynolds "Preliminary Lessons from Russia's Unconventional Operations During the Russo-Ukrainian War, February 2022–February 2023" RUSI Special Report, 29 March 2023. Russia Agent Network, P. 4-12. https://rusi.org/explore-our-research/publications/special-resources/preliminary-lessons-russias-unconventional-operations-during-russo-ukrainian-war-february-2022

6) Zoltan Barany "Armies and Autocrats: Why Putin's Military Failed", Journal of Democracy, Issue 1, January 2023, P. 80-94. https://www.journalofdemocracy.org/articles/armies-and-autocrats-why-putins-military-failed/

7) Rachel Tecott and Andrew Halterman, "The Case for Campaign Analysis: A Method for Studying Military Operations," International Security 45, no. 4 (Spring 2021): P. 44-83. https://direct.mit.edu/isec/article-abstract/45/4/44/100567/The-Case-for-Campaign-Analysis-A-Method-for

8) Seth G. Jones, "Russia's Ill-Fated Invasion of Ukraine. Lessons in Modern Warfare", CSIS BRIEFS, June 2022, Russian Military Failures P. 3-8. https://www.csis.org/analysis/russias-ill-fated-invasion-ukraine-lessons-modern-warfare

9) Kateryna Stepanenko, Katherine Lawlor, Karolina Hird, George Barros, and Frederick W. Kagan, Russian Offensive Campaign Assessment, August 7, 2022. The UK Ministry of Defense (UK MoD) confirmed ISW's previous assessments that Russian military leadership has experienced major turn-overs due to Russian military failures in Ukraine. https://understandingwar.org/backgrounder/russian-offensive-campaign-assessment-august-7.

10) Charles Bartles, "Factors Influencing Russian Force Modernization", US Army War College, December

2018. Modular maneuver brigades. P. 41. https://www.researchgate.net/publication/329946783_Russian_Force_Modernization

11) Riley Bailey and Kateryna Stepanenko, Russian Offensive Campaign Assessment, April 30, 2023, Institute for the Study of War and AEI's Critical Threats Project 2023. Russian Command Changes, P. 2-11. https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-april-30-2023

12) Dara Massicot, "What Russia Got Wrong: Can Moscow Learn from Its Failures in Ukraine," *Foreign Affairs*, March/April 2023. Accessed at: What Russia Got Wrong: Can Moscow Learn from Its Failures in Ukraine? (foreignaffairs.com)

13) Another Rude Awakening: Making Sense of Russia's War Against Ukraine, Swedish Defense Research Agency (FOI), June 2023. https://www.foi.se/rest-api/report/FOI-R--5332--SE

14) Ronald Ti & Christopher Kinsey (2023) Lessons from the Russo-Ukrainian conflict: the primacy of logistics over strategy, *Defence Studies*, July 2023. https://www.tandfonline.com/doi/full/10.1080/14702436.2023.2238613?src=

15) B.J. Armstrong, "The Russo-Ukrainian War at Sea: Retrospect and Prospect," *War on the Rocks*, 21 April 2022. https://warontherocks.com/2022/04/the-russo-ukrainian-war-at-sea-retrospect-and-prospect/

16) "How oceans became new technological battlefields," *The Economist*, 3 July 2023. https://www.economist.com/special-report/2023/07/03/how-oceans-became-new-technological-battlefields

C. Operational Level

1) Martin, D. Sean Barnett, and Devin McCarthy, "Russian Logistics and Sustainment Failures in the Ukraine Conflict: Status as of January 1, 2023," Rand, January 2023. https://www.rand.org/pubs/research_reports/

2) Ian Williams," Putin's Missile War: Russia's Strike Campaign in Ukraine," Center of Strategic and International Studies, May 2023. Accessed at: 230505_Williams_Putin_Missile.pdf (csis-website-prod.s3.amazonaws.com)

3) "Why logistics are too important to be left to the generals" *The Economist*, 3 July 2013. https://www.economist.com/special-report/2023/07/03/why-logistics-are-too-important-to-be-left-to-the-generals

4) Sébastien Roblin, Popular Mechanics, 1 January 2023, "7 Lessons Russia Learned from Its Epic Failures in Ukraine", https://www.popularmechanics.com/military/a44052470/how-russia-military-adapted-from-early-failures-in-ukraine/

D. Tactical Level

1) Dr Jack Watling, Oleksandr V Danylyuk and Nick Reynolds, "Preliminary Lessons from Russia's Unconventional Operations During the Russo-Ukrainian War, February 2022–February 2023" *RUSI* 29 March 2023. https://static.rusi.org/202303-SR-Unconventional-Operations-Russo-Ukrainian-War-web-final.pdf.pdf

2) Dr Jack Watling and Nick Reynolds, "Meatgrinder: Russian Tactics in the Second Year of Its Invasion of Ukraine" 19 May 2023. https://static.rusi.org/403-SR-Russian-Tactics-web-final.pdf

3) John Amble, "MWI Podcast: How is Russia Adapting its Tactics in Ukraine?" *Modern War Institute*, 31 May 2023. Accessed at: MWI Podcast: How Is Russia Adapting Its Tactics in Ukraine? - Modern War Institute (usma.edu)

4) Miroslav Mitrović, Dragan Bojanić, "Battalion tactical groups of the Russian armed forces in the altered physiognomy of modern conflicts", Research Gate, August 2021. https://www.researchgate.net/publication/353669886_BATTALION_TACTICAL_GROUPS_OF_THE_RUSSIAN_ARMED_FORCES_IN_THE_ALTERED_PHYSIOGNOMY_OF_MODERN_CONFLICTS

5) Рекомендации по противодействию противнику, действующему танковыми и механизированными колоннами [Recommendations for countering the enemy in tank and mechanized columns] Joint Grouping of Forces, Rostov-on-the-Don July 2003. https://sprotyvg7.com.ua/wp-content/uploads/2023/07/рекомендации_по_борьбе_с_пративником.pdf

6) "The latest in the battle of jamming with electronic beams" *The Economist*, 3 July 2023. https://www.economist.com/special-report/2023/07/03/the-latest-in-the-battle-of-jamming-with-electronic-beams

7) Ian Cameron, "Lessons from Ukraine's Current Air Defence Deficit" American Security Project, 30 November 2022. https://www.americansecurityproject.org/lessons-from-ukraines-current-air-defense-deficit/

4. BACKGROUND AND DISCUSSION

A. General Overview

The Russia-Ukraine war, with all its unique combinations of past and emerging tactics and technologies, has challenged Russia's doctrinal and conventional approaches to warfare in three environments (air, land, and sea) and at all three levels (tactical, operational, and strategic). A review of Russia's responses to these challenges–as observed by the Ukrainian Armed Forces after more than a year of war—provides a snapshot of key Russian Lessons Learned that may evolve its doctrine and way of war in the future. The outline below suggests subtopics for case studies that will provide the student with a broad context for this lesson subject.

B. Definitions

1) **General concept of strategy:** As a guide - strategy equals ends plus ways plus means - we can develop an approach to military strategy. Ends can be expressed as military objectives. Ways are concerned with the various methods of applying military force. In essence, this becomes an examination of courses of action designed to achieve the military objective. These courses of action are termed "military strategic concepts." Means refers to the military resources (manpower, materiel, money, forces, logistics and so forth) required to accomplish the mission. This leads us to the conclusion that military strategy is military objectives + military strategic concepts + military resources. This conceptual approach is applicable to all three levels of war: strategic, operational, and tactical. Source: https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/MR-75th-Anniversary/75th-Lykke/

2) **Military strategy** is one part of an all-encompassing national strategy. The military component of national strategy is sometimes referred to as national military strategy, where military strategy is at a higher level and differentiated from operational strategies used as the basis for military planning and operations. Military strategy must support national strategy and comply with national policy, which is defined as a broad course of action or statements of guidance adopted by the government at the national level in pursuit of national objectives. Source: https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/MR-75th-Anniversary/75th-Lykke/

3) **Military doctrine:** defines military-political, military-strategic, and military economic foundations for ensuring the country's security. It represents a system of officially accepted views and positions on the goals or character of a potential war, and how to prepare for it or prevent it. Source: https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf

4) **Non-military means:** broadly include political, information (both psychological and technical), diplomatic, economic, legal, spiritual/moral, and humanitarian measures. Source: https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf

5) **Types of war according to Russian military doctrine:** military danger, military threat, armed conflict, local war, regional war, and large-scale war. Source: https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf

6) **Active defense strategy:** a strategic concept integrating preemptive measures to prevent conflict, and wartime concepts of operations that seek to deny an opponent a decisive victory in the initial period of war, degrading and disorganizing its effort, while setting the conditions for a counteroffensive or attaining war termination. The strategy is related to a permanent standing force, arrayed with high-readiness operational formations in each strategic direction, prepared to execute operations jointly. Source: https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf

7) **Critical objects:** broad term for important military and civilian infrastructure targets: they vary at the strategic, operational, and tactical levels. Source: https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf

8) **Disorganization of C2:** measures aimed at complicating and fragmenting the functioning of an adversary C2 system, preventing effective management of forces, and achieving information superiority. Source: https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf

9) **Forms and methods of warfare:** forms include operations, engagement, combat, and strikes; while methods are understood as the aggregate of forms, modern approaches, and procedures. Source: https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf

10) **Initial period of war:** according to Soviet and Russian military science, this is the most critical and decisive period of conflict when countries launch strategic operations with already-deployed forces. Source: https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf

C. Strategic Level

1) AIR & AIR DEFENCE. In the initial stages of the Russia-Ukrainian war, Ukrainian Air Defence capabilities prompted Russia to emphasize missile and drone strikes over its use of air and aviation assets.

D. Operational Level

1) LOGISTICS. Logistical challenges, including overstretched supply chains and insufficient security, were central to Russia's failed effort in capturing Kyiv during the invasion of Ukraine.

2) ELECTRONIC WARFARE and DRONE JAMMING. Ukraine's effective use of drones against its adversary's front lines prompted Russian forces to re-allocate smaller and more mobile Electronic Warfare jamming capabilities to tactical units.

3) MARITIME & RIVERINE. Ukrainian attacks against Russian maritime and riverine assets led to significant changes in Russia's ship and boat offensive and defensive tactics since the beginning of the war.

E. Tactical Level

1) BATTALION TACTICAL GROUPS (BTG). The Russia-Ukraine war has significantly challenged Russia's design and concept for the BTG primarily in the areas of C2, task organization, infantry formations, and ISR employment.

2) GROUND DEFENSE. Longstanding inconsistencies in Russian and separatist ground defences became a critical weakness following the Russia-Ukraine invasion; however, Russian forces have now innovated and carried out new methods to strike enemy troops who occupy Russia's former strongholds.

5. QUESTIONS FOR CONSIDERATION

A. From a Russian perspective, what are some of the advantages and disadvantages of utilizing missiles and drones over air and aviation assets?

B. In terms of logistics, what significant components were absent during Russia's advance toward Kyiv, and would their presence have changed the outcome of Russia's initial invasion?

C. What are some ways in which drones have changed Russian offensive and defensive actions at the tactical, operational, and strategic levels?

D. What were two key events that caused Russia to modify its maritime posture in the Black Sea, with respect to its operations related to the Russia-Ukraine war?

E. Where and why are riverine operations critical to Russia and Ukraine success in the war, and what are some key riverine tactics carried out by each side?

F. From a Russian perspective, what were the intended strengths or advantages to the BTG formation, and why has the BTG largely failed to achieve its purposes in the Russia-Ukraine War?

G. What were some of the inconsistencies—or weaknesses—in Russia/separatist defensive operations in Ukraine since 2014, and what tactics has Russia adopted to strengthen these areas?

H. How do you define the general concept of military strategy?

I. What are the components of military strategy?

J. What are the main characteristics of Serdyukov's reform?

K. What is the role of "non-military means" according to the 2013 Gerasimov Doctrine?

L. What is the difference between the 2019 Gerasimov Doctrine and the 2013 doctrine?

M. What does "active defence" mean according to Gerasimov in the 2019 Doctrine?

N. What are the main differences between the 2015 and 2021 national security strategies of Russia?

O. What strategic goals did Russia pursue with the beginning of the full-scale invasion?

P. What role did the Primakov Doctrine play in shaping Russia's foreign policy?

Q. What are the characteristics of the Russian C2 on the strategic level?

R. What is the difference between the official and the real state of Russian C2?

S. What are the main failures of the Russian theatre commanders in Ukraine?

T. What are the main elements of the Russian BTG?

U. What key challenges did Russian commanders face in utilizing the BTG concept during their full-scale invasion of Ukraine?

V. What are the primary weaknesses of the Russian BTG?

W. How did Russia employ VKS during its invasion of Ukraine?

X. Describe the Russian defence posture following its retreat to the eastern and southern parts of Ukraine?

LESSON 14:
THE BATTLE UNDER BROVARY — THE GROUND WAR IN DEFENCE AT THE TACTICAL LEVEL

1. PURPOSE AND SCOPE

The purpose of this two-hour lesson is to highlight the lessons learned regarding mobile defence groups and small Unmanned Aerial Systems (sUAS)-assisted fire support in the defence of Kyiv. The Battle Under Brovary is used as the primary case study for this lesson. This overview lesson introduces students to the study of tactical defence, primarily the lethality of small mobile defence teams and fire support assets guided by real-time sUAS provided intelligence. When presented on its own, this lesson provides a general overview of the subject. It can also be presented as part of a group lesson to provide background and basis for further discussion of UAS, air defence, and fire support. Upon completion of this lesson, the student will understand the capabilities and advantages of highly mobile defence units armed with Anti-Tank (AT) and Man Portable Air Defence (MANPAD) weapons. Additionally, the student will understand the use and advantages of sUAS in indirect fire support. This lesson is linked to the UAV, National Resilience, Air Defence, and Air War lessons. This lesson plan can also serve as a source material for adaptation by curriculum developers for inclusion in their own curricula.

2. LESSON LEARNING OBJECTIVES

1) EXPLAIN the capabilities and advantages of highly mobile defence groups armed with AT and MANPAD weapons.

2) DESCRIBE sUAS-assisted fire support in the defence of Brovary.

3. READINGS

All identified readings are recommended as required readings. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Hryhorii Haidarly, "The Battle Under Brovary — The Ground War in Defense at the Tactical Level," PPT Briefing, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19098_download&client_id=DEEP

2) Hryhorii Haidarly, "The Battle Under Brovary — The Ground War in Defense at the Tactical Level," Talking Paper, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19097_download&client_id=DEEP

A. "**Battle for Kyiv:** Ukrainian valor, Russian blunders combined to save the capitol," By Paul Sonne, Isabelle Khurshudyan, Serhiy Morgunov, and Kostiantyn Khudov, *The Washington Post*, 24 April 2022. https://www.washingtonpost.com/national-security/interactive/2022/kyiv-battle-ukraine-survival/

B. **US Army Field Manual** 1-02.2 *Military Symbols* https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN35425-FM_1-02.2-000-WEB-1.pdf

C. **Defence of Kyiv**

1) Ukraine at War: Paving the Road from Survival to Victory. July 2022. *Royal United Services Institute for Defence and Security Studies*. Jack Watling, Nick Reynolds. p. 1-23. https://static.rusi.org/special-report-202207-ukraine-final-web_0.pdf

2) "The Russian Air War and Ukrainian Requirements for Air Defence." 7 November 2022. *Royal United Services Institute for Defence and Security Studies*. Justing Bronk, Jack Watling, Nick Reynolds. p. 35-41. https://static.rusi.org/SR-Russian-Air-War-Ukraine-web-final.pdf

3) "Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February–July 2022." *Royal United Services Institute for Defence and Security Studies*. Mykhaylo Zabrodskyi, Jack Watling, Oleksandr V Danylyuk and Nick Reynolds. p. 13-20, p. 24-34, p. 53-66. https://static.rusi.org/359-SR-Ukraine-Preliminary-Lessons-Feb-July-2022-web-final.pdf

4) "The Battle of Hostomel Airport: A Key Moment in Russia's Defeat in Kyiv.", 10 August 2023. *War on the Rocks*. Liam Collins. https://warontherocks.com/2023/08/the-battle-of-hostomel-airport-a-key-moment-in-russias-defeat-in-kyiv/

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson uses the case study of the Battle Under Brovary to highlight two specific lessons learned from the war in Ukraine. This lesson introduces students to the study of tactical defence, more specifically small mobile defence teams and fire support assets guided by real-time sUAS provided intelligence. Both innovations were crucial in Ukraine's defence of Kyiv. This lesson begins with setting the stage of the battle, to include the order of battle of both the Ukrainian's 3rd Battalion of the 72nd Mechanized Brigade and elements of the Russian 6th Tank Regiment. The main objectives of the defence are explained. The main tasks of the Ukrainian units are also delineated. The lesson then explains the terrain and infrastructure on which the battle ensues. The conduct of the ambush and the results of the combat are explained. Most importantly, this lesson discusses the "why" of the battle. How did Ukraine accomplish such a decisive victory over the Russians?

The student can draw two main lessons learned from the Battle Under Brovary. First, the Ukrainians used small, mobile attack teams armed with AT weapons and MANPADs. This allowed for a high level of mobility and encouraged surprise and the use of the "shoot and scoot" technique. Russian air assets were exceptionally vulnerable to ambush. The second lesson from this battle is one on the contribution of sUAS to both these mobile attack teams and indirect fire, including mortars, artillery, and tanks firing in in-direct mode. sUAS allowed the Ukrainians to find and target the Russian column and adjust fire for deadly results. These two innovations, small mobile teams, and the use of sUAS, allowed the Ukrainians to stave off the Russian advance and protect Kyiv.

B. Outline of Presentation

1) <u>Capabilities and advantages of highly mobile defence groups armed with AT and MANPAD weapons.</u>

   a. The three stages of the defence of Kyiv during the operation.

   b. The key tasks of the initial stage of the defence of Kyiv.

      i. Mobile support for units in first battle positions.

      ii. Delaying operations.

      iii. Blocking force.

   c. The enemy's main miscalculations during the war.

      i. Miscalculation of a blitzkrieg success.

      ii. Not prepared for combat

      iii. Overestimated Russian sympathizers and 5th columnists in Kyiv.

   d. Russian tactical errors

      i. Long supply lines

      ii. Large formations.

      iii. Low communications

      iv. SAT navigation jamming

   e. The AFU basic order of battle for small, mobile defence groups.

      i. Anti-tank weapons (Javelin, NLaw, Stugna-P, RPG-7).

      ii. MANPADs (Stinger, Igla, Piorun).

   f. Russian order of battle

   g. Infrastructure and terrain limited the enemy's deployment into combat formations.

   h. Armed Forces of Ukraine (AFU) advantages.

      i. Support from and interaction with the local population.

      ii. Local population provided "technicals"

      iii. ISR warning

      iv. Knowledge of local terrain

      v. Local population support in creating defensive positions.

      vi. AFU Mission Command and flexibility.

   i. The ambush and aftermath.

2) <u>sUAS-assisted fire support in the defence of Brovary.</u>

   a. Early pre-positioning

      i. Fire positions.

      ii. Medical transfer areas

      iii. Mining operations.

   b. 3rd Mech BDE order of battle

c. Ambush actions

d. Tank fire

    i. Indirect –ARMOR programme

    ii. Direct

    iii. Changing fire locations

e. Mortar fire

f. Artillery fire

g. sUAS support

    i. ISR/target location

    ii. fire adjustment

h. Russian actions

    i. Chaos

    ii. Defensive positions

3) Conclusions/Lessons Learned

a. sUAS support enabled accurate indirect fires. Using the Mavic 3 commercial drone, the 3rd Battalion of the 72nd Mech Brigade was able to find, fix, engage, and evaluate Russian targets.

b. Small mobile groups using AT and MANPAD weapons were able to ambush Russian formations that were canalized and restricted to the main highway.

C. Definitions

1) sUAS. For this lesson plan, we use the term sUAS for small Unmanned Aerial Systems instead of the more common term drone or Unmanned Aerial Vehicle (UAV).

2) The term ARMOR stands for the software programme that allows tanks to fire in an indirect mode.

5. QUESTIONS FOR CONSIDERATION

A. What factors contributed to the Russian's lack of preparation? What assumptions did the Russians make?

B. How do you think this battle would have concluded had the Russians been more prepared?

C. How could the Ukrainians have been better prepared?

D. How did technology assist the Ukrainians?

E. What operational risks did the Ukrainians take, especially in terms of task organization?

F. How did you think Ukrainian tactics departed from traditional Soviet doctrine, and how important was this deviation?

G. Consider the lack of deliberate defences. How could better trenches, dragon's teeth, etc., have improved or detracted from the Ukrainian defence?

H. How did the Russian manoeuvre units operate at various stages?

I. How did the offensive operations of the Russian forces at the beginning of the aggression reflect their adherence to combat doctrines?

J. In what types of areas did the Russian units show changes in attack tactics?

K. According to the Russian rules of combat, what are assault groups and what is their purpose?

L. What were the three stages of the defence of Kyiv during the operation?

M. What were the key tasks at the initial stage of the defence of Kyiv?

N. How did the infrastructure limit the enemy's deployment into combat formations?

O. How did the enemy provide air support for its ground operations?

P. How were mobile fire groups created to counter enemy aircraft?

Q. Can you give an example of a successful air defence operation using man-portable air defence systems?

R. What became the main way to fight attack aircraft and combat helicopters?

S. What are the challenges of performing ambush missions?

Photographer: Eduard Kryzhanivskyi

LESSON 15:
THE WAR AT SEA

1. PURPOSE AND SCOPE

The purpose of this two-hour lesson is to understand the features of enclosed sea/littoral naval warfare through the lens of the Ukrainian experience and lessons learned in the war at sea against Russia in 2022. The scope includes operational objectives and approaches, resource constraints and prioritization of enemy targets; the use of shore-based and unmanned reconnaissance and strike capabilities to overcome disadvantages against a stronger naval power; and the contribution of riverine forces to land operations.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

1) RECOGNIZE Ukrainian and Russian navy composition, objectives, and operational approaches at the outbreak of hostilities.

2) EXPLAIN early operations of both Ukrainian and Russian navies in the Black Sea

3) DESCRIBE the planning and attack on the cruiser *Moskva*, and how the loss of the ship affected subsequent operations in the Black Sea.

   a. Explain the role of unmanned reconnaissance vehicles and surface-based anti-ship cruise missiles in the attack.

4) EXPLAIN how Ukrainian unmanned systems (UAVs, USVs) were used as separate reconnaissance and attack platforms to detect and engage Russian surface targets.

   a. Identify the advantages and disadvantages of unmanned systems in the maritime domain.

5) RECOGNIZE the missions of riverine forces and their relationship to ground operations.

3. READINGS

A. General Overview

All identified readings could be required or optional readings. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Mykhailo Chuchyn, "War at Sea" PowerPoint slides. National Defense University Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19099_download&client_id=DEEP

2) Mykhailo Chuchyn, "War at Sea" Talking Paper. National Defense University Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19100_download&client_id=DEEP

B. Additional Readings—General

1) B.J. Armstrong, "The Russo-Ukrainian War at Sea: Retrospect and Prospect," *War on the Rocks*, 21 April 2022, https://warontherocks.com/2022/04/the-russo-ukrainian-war-at-sea-retrospect-and-prospect/ **Note:** Brief overview of the war at sea. Analysis ties into historical and contemporary thinking on doctrine, particularly Sea Control.

2) Bill Combes, "The War at Sea: Russia's War in Ukraine, Series No. 6," International Centre for Defence and Security, June 2022, https://icds.ee/en/russias-war-in-ukraine-the-war-at-sea/ **Note:** Draws lessons learned from the war at sea for Baltic States, and states with small navies, which might find themselves at war against a more powerful navy.

3) Seth Cropsey, "Naval Considerations in the Russo-Ukrainian War," *Naval War College Review*, Vol. 75/4, Autumn 2022, https://digital-commons.usnwc.edu/nwc-review/vol75/iss4/4/ **Note:** Excellent analysis of the war at sea. Provides historical underpinnings and a thorough analysis of the first year of the war at sea.

4) Daniel Fiott, "Relative Dominance: Russian Naval Power in the Black Sea," *War on the Rocks*, 9 November 2022, https://warontherocks.com/2022/11/relative-dominance-russian-naval-

power-in-the-black-sea/ **Note:** Good overview from the Russian perspective.

5) Raul (Pete) Pedrozo, "Russia-Ukraine Conflict: The War at Sea," *International Law Studies*, Vol 100, 2023, https://digital-commons.usnwc.edu/ils/vol100/iss1/1/ **Note:** Not operationally oriented. Analyzes the war at sea from an international law perspective. An interesting section on mine warfare.

6) Allam C. Stam and Andrew Bennett, "The Naval War for Ukraine," UVA Frank Batten School of Leadership and Public Policy, 28 March 2002, https://batten.virginia.edu/about/news/naval-war-ukraine **Note:** Concise overview of the war at sea.

7) Yakymiak, Stepan. Hybrid and War Actions of the Russian Federation at Sea: Lessons Learned, Cooperative Countering and Prospectives // *National Security and the Future* (Journal). 2023. Volume 24, No. 1. https://www.nsf-journal.hr/online-issues/focus/id/1418#.ZAM2W3ZBxPb **Note:** Directly relates to the presentation.

C. Additional Readings — Strategic

1) Maritime Strategy of Ukraine, https://zakon.rada.gov.ua/laws/show/1307-2009-%D0%BF#Text

2) Strategy of the Naval Forces of the Armed Forces of Ukraine 2035, https://navy.mil.gov.ua/strategiya-vijskovo-morskyh-syl-zbrojnyh-syl-ukrayiny-2035/

D. Additional Readings — Tactical

1) Sidharth Kaushal, Ukraine's Uncrewed Raid on Sevastopol and the Future of War at Sea," *RUSI*, 2 February 2023, https://www.rusi.org/explore-our-research/publications/commentary/ukraines-uncrewed-raid-sevastopol-and-future-war-sea

4. BACKGROUND AND DISCUSSION

A. Ukrainian and Russian navy composition, objectives, and operational approaches at the outbreak of hostilities

1) Slide titles

a. "The main provisions of Russian naval strategy"

b. "Russia's strategic directions and aims"

c. "General ratio of forces at sea 24.02.2022"

d. "Russian strategy at sea (24.02.2022): operation objectives in Black Sea and Sea of Azov"

e. "Main tasks of Ukrainian naval task forces"

Enhance NATO capability in the Black Sea. Current NATO members (Romania, Bulgaria, Turkey) do not have sufficient assets to deter Russian activities. Consider (once hostilities have concluded) establishing a standing NATO force for the Black Sea.

Requirements for comprehensive defence of maritime states:

Must be built on the principles of joint forces and have a unified C2 system before war.

Can be ensured using asymmetric methods and means (mine weapons, coastal missile systems, reconnaissance and strike maritime robotic systems, etc.).

Requires an advantage in awareness of the situation at sea, constant complex analysis (retrospective and prospective) of the enemy forces.

To prevent or disrupt the enemy's command at sea it is necessary to ensure an intellectual advantage and combination of kinds of defence (in particular coastal defence by the creation of mine-missile-artillery positions).

2) Definitions

a. Sea Control – A wartime condition in which naval forces of one country have uncontested use of the sea or sea lanes, while denying their use to the enemy. (Generally accepted definition)

b. Ukrainian Naval Task Force – Equivalent to NATO Maritime Component Command (AJP 3.1)

B. Early operations of both Ukrainian and Russian navies in the Black Sea

1) Slide titles

a. "Stages of the war at sea"

b. "Combat actions (episodes, examples) on the mine-missile-artillery positions"

c. "Combat actions (episodes, examples) fire support of ground forces"

The importance of anti-access/area denial when fighting an enemy with superior naval forces.

C. The attack on the cruiser Moskva and how the loss of the ship affected subsequent operations in the Black Sea. The role of unmanned reconnaissance vehicles and surface-based anti ship cruise missiles in the attack.

1) Slide titles

a. "Combat actions for the destruction of guided missiles warships"

b. "Disruption of the Russia's sea control"

c. "Consequences of the destruction of the cruiser (tactical, operation, strategic)"

d. "Enemy's losses of warships"

Shore based anti-ship cruise missiles (ASCMs) can provide an important means of Area Denial, increasing standoff distances from the coastline, while also offering the opportunity to attack and sink enemy warships. Effective ASCM coverage will require both land-based mobile missile batteries and anti-ship cruise missile warships.

D. Ukrainian unmanned systems (UAVs, USVs) employed as reconnaissance and attacks on Russian surface units. Advantages and disadvantages of unmanned systems in the maritime domain.

1) Slide titles

a. "Main lessons learned from UAVs employment to hit sea targets"

b. "Combat actions of the maritime robotic systems for destruction of the enemy warships in the naval base"

c. "Main conclusions and lessons learned USV employment"

d. "Advantages and disadvantages of USV"

Autonomous vehicles (USVs, UUWs), provide a cost-efficient means of ISR and targeting without putting ships and sailors in harm's way. However, … the emergence of countermeasures (jamming, directed energy weapons, etc.) requires continuous effort to overcome the technical countermeasures. Unmanned vehicles

(aerial, surface and underwater) must be employed not only for ISR tasks, but to strike the enemy as well. At the same time, it is necessary to consider that the enemy is also learning and drawing conclusions. They significantly improved the defence of base points, with the use of boom barriers. That is why it is exceedingly difficult to attack their ships in base points. In these conditions, ambush tactics can be successful and effective. A stealth approach to the enemy is especially important in these conditions and therefore the use of underwater drones will be appropriate.

Ships remaining in a single port for too long become targets, particularly with the use of unmanned vehicles for ISR. Ships need to be rotated or develop means to camouflage if spending extensive periods in port. And it was confirmed by the experience of the Ukraine NTF employment. UKR ships and boats continually change their positions, especially after enemy strikes or the detection of a reconnaissance drone.

E. Riverine forces and their relationship to ground operations

1) Slide title

a. "Prerequisites of creation of riverine forces and its main tasks"

It is important that countries with large rivers do not forget about riverine forces. It was a shortcoming before the war, and Ukraine had developed such forces during hostilities.

F. Lessons Learned

1) Shore based anti-ship cruise missiles (ASCMs) can provide an important means of Area Denial, increasing standoff distances from the coastline, while also offering the opportunity to attack and sink enemy warships. Effective ASCM coverage will require both land-based mobile missile batteries and anti-ship cruise missile warships.

2) Autonomous vehicles (USVs, UUWs), provide a cost-efficient means of ISR and targeting without putting ships and sailors in harm's way. However, … the emergence of countermeasures (jamming, directed energy weapons, etc.) requires the continuous effort to overcome the technical countermeasures. Unmanned vehicles (aerial, surface and underwater) must be employed not only for ISR tasks, but to strike the enemy as well. At the same

time, it is necessary to consider that the enemy is also learning and drawing conclusions. He significantly improved the defence of base points, with the use of boom barriers. That is why it is exceedingly difficult to attack his ships in base points. In these conditions, ambush tactics can be successful and effective. A stealth approach to the enemy is particularly important in these conditions and therefore the use of underwater drones will be appropriate.

3) Ships remaining in a single port for too long become targets, particularly with the use of unmanned vehicles for ISR. Ships need to be rotated or develop means to camouflage if spending extensive periods in port. This was confirmed by the experience of the Ukraine NTF employment. UKR ships and boats continually change their positions, especially after enemy strikes or the detection of a reconnaissance drone.

4) Enhance NATO capability in the Black Sea. Current NATO members (Romania, Bulgaria, Turkey) do not have sufficient assets to deter Russian activities. Consider (once hostilities have concluded) establishing a standing NATO force for the Black Sea

5) It is important that countries with large rivers do not forget about riverine forces. It was a shortcoming before the war, and Ukraine had developed forces during hostilities.

6) Requirements for comprehensive defence of maritime states:

a. Must be built on the principles of joint forces and have a unified C2 system before war.

b. Can be ensured using asymmetric methods and means (mine weapons, coastal missile systems, reconnaissance and strike maritime robotic systems, etc.)

c. Requires continuous analysis of enemy capabilities and actions to maintain a maritime domain awareness advantage.

d. To prevent or disrupt the enemy's command at sea it is necessary to ensure an intellectual advantage and combination of kinds of defence (in particular coastal defence by the creation of mine-missile-artillery positions).

5. QUESTIONS FOR CONSIDERATION

A. What was the state of the Ukrainian Navy at the outbreak of hostilities? What were its objectives? What operational approaches did it develop to achieve those objectives?

B. How did the Ukrainian Navy adapt its operational approaches during the first phase of the war at sea?

C. What was the state of the Russian Navy at the outbreak of hostilities? What were its objectives in the war? What operational approaches did it develop to achieve the objectives?

D. What types of operations occurred during this period?

E. What assets were involved in the attack on *Moskva*? What were the operational, strategic, and tactical consequences of the sinking of *Moskva*?

F. What roles did unmanned systems play in the naval war.

G. What roles do riverine forces play in a ground war? What missions did the Ukrainian Navy assign to its riverine forces?

LESSON 16:
UNMANNED AERIAL VEHICLES

1. PURPOSE AND SCOPE

The purpose of this lesson is to understand the various Lessons Learned resulting from the sudden and massive presence of Unmanned Aerial Vehicles (UAVs) in the Russian-Ukraine War. Though present on the battlefield for many years, the Russian War Against Ukraine has seen the widespread penetration of UAVs into many different combat functions, and an attendant acceleration of technological adaptation on both sides of the fighting. Rapid adoption of UAVs down to the lowest tactical level has furnished Ukraine with vital tactical efficiency and an economy of force option even as it is locked in an attritional struggle with a much larger opponent. Beyond this issue, a key takeaway from this period of instruction is that all militaries will need to come to terms with the presence, utility, and challenges of ubiquitous UAV usage for the near future. While many of the specific techniques, procedures and problems mentioned in this lesson will lose their currency very rapidly, the overall dynamic and need of militaries to rapidly field, test, exploit and adapt to relatively low-cost, high utility UAVs will likely remain.

Students should finish this approximately two-hour lesson and they will be able to **understand** these various lessons and to provisionally **apply** those lessons into new situations in the contemporary environment and/or near future. Staying ahead in this cycle, especially in the tactical sphere, has and will likely again represent the margin of victory or defeat in the tactical fight, and perhaps beyond. Because UAVs have become part of so many other joint functions, it is recommended that this lesson be used in conjunction with others from this series, most especially, *Intelligence, Surveillance and Reconnaissance, National Resilience, Fire Support, Air Defence, War at Sea, and Strategic Communication.*

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. EXPLAIN the rapidly evolving dynamic created by the massive presence of UAVs on the tactical/operational battlefield, particularly concerning:

1) The speed and efficiency of the Ukrainian Recon-Strike Complex.

2) The adaptation and growing effectiveness of Russian Electronic Warfare countermeasures.

3) The power of UAVs particularly in a defensive scheme.

B. DESCRIBE how UAVs, despite their apparent tactical nature, have created a temporary economy of force advantage for Ukraine and how Russian adaptation threatens this advantage.

C. SUMMARISE how civil-military partnerships in terms of drone technology has provided Ukraine important successes in terms of technical and tactical flexibility as well as critical strategic messaging.

D. APPLY and extrapolate these lessons to a new theatre and timeframe.

3. READINGS

All identified readings are required to enhance the student's learning. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper. To access these, click on the links below.

A. General Readings

1) Ilona Korenivska, Ukrainian Air Force, Talking Paper, available at https://deepportal.hq.nato.int/ilias/goto.php?target=file_19101_download&client_id=DEEP

2) Ilona Korenivska, Ukrainian Air Force, PowerPoint slides, available at: https://deepportal.hq.nato.int/ilias/goto.php?target=file_19102_download&client_id=DEEP

B. Recommended Readings

The following readings and podcast do an excellent job of highlighting/reinforcing how rapid adaptation and innovation of the kind mentioned in the main Talking Paper and presentation have kept Ukraine in a war against an opponent who outmatches it in most objective measures of strength. The authors discuss UAVs as a critical component in any analysis of Ukrainian resistance. These resources can provide additional wid-

er-ranging context for the discussion questions. The last reading addresses how UAVs have become a key part of Ukrainian public relations.

1) John Amble, MWI Podcast: "Who Innovates Wins? Drones and Adaptation in the Ukraine War," Modern War Institute, West Point, NY, 15 January 2023. Accessed at: MWI Podcast: Who Innovates Wins? Drones and Adaptation in the Ukraine War - Modern War Institute (usma.edu)

2) Seth G. Jones, et al, "Ukrainian Innovation in a War of Attrition," *Center for Strategic and International Studies*, 27 February 2023. Accessed at: https://www.csis.org/analysis/ukrainian-innovation-war-attrition

3) Faine Greenwood, "The Drone War in Ukraine is Cheap, Deadly, and Made in China," *Foreign Policy Magazine*, 16 February 2023. Accessed at: https://foreignpolicy.com/2023/02/16/ukraine-russia-war-drone-warfare-china

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson explores UAV usage across the various levels of war. Bear in mind, however, that strict distinctions are not always possible or fruitful. The lesson proceeds conceptually rather than chronologically from the close-in fight to the broader strategic issues raised by UAV usage. Furthermore, it will focus exclusively on *aerial* vehicles, though any observer of the war will know that unmanned systems have progressed beyond the air domain. For an exploration of naval drones, please reference the *War at Sea* module.

B. Definitions

1) NATO UAV Classification:

Class	Application level	Range of action	NATO classification	Level
Class I < 150 kg	micro (tactical) take off weight < 2 kg	less than 5 km	micro	platoon, company, battalion
	mini (battlefield) 2 kg ≤ take off weight ≤ 15 kg	more than 5 km	mini	
	small (tactical) take off weight > 15 kg	more than 25 km	small	
Class II 150-600 kg	tactical (operational and tactical)	more than 50 km	tactical	battalion-brigade
Class III > 600 kg	operational	more than 200 km	MALE	brigade, formations of several brigades
	strategic		HALE	

MALE – Medium Altitude, Long Endurance

HALE – High Altitude, Long Endurance

C. Tactical/Operational Level

The following are topics to keep in mind as you peruse the lesson material.

1) Ukrainian Recon-Strike Complex (artillery).

   a. Tactical (Civilian) UAVs, e.g., Mavic-3, FPV systems

   b. Incorporation of UAVs to Situational Awareness Systems (Delta and Kropyva systems)

   c. Role of personal technology for training and updates to Tactics, Techniques and Procedures

2) Effectiveness of Russian/Ukrainian "trench" Electronic Warfare systems – intensity of drone losses

3) TB2 (Bayraktar) as Strike to Reconnaissance Platform – need for cost efficient substitutes

4) Russian "Terror" Drones, e.g., Shaheed strikes – low cost, high notoriety – imposes need for Ukraine to develop a cheaper countermeasure (See module on *Air Defense*)

D. Strategic Level

The following are topics to keep in mind as you peruse the lesson material

1) Danger of cost inversion – "Drones are cheaper than the means to destroy them." (Reference C4) Russian moves to acquire a small-drone fleet.

2) Military-Civilian Cooperation for UAV acquisition and training, e.g., "Victory Drones", "Drone Army" phenomenon

3) UAVs as key component of Ukrainian Strategic Communication (See module on *Strategic Communication*)

E. Application (See discussion questions I-M)

Group work suggestion (15-20 min, *replaces applicable discussion questions - if you desire to take this lesson more to the level of Analyze, consider using the discussion questions*): Consider breaking the class into two groups. Have one group consider the effect of UAVs on offensive warfare in the near future, while the second group considers the likely defensive effects. After they have briefed one another, have the student place that struggle into a specific real-world context, e.g., South China Sea and the Korean peninsula. Now, have them consider how their estimate of the effects changes given the context.

5. QUESTIONS FOR CONSIDERATION

A. How might the Russo-Ukrainian War's opening phase have gone if Ukraine did not have access to a large fleet of tactical/operational UAVs?

B. How did Ukraine, despite no active government drone programme prior to 2014, manage to field such a vast and sophisticated drone force from the war's outset?

C. How have tactical drones facilitated Ukraine's strike complex at the tactical level? How has readily accessible, downloaded situational awareness software facilitated the speed of this system? Why was Russia's version of this (Orlan-10 primarily) not as efficient earlier in the war?

D. How has Russia recovered from its initial deficit in small, tactical drones?

E. Though crucial in the first eighteen months of the conflict, how important do you believe UAVs will be for the remainder of the war, and for future conflicts in the next five years? How will issues of distance (distances even larger than the Ukraine frontline) affect the military usage of UAVs?

F. How important has the ubiquity of near real-time video been to creating and maintaining international public support for Ukraine?

G. What aspects of Russian failure in the initial stages of the war should you consider as pertinent to the weaknesses of your own military establishment?

H. Will the war move to larger, more capable drones to overcome EW or to drone swarm tactics?

I. Will pervasive UAVs push combat to more night-time operations?

J. While clearly powerful in the defence, can UAVs be more effectively adapted to a potent operationally offensive role?

K. How might your own nation's doctrine need to shift to accommodate omnipresent UAVs?

L. Given the increasingly hostile EW and Air Defence environment, will civilian drones be pushed from the battlefield? Is there a need for development of more operational use of UAVs?

M. In an attritional struggle, widespread UAV usage is key in preserving lives for Ukrainian forces. Each UAV sortie represents a task that a Ukrainian soldier does not have to perform at risk to self. How much does improved Russian Electronic Warfare threaten this key aspect of economy of force? Can Russia reverse this cost imposition system? How might this dynamic play out in conflict against an even more technologically developed adversary?

LESSON 17: FIRE SUPPORT

1. PURPOSE AND SCOPE

This two-hour lesson (this could be a three-hour lesson given the material covered) provides the fundamentals of using precision guided munitions (PGMs) and countering enemy artillery fires during the Russian War against Ukraine. It is suitable for audiences at the tactical level of conflict. When delivered alone, it provides an overview of the subject. It can also be delivered as part of a group of lessons to provide the background and foundation for further discussions regarding these concepts. Upon completion of this lesson, the student will be able to: **explain** the types of PGMs used in the Russian-Ukrainian war, **describe** the distinct features of PGM employment, and **summarise** what type of PGM is the most suitable to engage enemy command posts, logistical points, high value targets, and bridges when the enemy is using Electronic Warfare (EW) capabilities. The learner will also be able to: **identify** counter-battery fire tactical procedures used in the Russian-Ukrainian war and **describe** Ukrainian artillery units' adaptation to enemy counter-fire. The student will also be able to **relate** that understanding to a different national situation to **identify** relevant aspects. This Lesson Plan may also serve as source material to be adapted by curriculum developers for incorporation into their own curriculum. The **primary lesson learned** is the ability to destroy targets on a first strike increases a firing unit's survivability, and employment of laser-guided artillery rounds gives an important advantage while fighting against an enemy force that actively uses EW capabilities.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. IDENTIFY counter-battery fire tactical procedures used in the Russian-Ukrainian war.

B. DESCRIBE how Ukrainian artillery units adapt to overwhelming enemy counter-fire.

C. EXPLAIN the types of precision-guided munitions used in the Russian-Ukrainian war.

D. DESCRIBE distinct features of precision-guided munition employment.

E. SUMMARISE how Ukraine adapted its employment of precision-guided munition to engage enemy command posts, logistical points, high value targets, and bridges in a saturated EW environment.

3. READINGS

A. General Overview

All identified readings enhance student background. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper. To access these, click on the links below.

1) Iurii Repilo, Fire Support PowerPoint slides. National Defense University Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19103_download&client_id=DEEP

2) Iurii Repilo, Fire Support Talking Paper. National Defense University Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19103_download&client_id=DEEP

B. Counter-battery Readings

1) Required. Fire Support slides, Iurii Repilo (2023). https://deepportal.hq.nato.int/ilias/goto.php?target=file_19104_download&client_id=DEEP

2) Required. Fire Support Talking Paper, Iurii Repilo (2023). https://deepportal.hq.nato.int/ilias/goto.php?target=file_19103_download&client_id=DEEP

3) Required. Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February-July 2022, Mykhaylo Zabrodskyi, Jack Watling, Oleksandr V Danylyuk and Nick Reynolds. https://www.degruyter.com/document/doi/10.1515/sirius-2023-1011/html

4) Required. Shaping the battlefield, Gerry Doyl (2023). https://www.reuters.com/graphics/UKRAINE-CRISIS/ARMS/lgvdkoygnpo/

5) Required. The Art of Countering Artillery Fires in Ukraine. https://www.armadainternational.

com/2023/03/the-art-of-countering-artillery-fires-in-ukraine-2/

6) Required. Meatgrinder: Russian Tactics in the Second Year of Its Invasion of Ukraine. https://static.rusi.org/403-SR-Russian-Tactics-web-final.pdf

PGM Readings

1) Required. Fire Support presentation, Iurii Repilo (2023). https://deepportal.hq.nato.int/ilias/goto.php?target=file_19104_download&client_id=DEEP

2) Required. Fire Support Talking Paper, Iurii Repilo (2023). https://deepportal.hq.nato.int/ilias/goto.php?target=file_19103_download&client_id=DEEP

3) Required. Lessons from the Ukraine-Russia conflict, Abhijit Singh (2023). https://www.orfonline.org/expert-speak/lessons-from-the-ukraine-russia-conflict

4) Required. The Russia-Ukraine Conflict and the (Un) Changing Character of War. *Journal of Military and Strategic Studies*, Paul Robinson, VOLUME 22, ISSUE 2. Page 65 – 87. https://jmss.org/article/view/76588

5) Required. Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February-July 2022, Mykhaylo Zebrowski, Jack Watling, Oleksandr V. Danylyuk and Nick Reynolds. https://www.degruyter.com/document/doi/10.1515/sirius-2023-1011/html

6) Required. Shaping the battlefield, Gerry Doyl (2023). https://www.reuters.com/graphics/UKRAINE-CRISIS/ARMS/lgvdkoygnpo/

7) Required. Precision Guided Munition Market Demand, Future Trend and Recent Development, Hrishi Kawde (2023). https://www.linkedin.com/pulse/precision-guided-munition-market-demand-future-trend-recent-dicosta/

C. Tactical Level

Counter-battery Readings

1) Required. Ukraine Is Winning the Artillery War—By Destroying Four Russian Howitzers for Every Howitzer It Loses, (2023). https://www.forbes.com/sites/davidaxe/2023/07/11/ukraine-is-winning-the-artillery-war-by-destroying-four-russian-howitzers-for-every-howitzer-it-loses/?sh=5e51c667fcc0

2) Optional. A fired general's pleas from the front lines reveal Ukraine is bloodying Russian forces in a critical fight. https://www.businessinsider.com/fired-generals-concerns-show-ukraine-bloodying-russia-in-key-fight-2023-7?IR=T (2023).

3) Optional. Ukraine Situation Report: Kyiv's Growing Counter-Battery Advantage. https://www.thedrive.com/the-war-zone/ukraine-situation-report-kyivs-growing-counter-battery-advantage (2023).

4) Optional. How Ukraine is fighting back against Russian artillery https://www.economist.com/the-economist-explains/2022/06/02/how-ukraine-is-fighting-back-against-russian-artillery

5) Optional. Ukraine's adoption of Western artillery rendered Russian counter-battery fire ineffective – GenStaff. https://euromaidanpress.com/2023/03/22/ukraines-adoption-of-western-artillery-rendered-russian-counter-battery-fire-ineffective-genstaff/

6) Optional. Russian losses are four times higher: Ukrainian Armed Forces win counter-battery battle. https://fakty.com.ua/en/ukraine/20230712-vtraty-rf-v-chotyry-razy-bilshi-zsu-peremagayut-u-kontrbatarejnij-bytvi/

7) Optional. UK Defense Ministry: Russia faces worsening counter-battery capabilities. https://kyivindependent.com/uk-defense-ministry-russia-faces-shortages-in/

8) Optional. Analysis: Comparison between Russian and Ukrainian Artillery powers on the battlefield. https://www.armyrecognition.com/ukraine_-_russia_conflict_war_2022/analysis_comparison_between_russian_and_ukrainian_artillery_powers_on_the_battlefield.html?utm_content=cmp-true

9) Optional. The expert explained the success of Russian artillery in counter-battery combat in the NVO zone. https://pledgetimes.com/the-expert-explained-the-success-of-russian-artillery-in-counter-battery-combat-in-the-nvo-zone/

PGM Readings

1) Required. Ukraine Is Winning the Artillery War—By Destroying Four Russian Howitzers for Every Howitzer It Loses, (2023). https://www.forbes.com/sites/davidaxe/2023/07/11/ukraine-is-winning-the-artillery-war-by-destroying-four-russian-howitzers-for-every-howitzer-it-loses/?sh=5e51c667fcc0

2) Optional. New precision-guided shells are giving Ukraine an edge over Russia in their grinding artillery battle, Michael Peck (2022). https://www.businessinsider.com/precision-artillery-shells-aid-ukraine-in-artillery-battle-with-russia-2022-10?IR=T

3) Optional. Precision guided munitions and the new era of warfare, Air Power Studies Centre, Royal Australian Air Force, Hallion Richard (2009). https://man.fas.org/dod-101/sys/smart/docs/paper53.htm

4) Optional. Wikipedia, https://en.wikipedia.org/wiki/Infrared_homing/sites/davidaxe/2023/07/11/ukraine-is-winning-the-artillery-war-by-destroying-four-russian-howitzers-for-every-howitzer-it-loses/?sh=5e51c667fcc0

3. BACKGROUND AND DISCUSSION

A. General Overview

This lesson provides the lessons learned from Ukrainian artillery efforts in the Russian war against Ukraine to employ counter battery fires and employ PGMs in contemporary and future conflicts. During this lesson the following topics are addressed: target acquisition capabilities and operations, counter-battery fire tactical procedures used in Russian-Ukrainian war, Ukrainian artillery units' adaptation to overwhelming enemy counter-fire, and the role that precision guided munitions (PGMs) play in this aspect of the battle. See the readings for background material to further develop this lesson.

Counter-battery fire is the practice of engaging the enemy's artillery to prevent them from bringing their most potent firepower to bear. The army that wins the counter-battery fight in a particular battle usually wins that battle. This is why Ukraine's steady destruction of Russian howitzers and launchers is so encouraging.

Why the Ukrainians are gradually winning the counter-battery fight should be obvious. Huge consignments of Western-made systems - which often have quicker target acquisition capabilities, and are more dependable, more accurate, and longer ranged than Soviet-style systems are - have radically improved Ukraine's 13 artillery and rocket brigades.

Most importantly, the Ukrainians have received scores of counter-battery radars from Germany, Norway, the United Kingdom, and the United States that spot incoming artillery shells and rockets, pinpoint the source and cue friendly howitzers and launchers to fire back. The radars, working in conjunction with small drones, make it extremely dangerous for Russian gunners to function. They must "shoot then scoot" to have any chance of surviving Ukrainian counter-battery fire. The Russians have their own radars and drones, too, of course - but they have been less effective.

Lesson learned regarding Ukrainian artillery units' adaptation to enemy mass counter-fire

During the war Ukrainian artillery units were actively engaged by Russian counter-battery fires. To increase the unit's survivability and counter-fire flexibility Ukrainian ground forces started to divide artillery batteries into firing groups which consisted of one to two guns per group. The separation of battery guns gave a huge flexibility for ground commanders to conduct counter-battery fire. The usual practice is that artillery batteries are divided into one to four fire groups. The first group of guns usually conduct a deception fire mission to provoke Russian artillery counter-fire and immediately change position to secondary firing point. During this time two or three other fire groups from separate locations and supported by UAVs engaged to destroy enemy artillery batteries that conducted a counter-fire task.

This lesson also provides specific lessons learned from Ukrainian artillery efforts in the war of Russian aggression to employ precision-guided munitions in combat action. This lesson addresses the types of PGMs used in Russian-Ukrainian war, features of precision-guided

munition employment, and how to engage enemy command posts, logistical points, high value targets, and bridges with precision-guided munitions.

Since the war began, Ukraine has received millions of rounds of ammunition, including artillery shells. Some of these shells have advanced capabilities, such as the Excalibur, which uses GPS guidance and steering fins to hit targets as small as 3 meters up to 40 km away. The Howitzer's crew puts GPS coordinates into the shell, which has a range of about 25 miles. After launch, the fins pop out, allowing it to adjust its trajectory to hit the designated location. The Excalibur shell can reportedly strike within 7 feet of a target. Other sources suggest it can hit a target within 250 feet to 500 feet of the aimpoint.

NATO partners also provided PGMs such as Vulcano. The Vulcano has a range of about 43 miles and is accurate to within about 5.4 yards, according to its manufacturer, the Italian firm Leonardo. The shell is GPS-guided, though it can also be guided to its target by a semi-active laser illuminator. One problem with GPS-guided rounds is that a moving target may change location by the time the round arrives. Laser-guided shells are considered more accurate as they hone in on a target illuminated by a laser designator. The Excalibur S variant has the option of using a semi-active laser, as does the Vulcano. The laser offers further improved precision with respect to pure GPS guidance.

Improved Russian electronic warfare systems have destroyed about 10,000 Ukrainian drones a month, and they have also intercepted and decrypted Ukrainian tactical communications in real time. They also have learned to intercept GPS-guided rockets fired by Western-supplied launchers such as the U.S. made HIMARS, which had previously embarrassed the Russians and inflicted major damage.

Ukrainian ground forces learned the lesson that Vulcano and Excalibur S are far more resilient to enemy electronic warfare capabilities and should be used while engaging high value targets.

Ukraine has also received BONUS and SMArt 155 rounds, which deploy submunitions that float down under parachutes or small wings, hunting for the infrared signatures of armoured vehicles. When one is spotted, the submunition waits until it is aimed properly, then fires a shaped charge into the top of the target. Ukraine

has also received HARMs - High Speed Anti-Radiation Missiles - which it has rigged to fire from its Soviet-era aircraft to attack Russian air-defence radars.

Lesson learned regarding usage of precision-guided munitions

The use of PGMs with laser guidance capability enabled Ukrainian ground forces to engage Russian high value targets without conducting mass fire missions and wasting regular ammunition. The main lesson learned is that the ability to destroy targets on a first strike enhances a firing unit's survivability and prevents counter-battery fire which lowers ground force casualties. Furthermore, employing laser-guided artillery rounds is more effective against an enemy that actively uses EW capabilities.

B. Definitions

1) **Counter-battery fire** (sometimes called **counter-fire**) is a battlefield tactic employed to defeat the enemy's indirect fire elements (multiple rocket launchers, artillery and mortars), including their target acquisition, as well as their command and control components. Counter-battery arrangements and responsibilities vary between nations but involve target acquisition, planning and control, and counter-fire.

2) **Counter-battery radar** is a radar system that detects artillery projectiles fired by one or more guns, howitzers, mortars or rocket launchers and, from their trajectories, locates the position on the ground of the weapon that fired it. Such radars are a subclass of the wider class of target acquisition radars.

3) **Precision-guided munition (PGM, smart weapon, smart munition, smart bomb)** is a guided munition intended to precisely hit a specific target, to minimize collateral damage, and to increase lethality against intended targets.

4) **Infrared-guided/electro-optical is a passive weapon guidance system** which uses the infrared (IR) light emission from a target to track and follow it seamlessly. Missiles which use infrared seeking are often referred to as "heat-seekers" since infrared is radiated strongly by hot bodies. Many objects such as people, vehicle engines and aircraft generate and emit heat and so are especially visible

in the infrared wavelengths of light compared to objects in the background.

5) **Moving Target Artillery Round (MTAR)** is a new 155 mm (6.1 in) artillery round capable of destroying moving targets in GPS-denied environments.

6) **Cannon and mortar-launched guided projectiles** are precision-guided munitions launched by howitzers, mortars, tank guns, and naval guns.

5. QUESTIONS FOR CONSIDERATION

A. What is a counter-battery fire?

B. What is a counter-battery radar?

C. What counter-battery fire tactical procedures were used in the Russian-Ukrainian war?

D. How do Ukrainian artillery units adapt to overwhelming enemy counter-fire?

E. Why are the Ukrainians gradually winning the counter-battery fight?

F. What kind of Ukrainian counter-battery radars do you know?

G. What kind of Russian counter-battery radars do you know?

H. What is the main lesson learned?

I. What do you think about adaptation of lessons learned from the Russian-Ukrainian war for different national situations?

J. What types of precision-guided munitions were used in the Russian-Ukrainian war?

K. How do Precision-Guided Munitions work?

L. What types of Precision-Guided Munitions are in use today?

M. What features of precision-guided munition employment do you know?

N. What type of precision-guided munition is the most suitable to engage enemy command posts, logistical points, high value targets and bridges when the enemy is using EW capabilities?

O. How did Ukraine adapt its employment of precision-guided munitions to engage enemy command posts, logistical points, high value targets, and bridges when the enemy employed its EW capabilities?

P. What is the main lesson learned?

LESSON 18:
WAR IN THE AIR — FIXED AND ROTARY WING AIRCRAFT

1. PURPOSE AND SCOPE

The purpose of this two-hour lesson is to illustrate the ways in which the Armed Forces of Ukraine (AFU) and Russian forces adapted to ongoing combat operations in Ukraine to increase effectiveness and survivability. The AFU adaptations in counter air, air interdiction, close air support, and general aviation support coupled with combined operations such as Air Defence, Fire Support, and Unmanned Aerial Vehicles (UAVs) prevented the Russians from gaining air superiority despite the Russian's significant quantitative and qualitative advantages.

This session will answer the question of how the Air Force of the AFU not only managed to preserve its combat potential but also disrupted the enemy's air offensive operation, achieved parity, and maintained control of the airspace over the majority of Ukrainian territory. This lesson also has a direct connection to three other topics in the course, namely "Air Defence," "Fire Support," and "Unmanned Aerial Vehicles."

This lesson plan is designed for use by students at all levels and assumes students have a basic understanding of air operations and how air operations support Ukrainian strategic objectives.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will understand the key role of air operations during a full-scale invasion by the Russian Armed Forces into Ukraine.

A. EXPLAIN the Ukrainian and Russian approaches to *Counter Air operations* at the strategic, operational, and tactical level including understanding adaptations in defensive and offensive counter air operations to deny the adversary from gaining air superiority.

B. COMPARE how and why AFU and Russian *Air Interdiction* missions have evolved from their ini-

tial use in the operational depth at the beginning of the war to the decision to refrain from crossing into enemy occupied territory.

C. EXPLAIN the evolution of the use of air defence forces and unmanned aerial vehicles.

D. SUMMARISE how AFU adapted use of fixed and rotary wing platforms at the operational and tactical levels to provide effective *Close Air Support* (CAS) to ground forces.

E. RELATE how *general aviation support* increased AFU survivability and effectiveness at the strategic, operational, and tactical level.

3. READINGS

A. General Overview

1) Yurii Dziubenko, Talking Paper, The Air War (Fixed and Rotary Wing Aircraft, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19105_download&client_id=DEEP

2) Yurii Dziubenko, Presentation, The Air War (Fixed and Rotary Wing Aircraft, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19106_download&client_id=DEEP

3) Stijn Mitzer and Jakub Janovsky in collaboration with Joost Oliemans. "List Of Aircraft Losses During The 2022 Russian Invasion Of Ukraine", Oryx, 2022. https://www.oryxspioenkop.com/2022/03/list-of-aircraft-losses-during-2022.html

B. Strategic Level

1) NATO Standard AJP-3.3 Allied Joint Doctrine for Air and Space Operations. https://www.coemed.org/files/stanags/01_AJP/AJP-3.3_EDB_V1_E_3700.pdf

2) NATO Standard AJP-3.3.3 Allied Joint Doctrine for Air-Maritime Coordination. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/624130/doctrine_nato_air_mar_coord_ajp_3_3_3.pdf

C. Operational Level

1) Justin Bronk et al, 'The Russian Air War and Ukrainian Requirements for Air Defence', *RUSI*. https://rusi.org/explore-our-research/publications/special-resources/russian-air-war-and-ukrainian-requirements-air-defence (accessed 11 November 2022).

2) Rafael Ichaso, SPAF, Russian Air Force's Performance in Ukraine, Air Operations: The Fall of a Myth. Joint Air Power Competence Centre. https://www.japcc.org/articles/russian-air-forces-performance-in-ukraine-air-operations-the-fall-of-a-myth/

3) Justin Bronk et al, Russian Air War and Ukrainian Requirements for Air Defense, *RUSI*, 7 November 2022. https://rusi.org/explore-our-research/publications/special-resources/russian-air-war-and-ukrainian-requirements-air-defence

4) Pavel Aksonov, Why Aviation Doesn't Play a Major Role in Russia's War Against Ukraine and Whether It Can Change Everything. https://www.bbc.com/ukrainian/features-65112620

5) Justin Bronk, Are the Russian Air Force Truly Incapable of Complex Air Operations? *RUSI*, 4 March 2022. https://rusi.org/explore-our-research/publications/rusi-defence-systems/russian-air-force-actually-incapable-complex-air-operations

6) Mykhaylo Zabrodskyi, et al, Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February–July 2022, 30 November 2022. https://rusi.org/explore-our-research/publications/special-resources/preliminary-lessons-conventional-warfighting-russias-invasion-ukraine-february-july-2022

D. Tactical Level

1) Abdujalil Abdurasulov and Zhanna Bezpiatchuk, Ukraine war: Jet pilots talk about the air war with Russia. BBC News, Vinnytsia. https://www.bbc.com/news/world-europe-65461405

2) Evgeniy Rudenko, "We need F-16s," Interview with pilot Karaya about the enemy, unmanned aviation, the movie "Top Gun," and faith in God. https://www.pravda.com.ua/rus/articles/2022/12/28/7382581/

4. BACKGROUND AND DISCUSSION

A. General Overview

War in the Air (Fixed and Rotary Wing Aircraft). Although a much superior force in terms of quantity and quality of equipment, the Russians failed to achieve air superiority during their invasion of Ukraine. The AFU has very successfully leveraged organic resources and employed partner support to effectively defend their territory. The following definitions and description of adaptations provide the foundational knowledge necessary to achieve the lesson objectives.

B. Background Material

1) Actors Airpower Comparison:

a. As of July 2023, Ukraine had:

	TACTICAL AVIATION
Su-27	≈ 36…40
MiG-29	≈ 50…55
Su-25	≈ 20…24
Su-24M	≈ 10…12
Su-24MR	≈ 10…12

for a total of approximately 135 aircraft.

b. Russia had:

	TACTICAL AVIATION
Su-27	≈ 100
MiG-29	≈ 120
Su-25	≈ 120
Su-24M	≈ 70
Su-24MR	≈ 40
Su-34	≈ 124
Su-35	≈ 97
Su-30	≈ 110
MiG-31BM/K	≈ 105 / 10

for a total of approximately 900 aircraft. Total Russian aircraft losses as counted by Ukraine is 315.

2) Key factors affecting Russian Air Operations:

a. Factors that help Russians:

| |
|---|
| Sevenfold or more superiority in aircraft |
| Modern fighters |
| A-50 (AWACS) |
| Developed airfield infrastructure |
| Use aircraft produced in Russian, therefore easier to maintain |
| AFU mainly using old Soviet air defense systems and radars |

b. Factors that Hinder Russians:

Ukrainians were able to build a layered air defense system of medium and short-range
Lack of experience and skills in suppressing air defense in the Russian military
Help from western countries
Courage of Ukrainian servicemen
Timely withdrawal from the attack of AFU aviation; dispersal of aircraft and decoys at airfields
Active movement of ground complexes of anti-aircraft missile forces and minimization of radar activation time

3) Russia has not achieved its strategic goal of gaining superiority in the air; lost ⅓ of its aviation assets and depleted much of its missile inventory. Russia was forced to abandon the large-scale use of its aviation over Ukraine.

4) Russia began launching missile strikes on important critical infrastructure and settlements from long distances.

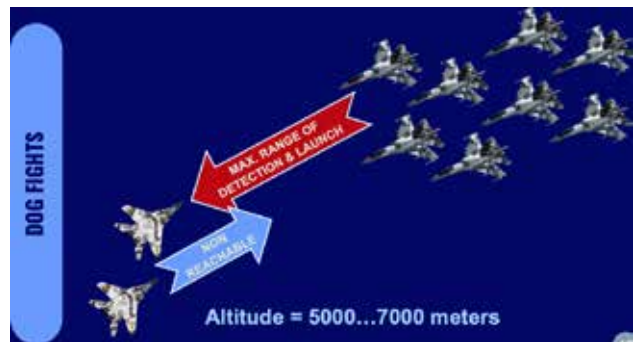**5)** Russia carried out about 170 attacks on energy infrastructure as of June 2023.

6)

7)
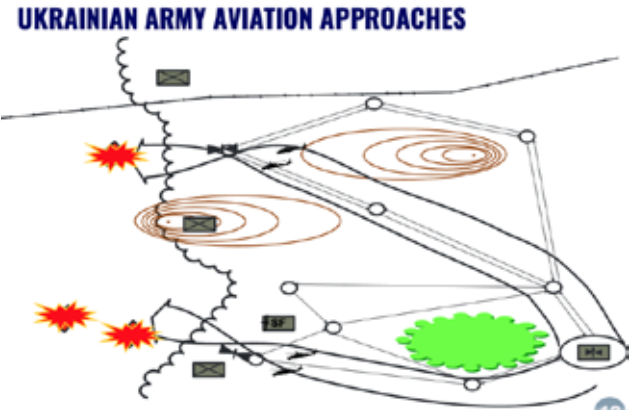
8) To best understand the air war, it's important to have a basic understanding of Ukrainian tactical aviation to include:

   a. Su-24M

   b. Su-25

   c. MiG-29

   d. Su-27

9)

10)

11)

UKRAINIAN ARMY AVIATION APPROACHES

12)

UKRAINIAN ARMY AVIATION APPROACHES

13)

UKRAINIAN ARMY AVIATION APPROACHES

C. Definitions

1) Air Operations:

a. NATO provides several categories of Air Operations, each with its own definition, which can be carried out by each component both within the framework of a joint aviation campaign and in support of the main component. *Defined in NATO Standard Allied Joint Publication* (AJP)-3.3.3 *Allied Joint (Inter-Service) Doctrine for Air-Maritime Coordination.*

b. The National Defence University of Ukraine (NDUU) defines "Air Operation" as a combination of interrelated and coordinated actions, car-

ried out by a grouping of forces (troops) of the Armed Forces, with a unified concept, during a defined period of time and within a designated operational zone (area). The purpose of these actions is to repel (disrupt) an air offensive operation, inflict damage on important enemy objects and force groupings.

2) Counter Air Operations:

a. NATO defines counter air operations as "an air operation directed against the enemy's air offensive and defensive capability in order to attain and maintain a desired degree of air superiority." *Defined in Allied Administrative Publication* (AAP)-06; AAP-15; and AAP-39.

b. The NDUU does not have a distinct definition of counter air operations. There is no difference in the definition of a defensive or offensive air operation, since the only existing definition of the concept of an air operation includes the possibility that it could be offensive or defensive.

3) Air Interdiction:

a. NATO defines Air Interdiction as "Air operations conducted to divert, disrupt, delay, degrade or destroy an enemy's military potential before it can be brought to bear effectively and at such distance that detailed integration of each air mission with the fire and manoeuvre of friendly forces is not required." *Defined in AAP-15; AAP-06; AAP-39; ISRI WG Glossary (AEDP-2, Vol. 4).*

b. NDUU defines Air Interdiction as prohibiting or slowing down the advance of the enemy's reserves in operational and operational-tactical depth, as well as prohibiting the transportation of material and technical means, weapons, fuel, and lubricants.

4) Close Air Support (CAS):

a. NATO defines CAS as "an air action against hostile targets which are in close proximity to friendly forces, and which require detailed integration of each air mission with the fire and movement of those forces." *Defined in AAP-06; AAP-15; AAP-39; ISRI WG Glossary (AEDP-2, Vol. 4).*

b. NDUU defines CAS as performing fire support missions for units and subunits located on the front

line or in close proximity to it, which is mainly performed by army aviation and assault aviation with the presence of advanced air gunners.

5) General Support:

a. NATO defines General Support as "support given to the supported force as a whole rather than to any particular subdivision of it." *Defined in AAP-06; AAP-15; AAP-39.*

b. NDUU defines General Support as "Air Operation," which are a combination of interrelated and coordinated actions, carried out by a grouping of forces (troops) of the Armed Forces, with a unified concept, during a defined period of time and within a designated operational zone (area). The purpose of these actions is to repel (disrupt) an air offensive operation, inflict damage on important enemy objects and force groupings.

D. Adaptations made by Ukrainian and Russian Forces

1) Counter Air:

a. Ukraine and Russia remain unable to achieve air superiority over enemy controlled territory. After sustaining significant losses during the opening days of Russia's full-scale invasion in 2022, Russia rarely attempts to fly fixed wing aircraft over Ukrainian held territory. Similarly, Ukraine remains unable to effectively fly fighter and bomber aircraft inside Russian air defence coverage except at extremely low altitude.

b. The introduction of AGM-88 High-speed Anti-Radiation Missiles (HARM) around August 2022 timeframe has helped Ukraine conduct Suppression of Enemy of Air Defence (SEAD) missions with increased effectiveness. Due to a lack of interoperability between NATO and Ukrainian systems, however, the use of AGM-88 HARMs required physical modifications to Ukraine's fighter aircraft. (Strategic)

c. The AFU adapted operations to include increased passive air and missile defence techniques in order to improve aircraft survivability during repeated Russian air and missile attacks targeted against Ukrainian air bases. These techniques include aircraft dispersal, concealment, and deception, hardening, and reconstitution of losses of both people and equipment. (Strategic)

d. AFU adapted the air defence primary mission to counter missile and UAV attacks. (Strategic and Operational)

e. AFU acquired and adapted to American "Zuni" air-to-ground missiles and employed them on Su-25 aircraft against Russian ground forces; the introduction of the Zunis helped compensate for the depletion of Ukraine's arsenal of S-5/S-8 unguided rockets; the Zuni's increased range and lethality also creates new opportunities in targeting Russian ground forces. (Tactical)

f. Russia employs Beriev A-50 Mainstay and IL-22 aircraft for airborne early warning and control (AEW), but the AFU lacks a similar capability. This is a problem for AFU because this command and control aircraft provides the Russians with an accurate picture of the airspace in real time, without which it is much more difficult to manage the battlespace. The Russians adapted coordination of their AEW aircraft with low-level fighter aircraft to counter AFU helicopter attack missions. When the Ukrainians employ their attack helicopters and the helicopter flares up to fire rockets, the Russian fighter aircraft fires an air-to-air missile at the second helicopter. The majority of the missile's flight path is passive, emitting no signals, and it activates its seeker only when approaching the designated area, searching for its target autonomously. In this situation, the helicopter pilot has only a few seconds to attempt evasive manoeuvres to avoid the incoming missile. There have been instances where AFU helicopters were unable to carry out the attack and were forced to land without shutting down the engines, repeating this process up to three times in a row. Unguided rockets have a large dispersion ellipse, making them primarily suitable for engaging area targets. The effectiveness of their application diminishes when only one helicopter is able to launch the rockets, reducing the quantity from 80 units, typically fired in pairs, to 40 units, significantly decreasing their overall effectiveness. (Strategic and Operational)

2) Air Interdiction:

a. The AFU created a method of joint strike missions using Su-24s to prep the battlefield and disperse the enemy column, attack helicopters to attrit enemy forces, then Su-25s complete the attack. (Operational and Tactical).

b. By integrating AGM-88 HARM anti-radar missiles and guided GBU-62 Joint Direct Attack Munition (JDAM) bombs into the arsenal of fighter aircraft, the AFU increased their lethality against the Russians. (Operational and Tactical).

c. AFU developed the process of defeating ground targets by improving the guidance and flight system of new aviation weapons (used JDAM Extended Range or JDAM-ER, AGM-88 HARM). (Operational and Tactical).

d. AFU Attack helicopters are primarily used as artillery platforms, launching unguided rockets from hover positions at maximum ranges from the security of Ukrainian-controlled territory. Because of this adaptation, there is minimal interaction required between helicopter crews and the low density and high demand forward aviation controllers. The main focus of the helicopter crews is interacting with the UAV operators who identify and transmit the enemy's location for helicopter strikes. AFU has very effectively integrated attack helicopters with UAVs for reconnaissance, target designation, and target engagement. (Strategic, Operational, and Tactical).

3) Close Air Support:

a. The AFU changed their tactics of manned aircraft strikes at the beginning of the war due to the absence of deployed air defence systems. Once air defence systems were deployed, AFU adapted aircraft strikes: Ukraine, like the Russians, began to use planes and helicopters only to support ground forces at the tactical level, fearing to fly far beyond the front line. They are expensive and highly effective tools used along with howitzers and mortars. (Operational and Tactical).

b. The AFU has restrictions on the use of manned aircraft to support troops in order to increase aircraft survivability. (Operational and Tactical).

c. The AFU adapted the joint use of strike packages with both helicopters and airplanes to support AFU forces engaged in combat. This improved support and survivability of the force. (Operational and Tactical).

4) General Support:

a. The delivery of MiG-29 and Su-25 airplanes and Mi-8, Mi-24, and Mi-17 helicopters by partners required subsequent training of Ukrainian pilots and aviation technicians abroad for these new types and variations of platforms. (Strategic).

b. AFU helicopters are employed as transport assets for carrying personnel and equipment, evacuating wounded personnel, and performing search and rescue missions. Although this is a standard use, pilots had to adapt flight routes and flight elevations to improve survivability. In some cases, pilots have to land along their flight routes, in order to confuse the Russians on their location. This prevents Russians from targeting these critical assets. (Tactical).

c. The AFU increased the distance between the helicopter landing sites and nearest supply bases many times to keep helicopters at a safe distance thus creating other challenges of integration into operations. Some of the resulting challenges were requirements for additional fuel and longer integration time into the ground war. (Operational, and Tactical).

d. The AFU encountered technical maintenance challenges due to service overloading; resource limitations (scarcity of spare parts, fuel, munitions, and qualified personnel to perform maintenance); limited access to resources (wartime conditions make it difficult for pilots to fly to areas with the most complete support); and extreme flight conditions (high humidity, dust, sand, freezing temperatures, or extreme heat). These challenges decrease the ability of the aircraft to support the war and tie in closely to the logistics lessons learned. As a result of these challenges, aviation support accounts for no more than 40% of the potential tasks that helicopters can potentially perform. (Strategic, Operational, and Tactical).

5) Additional points for student discussion:

a. In addition to the training received at educational institutions, prior to the war, AFU helicopter pilots gained significant experience through participation in peacekeeping missions. As a result, AFU pilots often accumulate extensive flight hours while operating under extreme climatic conditions with practical experience in employing live ordnance.

b. Students may also consider the discussion points, both for and against, the introduction of Western fighter aircraft into the Ukrainian Air Force. Of note, the F-16 has gathered much interest.

5. QUESTIONS FOR CONSIDERATION

A. What is the difference in the concept of air operations between Ukraine and NATO countries?

B. Why were the numerically superior and better-equipped Russian aerospace forces unable to achieve air superiority?

C. What are the main types of Ukrainian aircraft involved in the war in terms of tactical aviation and army aviation helicopters?

D. What tactical techniques do Ukrainian Air Force and army aviation pilots use to reduce the likelihood of their aircraft being hit while carrying out missions?

E. What technical advancements are being utilized to expand the range of available aviation strike assets?

F. How does the presence or absence of an airborne early warning and control system (AWACS) affect the effectiveness of combat operations?

G. What forces and resources are necessary to provide support for the aviation of the army (rotary wing resources)?

LESSON 19:
AIR DEFENCE

1. PURPOSE AND SCOPE

This two-hour lesson examines the adaptation of the Ukrainian Air Defence system during the Russian war against Ukraine. This overview lesson provides students an introduction to the situation in Ukraine on 24 February 2022 and during war regarding Air Defence issues, to include wide-ranging assistance from partners. It is suitable for audiences that study the tactical and operational levels of conflict.

Upon completion of this lesson, the student will **summarise** the impact on employment of the Ukrainian Air Defence system since the Russian invasion, **describe** the change/modification of Ukrainian Air Defence structure, and **explain** how tactics of the Russian air attacks during the Russian war against Ukraine were improved,

When delivered alone it provides an overview of the subject. This lesson also has a direct connection to two other topics in the course, namely "War in the Air" and "Unmanned Aerial Vehicles". This Lesson Plan may also serve as source material to be adapted by curriculum developers for incorporation into their own curriculum.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE the lessons learned related to the overall change/modification of the Ukrainian Air Defence structure.

B. SUMMARISE the lessons learned related to the impact on employment of the Ukrainian Air Defence system since the Russian invasion.

C. EXPLAIN the lessons learned associated with the evolving tactics of the Russian air attacks during the Russian war against Ukraine.

3. READINGS

A. General Overview Example

These readings offer a comprehensive range of materials for students to deepen their understanding of the lessons learned from the Russian war against Ukraine. By exploring these resources, students will gain valuable insights into the Air Defence. The key readings will be the briefing provided by the National Defence University of Ukraine and its associated Talking Paper.

1) Oleksandr Tytarenko, "Air Defence", PPT Briefing, (2023), National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19107_download&client_id=DEEP

2) Oleksandr Tytarenko, "Air Defence", Talking Paper, (2023), National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19108_download&client_id=DEEP

B. Tactical Level Example

1) Justin Bronk, et al, The Russian Air War and Ukrainian Requirements for Air Defence, Special Resources, *Royal United Services Institute*, London: 7 November 2022. Accessed at: https://www.rusi.org/explore-our-research/publications/special-resources/russian-air-war-and-ukrainian-requirements-air-defence

2) Valius Venckunas, Eight Lessons Air Forces are Learning from the War in Ukraine, *Aerotime Hub*, 8 January 2023. Accessed at: https://www.aerotime.aero/articles/eight-lessons-air-forces-are-learning-from-the-war-in-ukraine#:~:text=%E2%80%9CThe%20immediate%20lesson%20is%20that%20Russia%E2%80%99s%20failure%-20and,crippled%20the%20battlefield%20effectiveness%20of%20both%20air%20forces. (Required Reading).

3) Seth Jones, "Russia's Ill-Fated Invasion of Ukraine: Lessons in Modern Warfare," *Center for Strategic and International Studies (CSIS),* Washington, DC, June 2022. Accessed at: https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/220601_Jones_Russia%27s_Ill-Fated_Invasion_0.pdf?VersionId=Ggqjb.JsRbJzr_wlu5jrVT_Xe3AW3jur

4) ACdre. Prof. Dr. Frans Osinga, "Putin's War, A European tragedy and The strategic impact of Air Denial". March 2023. Accessed at: https://missiledefenseadvocacy.org/wp-content/uploads/2023/03/AirDenialBriefing_10Feb23_ACdreOsinga.pdf

5) Maxmilian Bremer and Kelly Grieco, "Air Defense Upgrades, Not F-16, are a Winning Strategy for Ukraine," Defense News Commentary, 22 January 2023. Accessed at: https://www.defensenews.com/opinion/commentary/2023/01/25/air-defense-upgrades-not-f-16s-are-a-winning-strategy-for-ukraine/ (Required Reading).

6) Anmol Chowdhary, "How Ukrainian Air Defense Strategy is Adapting to More Drone Attacks," *American Security Project Blog,* 9 June 2023. Accessed at: Air Defense in Ukraine-Russia War | ASP American Security Project https://www.americansecurityproject.org/how-ukrainian-air-defense-strategy-is-adapting-to-more-drone-attacks/ (Required Reading).

7) Jonathan Masters and Will Merrow, (2023) "How Much Aid Has the U.S. Sent Ukraine? Here are Six Charts," Council on Foreign Relations, 19 May 2023. https://www.cfr.org/article/how-much-aid-has-us-sent-ukraine-here-are-six-charts?gclid=CjwKCAjw36GjBhAkEiwAKwIWyWZQ_bXxep6fydt7xf5_xbV27Bs8ZL-Y69GjsF0ouQcXiQMCDjU4WRoCaZ0QAvD_BwE

8) ATP-82, Allied Doctrine for Ground Based Air Defence, January 2018.

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson provides the lessons learned from Ukrainian Air Defence and its employment during the Russian war against Ukraine. The lessons learned are examined through the topics of tactics of Ukrainian Air Defence and tactics of Russian air attacks during the Russian war against Ukraine.

B. Definitions

The lesson should begin with providing of three definitions:

1) Air Defence – all measures designed to destroy, nullify, or reduce the effectiveness of hostile air action. (AAP-06(2013))

2) Active air defence – active measures taken against attacking adversary forces to destroy or nullify any form of air or missile threat or to reduce the effectiveness of any such attack. (AAP-06(2013))

3) Passive air defence – Passive measures taken for the physical defence and protection of personnel, essential installations, and equipment in order to minimize the effectiveness of air and/or missile attack. (AAP-06(2013))

C. Focus Areas

1) Ukrainian Air Defence structure

2) This will include a brief synopsis of the pre-war Ukrainian Air Defence system. It will also explain the structure of Ukrainian Air Defence and Command and Control systems including the main tasks of Ukrainian Air Defence. This will help the student understand the preconditions to the War.

3) Russian invasion

4) Starting with the beginning of the war and situation on 24 February 2022 and followed by the situation after 24 February 2022 regarding Air Defence issues. Explaining the main directions of Russian air attacks: aircrafts, cruise missiles and UAVs. Giving a glance on air strikes statistics and the effectiveness of the Ukrainian Air Defence.

5) Changes in Air Warfare

6) Provides peculiarities of the missile strikes tactics by the Russian Air forces.

7) Assistance from partners

8) Illustrates evolution of support from man portable air defence systems to long-range surface-to-air missile systems with ballistic missile defence capabilities and gives the understanding how Ukrainian Air defence system has changed.

D. Lessons learned from the employment of Ukrainian Air Defence

1) All means must be involved to get air awareness on time.

   To use space satellites, various types of unmanned aerial vehicles, intelligence activities of the Armed Forces of Ukraine and particularly information from the population, which discovered the aerial vehicle and immediately released information about it to the air defence system.

2) Importance of Passive Air Defence.

   Deception operations: simulating activity in a feint position in order to deceive the enemy.

   Concealment: move units only at night using different routes. During the movement, it is necessary to organize air and ground defence.

   Do not forget to disperse the units.

3) Necessity of changing positions.

   As on the first day of the war, the main rule applies in the future: immediately change the position after firing the missile or being detected by the UAV/UAS.

4) Usage of non-standard air defence tactics.

   Employing the separate means from the surface-to-air missile systems for ambushes.

5) Usage of mobile air defence fire groups.

   Creating and employing mobile fire groups which consist of two machine guns and two man-portable air defence systems to engage the enemy in the air on the main predicted routes.

6) Establishment of air observation posts.

   To ensure the actions of mobile air defence fire groups, creating and employing air observation posts to detect the enemy in the air on the main predicted routes and around important objects. Provide information to the unified air defence system.

E. Lessons learned from the employment of Russian air attacks

1) Russian air attack tactics adapt to the situation.

   In total, at the end of March and the beginning of April, about 2,000 man-portable air defence systems of various types were delivered to Ukraine. (Stinger, Piorun, Mistral and Starstreak) This changed the situation in the sky – Russia sustained heavy losses in aviation. After all, the greatest losses of Russian aviation were in March, when the enemy did not yet adapt to the new conditions of the war. In the following months, enemy aircraft were mostly employed without crossing the front line and primarily using various long-range air-to-ground missiles, cruise missiles and loitering munitions such as the "Shahed" drone.

5. QUESTIONS FOR CONSIDERATION

A. What is the structure of Ukrainian Air Defence?

B. What measures include Passive air defence?

C. Why is it necessary to have air observation posts?

D. What are the critical lessons learned from Ukraine's Air Defence?

E. What lessons did you learn about the mobile air defence fire groups?

F. How have Russian air tactics changed?

G. How has the Ukrainian Air Defence system changed?

LESSON 20:
LOGISTICS

1. PURPOSE AND SCOPE

This two-hour lesson offers an introduction to a range of logistic lessons learned and operational adjustments developed during the Russia-Ukraine war. The intent is to cover a broad collection of issues, key decision challenges and ideas that span from the strategic level to the tactical and across all the logistics functions as defined by NATO. It is suitable for audiences that study at any of the three levels of conflict (strategic, operational, tactical). These areas include but are not limited to: Logistics concepts of operation, command and control/organization, supply and distribution management, transportation operations, logistics services, maintenance, and information management. When delivered alone it provides an overview of the subject. It can also be delivered as part of a group of lessons to provide the background and foundation for further discussions regarding these concepts. Because logistics undergirds virtually all aspects of military operations, this lesson necessarily must be considered in the context of many others. There is a clear and close relationship to all strategic lessons and obviously lessons on cybersecurity, resilience and many others need to be considered together. Similarly, the lessons on ground, air, maritime and special operations all must address logistics considerations. Upon completion of this lesson, the student will be able to **describe** the impact on logistics of the Russian invasion in February 2022; this includes changes to support operations at all levels. The student will also be able to **relate** that understanding to a different national situation in order to **identify** relevant aspects and develop potential solutions for the challenges identified. This Lesson Plan may also serve as source material to be adapted by curriculum developers for incorporation into their own curriculum.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. DESCRIBE the key aspects of Ukrainian logistics planning, support, and management in the context of the defence of their nation against the Russian invasion.

B. EXPLAIN how the Ukrainian approach evolved from prewar conditions through the course of the war, including the response to Russian actions.

1) Describe the major logistics shortfalls and challenges before the Russian invasion, including after the attack on Crimea, Donetsk and Luhansk

2) Describe the core aspects of Ukrainian logistics operations during the initial invasion period including critical supply and equipment shortages.

3) Summarise significant adjustments, changes, and new operation concepts during the course of the war.

C. SUMMARISE key Russian logistics shortfalls and their impact on their operational effectiveness.

1) APPLY the Ukrainian approach to another national situation.

3. READINGS

1) Yurii Hannenko, The Impact of Logistics Presentation, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19110_download&client_id=DEEP

2) Yurii Hannenko, The Impact of Logistics Talking Paper, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19109_download&client_id=DEEP

3) Marinko Aleksić, Sead Cvrk, Dražen Božović, Army of Montenegro, "Analysis of Land Army Maintenance Techniques in the War in Ukraine," *Military Review*, May-June 2023. Accessed at: https://www.armyupress.army.mil/Portals/7/military-review/Archives/English/MJ-23/Land-Army-Maintenance-Techniques/aleksic-analysis-of-battlefield-UA.pdf

4) Bradley Martin, Sean Barrett and Devin McCarthy, "Russian Logistics and Sustainment Failures in the Ukraine Conflict—Status as of January 1, 2023,"

RAND Corporation, June 2023. Accessed at: Russian Logistics and Sustainment Failures in the Ukraine Conflict: Status as of January 1, 2023.

5) Per Skoglund, Tor Listou and Thomas Ekstrom (2022). "Russian Logistics in the Ukrainian War: Can Operational Failures be Attributed to Logistics?" *Scandinavian Journal of Military Studies* 5 (1) pp 99-110. Accessed at https://doi.org/10.31374/sjms.158

6) Alex Vershinin. "Feeding the Bear: A Closer Look at Russian Army Logistics and the Fait Accompli," November 23, 2021 *War on the Rocks*. Accessed at: https:// Feeding the Bear: A Closer Look at Russian Army Logistics and the Fait Accompli - War on the Rocks

7) Alex Vershinin. "The Return of Industrial Warfare," June 17.2022, *RUSI* Commentary. Accessed at https:// The Return of Industrial Warfare | Royal United Services Institute (rusi.org)

8) Volodymyr Kyvliuk, Iurii Hannenko. Improvement of the system of material resources of the Armed Forces of Ukraine. *Social Development & Security*, Vol. 2, No. 4,2018. Accessed at: https:// doi.org /10.5281/zenodo.1231404

9) Volodymyr Kyvlyuk, Viktor Lazorenko, Yurii Hannenko, Mykhaylo Lavruk. Problems of management of the system of provision of military property of the troops of the Armed Forces of Ukraine and ways of their solution. Accessed at: https://doi.org/10.33099/2311-7249/2021-40-1-111-116

4. BACKGROUND AND DISCUSSION:

"Logisticians are an unhappy lot. They know they are the first ones I will slay if my plan fails." —Alexander the Great.

A. General Overview

As noted above, our primary goal is to raise awareness of the importance of logistics and the specific areas where successes, failures and challenges by both sides have had a significant operational impact on the Russian Invasion of Ukraine. The lesson is necessarily limited by operational security considerations but designed to highlight where problems existed and how they were addressed or are being solved now. This overview will allow students to develop insights that would apply to other conflicts and military planning efforts. The most important insight is to understand the elemental dilemma of assessing and managing risk in logistics operations. There is no alternative that is "correct", and every option will include risks that commanders need to be aware of to make operational decisions. Another key takeaway is the creative use of all the resources available to the Ukrainian Armed Forces (UAF)—in many cases in very innovative ways. Finally, their investment in developing logisticians capable of integrating functions and designing holistic solutions has resulted in operational improvements that have significantly enhanced support to combat operations. Listed below are a number of examples that illustrate the key concepts that the student should attempt to apply to other situations and environments.

a. Key Insights:

− Risk management is critically important to logistics planning and operations.

− The effective use and integration of commercial resources into support operations is a major combat multiplier.

− The development of senior leaders that understand logistics is essential to mission success in warfighting.

B. Topical Discussion

1) Supply planning and distribution management: The vulnerability of supply chains from enemy actions and the complexity of managing such a broad and turbulent logistics enterprise has made the UAF focus on smaller focused logistics deliveries which reduce the cost of interdiction and offer flexibility in distribution. For example, ammunition and fuel are delivered in small serials of a few trucks, they use multiple supply routes, and they incorporate deception into their deliveries. Before the invasion they also suffered some major sabotage attacks on ammunition storage sites that seriously reduced their inventories of key munitions. Improved security and storage farther from combat zones have reduced losses, but sabotage and drone strikes remain significant concerns. They have also integrated several different types of supplies into an integrated management system. It should be noted that they still have a need for a robust and

resilient logistics information system that would allow tracking without operational compromise. In transit visibility and supply tracking systems improve agility, rapid resupply and reduce pilferage.

a. Key insights:

– It is important to size storage, convoys, and support delivery to optimize efficiency and risk trade-offs.

– Integrated supply management systems improve performance.

– Material tracking systems have significant benefits for logistics performance.

2) Maintenance, Repair and Overhaul: There is a large collection of issues appropriate for discussion that should be considered also as part of the lesson on international military assistance and other lessons were readiness and equipment availability impact operations and decision-making. At the beginning of the invasion, limited resources and transfer issues restricted the amount of advanced material that UAF had for defence; the vast majority of equipment was of local manufacture or left over from the Soviet era. Consequently, maintenance was aligned with the equipment on hand, and the well-known shortcomings of this equipment became obvious in combat. As more complex equipment was transferred from Western nations in great quantities and very quickly, the challenges of sustaining all this varied equipment mounted. While Ukrainian mechanics and technicians are very capable, there is a learning curve associated with new equipment; additionally, tools and test equipment (metric vs non metric wrenches is an easy example) needed to be supplied and distributed properly. Maintenance activities are a valuable target for enemy fire and sabotage, especially at higher levels where more material is generally stored. Ukraine was able to move equipment to neighbouring countries for major repair operations and overhaul, but of course, the retrograde of vehicles is a challenge unto itself. It is always better to fix forward whenever possible.

Another major issue when repairing forward is to return damaged or inoperable components to the rear for repair—in some cases these items can cost hundreds of thousands of dollars or be in critically short supply as they were designed to be repaired

periodically. The UAF is also making effective use of cannibalization and controlled substitution to optimize their equipment readiness, but this comes at a cost.

The issue of maintenance reference materials such as technical manuals and even operator manuals were significant, and of course the language barrier is always a major problem. UAF has been able to send technicians to the rear and to partner nations for training and the use of telemaintenance is getting better every day.

There are many other aspects to this complex but critical logistics function that can be discussed with students at every level; the key insight is for commanders to make the best decisions on how to apportion their resources and prioritize their efforts. EVERYTHING COMES AT A COST TO SOMETHING ELSE.

a. Key insights:

– It is critical to plan for and resource the repair of all major equipment systems in your inventory.

– Tech manuals, training, tools and calibration equipment are essential to effective maintenance.

– There are special challenges to managing the readiness of both legacy and modern equipment.

3) Movement and Transportation: The transition from peacetime or even low-level conflict to major war or invasion puts tremendous strain on all aspects of transportation, from the planning and resource allocation at strategic levels to the complex management of many factors at the tactical levels. Ukraine, like almost every nation, at the start of the invasion suffered from a shortage of trucks, material handling equipment and countless other items as demand skyrocketed. Moreover, enemy action targeted logistics assets such as fuel trucks and transporters, making shortages more acute. The train system, while very efficient, was vulnerable to interdiction and needed for civilian support and evacuation. The discrepancy in rail gauges is a well-known example of a critical logistics issue. As massive amounts of western material started to be available in Eastern Poland, this put more stress on the system. As was seen dramatically in the Russian assault on Kyiv, moving in large convoys

may be efficient, but it can be very dangerous. The UAF has adapted to the dangers of the battlefield by dispersing their logistics deliveries, using multiple routes, nighttime resupply and using camouflage and other deception techniques. They have also been able to leverage the use of commercial transport and fuel trucks, although some of these vehicles are not ideal for use in rugged tactical conditions. One other area where the UAF has made great strides is in improving communications security; early in the war, compromises enabled the enemy to attack key resupply operations.

a. Key Insights:

− Advance planning is a key enabler of effective transportation, the better your information the better your performance.

− All forms of transport have tradeoffs.

− Dispersal, deception and camouflage are important requirements.

− Communications security is essential.

− Plan for the use of commercial capabilities.

4) Medical Support and MEDEVAC: Like every military, the UAF was not fully prepared and resourced to support the high number of casualties they suffered and continue to suffer from this shortfall—at the cost of lives. The shortage of field hospitals—which of course are very vulnerable themselves—ambulances and qualified combat medics to name a few were significant problems. One particular issue with combat wounded is you cannot easily predict where you will take casualties, so you must have a robust communications and response system. Recent NATO experience in Afghanistan and other places has shown that almost any injuries are survivable if there is immediate care, but sometimes that is not possible. In this particular war, the willingness of the Russians to inflict civilian casualties makes it imperative to have medical response everywhere, even in Lviv and Odesa which are not in combat areas. The Ukrainians have made several important adaptations that have had a tremendous impact on combat effectiveness, morale, and resilience. Most important is the integration of the civilian medical system into military medical capability. While they have sig-

nificant shortages of medical personnel for a variety of reasons, their emergency medical technicians are proving to be some of the greatest heroes of the war. Civilian ambulances (which require maintenance!) are in constant use evacuating casualties from combat zones where they have not traditionally been used. Doctors in hospitals are learning to treat catastrophic blast injuries and other combat wounds that they were not well-trained for; all of this continues to improve. The issue of personal medical kits to all soldiers has also been a great improvement.

MEDEVAC is another area where there has been significant adaptation. In addition to the extensive use of civilian ambulances, there is some limited aeromedical evacuation. The contested nature of air space makes this a challenge and the willingness of Russians to attack medical aircraft, vehicles and facilities is a particular problem. That said, new improvements are made every day, saving lives, and improving outcomes for patients. Effective medical support is a major combat multiplier and a significant factor in maintaining national will.

a. Key Insights:

− Medical resources are always scarce—and expensive, but it is a bill that must be paid.

− Early integration of civilian resources is a key enabler.

− Train lots of people to treat combat injuries.

− Getting wounded to care quickly is one of the most important imperatives in war.

5) Russian Logistics failures: While this subject has enough material to merit an entire college course, for a logistics overview it would be sufficient and useful to have a short discussion of a handful of the many key problems the Russians faced, as they could well apply to almost any military operation to some extent. A few examples:

− Operational security for the invasion prevented effective logistics planning and the positioning of materiel to support rapid movement.

− Providing logistics support in hostile territory is especially difficult, especially as your supply

lines get extended. Convoy security is a good investment.

— Poor treatment and evacuation of wounded significantly impacts morale. Ditto for poor clothing, especially for cold weather.

— Russians have limited ability to retrograde damaged equipment, increasing their combat losses.

— Russian soldiers are poorly trained and were not prepared for extended conflict. Despite a long history of being in Ukraine, they lacked detailed knowledge of their operational areas during offensive operations.

C. Summary

There are many other topics worthy of discussion as part of a lessons learned review; the main lessons are routinely very similar. The challenges associated with providing rations to a widely distributed force are fairly straightforward; once again, the assistance of the commercial sector is absolutely crucial to effective support. The provision of logistics services, basecamp management, environmental medicine, and contract management are all additional areas that are worth a sustained discussion. One area that is difficult to discuss in a specific Ukraine context but essential to consider is the issue of logistics planning. As always, ensuring that the concept of logistics support is aligned with the operational plans is the most important task for the planners and senior leaders.

Finally, this class should provide opportunities for students to look at other historical and contemporary examples to apply the lessons above. Almost all of the issues can be assessed at every level and from counter-insurgency to major theatre war. The fundamental precepts of logistics apply almost universally and have not changed dramatically over several millennia. Obviously, the benefits of technology and innovative solutions can have a significant impact on combat operations, but the basic rules of communication, trust and early and continuous planning will make the difference in effective logistics support.

Field Marshal Erwin Rommel summed it up well: "The battle is fought and won by the Quartermasters before the first shot is fired."

5. QUESTIONS/ISSUES FOR DISCUSSION

A. What were the most challenging supply problems for the Ukrainian armed forces? What made them so hard? What aspects of supply planning and execution worked well and why?

B. Describe what you see to be the major challenges associated with equipment maintenance for the Ukrainians.

C. How well have the Ukrainians managed their transportation and distribution management? What are the most important considerations for them? Are there issues besides logistics that have a major impact?

D. What are the key considerations for planning and executing medical support? Are there any particular vulnerabilities that you would be most worried about?

E. What do you believe were the most important logistics problems for the Russians and what can we learn from them?

F. If you were the senior logistician for the Ukrainian armed forces, what would you see as your most important things to focus on?

LESSON 21:
SPECIAL OPERATIONS FORCES

1. PURPOSE AND SCOPE

This two-hour lesson provides the fundamentals of Ukrainian Special Operations Forces (SOF). This overview lesson provides students an introduction to the Ukrainian SOF and subsequent lessons learned following the Russian war against Ukraine. It is suitable for audiences that study at any of the three levels of conflict (strategic, operational, tactical) and identifies Ukrainian adaptations of unconventional warfare with the Ukrainian resistance movement, the use of information operations, the principles of special operations employment as well as the effectiveness of Ukrainian versus Russian SOF. When delivered alone it provides an overview of the subject. It can also be delivered as part of a group of lessons to provide the background and foundation for further discussions regarding these concepts.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. EXPLAIN adaptations of the Ukrainian SOF Unconventional Warfare (UW) approach to train, equip, and lead the resistance movement in occupied territory.

B. EXPLAIN Ukrainian SOFs adaptation in the use of special operations and information operations in the Russian war against Ukraine.

C. DESCRIBE how Ukrainian SOF used the seven principles of special operations to create tactical/operational/strategic advantage.

D. DESCRIBE differences between the Ukrainian SOF and Russian SOF/spetsnaz employment and effectiveness in the Russian war against Ukraine.

3. READINGS

A. General Overview

All identified readings should be considered to be required readings. The key readings will be the PPT briefing provided by the National Defense University of Ukraine and its associated Talking Paper.

1) Petro Yakymets, "Special Operations," PPT Briefing, National Defence University of Ukraine. 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19112_download&client_id=DEEP

2) Petro Yakymets, "Special Operations," Talking Paper, National Defence University of Ukraine. 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19111_download&client_id=DEEP

3) Ukrainian SOF Website: https://sof.mil.gov.ua/

4) Ukrainian Law regarding Ukrainian Armed Forces https://zakon.rada.gov.ua/laws/show/1437-19#Text

5) Resistance Operating Concept from U.S. Joint Special Ops University https://www.jsou.edu/Press/PublicationDashboard/25

6) U.S. Unconventional Warfare Joint Publication 3-05.1 https://www.soc.mil/ARIS/books/pdf/Unconventional%20Warfare%20Pocket%20Guide_v1%200_Final_6%20April%202016.pdf

7) U.S. Information Operations Joint Publication 3-13 https://irp.fas.org/doddir/dod/jp3_13.pdf

8) Theory of Special Operations https://www.afsoc.af.mil/Portals/86/documents/history/AFD-051228-021.pdf

9) U.S. Special Operations Doctrine https://apps.dtic.mil/sti/tr/pdf/ADA543873.pdf

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson provides the lessons learned from Ukrainian SOFs efforts in the Russian war against Ukraine in their planning, training, and execution in the three main focus areas of special operations, leading the resistance movement in occupied territories, as well as informa-

tion operations. Due to the classification details of the methods and tactics used by SOF, this lesson will focus only on lessons learned in general terms in each of these areas. When discussing SOF leadership of the resistance movement in occupied territories, it is important to recognize that in 2021, Ukrainian Law was amended to formalize the hierarchy of SOF over the resistance movement to manage their training, equipping, and leading the three elements of movement: the guerilla force, the underground, and the auxiliary. This lesson focuses primarily on those lessons learned after the legal authorities were in place in 2021 and during the subsequent Russian war against Ukraine.

B. Definitions

1) **Special Operations** – a set of coordinated and interrelated special actions of special operations units of the Armed Forces of Ukraine in terms of purpose, tasks, place and time, aimed at creating conditions for achieving strategic (operational) goals, which are carried out according to a single plan independently or in cooperation with the military units, other units of the Armed Forces of Ukraine, other military formations, law enforcement agencies of Ukraine, and other components of the defence forces to perform tasks. (*Source: draft statute of the Ukrainian SOF Command*)

2) **Resistance Movement –** Ukraine defines this as: the resistance movement is a system of political, military, informational, and special measures, which are carried out with the aim of opposing the occupying power, fighting the aggressor in the occupied territory, creating favourable conditions for the restoration of state sovereignty and territorial integrity of Ukraine.

   Resistance is organized community-wide efforts covering the full range of activities, violent or non-violent, under the guidance of a legally established government for the purpose of restoring independence and autonomy within a sovereign territory that has been fully or partially occupied by foreign forces.

   It includes three parts: the guerilla force (the action arm of the unit), the underground (the intelligence gathering arm of the unit), and the auxiliary (the logistical support arm of the unit). (*Source: draft statute of the Ukrainian SOF Command, U.S. Joint Pub 3-05.1*)

3) **Psychological operation** is a set of coordinated and interrelated psychological actions and other actions, determined forces and means of defence forces, which are carried out according to a single plan, in order to influence the emotional state, motivation, and rational thinking of determined target audiences and changing their behaviour patterns in order to create favourable conditions for achieving political (strategic, operational) goals, as well as the use of forces and means of defence. (*Source: draft statute of the Ukrainian SOF Command*)

4) **Psychological action** – the organized use of the deliberate force and means of the Special Operations Forces to perform the tasks of applying and (or) exerting a psychological influence on the emotional state, motivation, and rational thinking of a target audience limited in scope and area that changes the target audience's behaviour in a way which will contribute to the achievement of military and political goals. (*Source: draft statute of the Ukrainian SOF Command*)

5) An **information operation** is a staff function of analysis, planning, evaluation, and integration of information actions to create the desired effect on the will, understanding, and capability of the adversary and established target audiences in support of the operation's objectives. (*Source: draft statute of the Ukrainian SOF Command*)

6) **Information actions** – actions prepared to influence information or information systems. Can be conducted by any actor (entity) and also provide for protection measures. (*Source: draft statute of the Ukrainian SOF Command*)

C. Focus Areas

1) Special Operations

a. Planning

It was critically important for Ukrainian Special Operations Forces to utilize NATO planning standards. This allowed for greater interoperability with foreign counterparts in training and preparation. This was also problematic in that SOF planning, when under the leadership of general military commanders (conventional forces), was difficult. Since conventional forces did not always use NATO planning procedures, this required

SOF personnel to be capable of planning under both planning procedures.

b. Training

SOF units rotate in and out of the combat zone on a rotational basis, so training must take place at their permanent duty station. The combat zone is for solely mission execution and does not allow for sufficient space to train.

c. Application

Each SOF unit was found to need both short-range and long-range UAV operators to assist with targeting and reconnaissance. UAV ISR was continuously critical to operational situation awareness but also operational security.

2) Resistance Movement

a. Planning

Ukrainian SOF quickly learned that since the civilians in the resistance movement had no military training, they did not know how to plan effectively. Civilians did not have enough time to learn to plan and as such, SOF needed to provide full planning support for the resistance movement.

Civilian elements in the resistance movements must be organized into units and, with the legal authority provided by the laws of the country, they can be registered as combatants.

b. Training

Before the emergence of a legitimate government (February 2022) In order to facilitate the training of civilians in an occupied area, they had to be taken out of the territory occupied by Russia. For this they needed a legitimate reason why they had to leave the territory. Once out it was possible to train individuals.

It was critical to begin peacetime training of the resistance movement before combat operations by operators who were from appropriate regions in order to train the resistance movement in the areas where they were from.

c. Application

The Ukrainian SOF created resistance cells before the start of the war which assisted SOF in performing tasks in the area of the cell. They were created before the legal bodies of the laws of

Ukraine officially formalized the relation to SOF. Each region and each district needed a center of the resistance movement for resistance efforts after the war began. Cell members assist SOF in completing missions in their area. The lesson learned from this was that these cells had to be established, trained, and secured before the commencement of hostilities in peacetime.

The organizational structures of the resistance movement cannot perform the tasks of the special operations forces. The tasks that they perform must be simpler: logistic support (providing ammunition or other supplies) to the special operations units, assisting with reconnaissance in the local area, simple fire support tasks such as providing covering fire, and the evacuation of wounded.

3) Information Operations

a. Planning

There was a lack of specialists in information warfare, which prevented SOF from effectively conducting information warfare. Because of this, mainly psychological operations (actions) were carried out, resulting in only a limited psychological influence.

Conventional Commanders did not understand information operations nor how to use it. SOF commanders and psychological operations teams knew how to create information operations plans.

Using NATO planning tools allowed planners to create information warfare plans from scratch, which was very helpful.

b. Training

Since there was only one information warfare agency in Ukraine, resulting in too few Information Planners (IP) operators, a qualification course was created to add more IP operators to the battlespace.

The lesson learned is that more effort (such as creating a qualification course) is needed to add as many information warfare specialists as possible to the battlefield.

With more information warfare specialists, this could mean more joint actions (operations) between SOF and IP operators.

c. Application

SOF commanders found over time that interoperability with information operations units was valuable to happen from the planning phase through execution.

At the beginning of the Russian war against Ukraine, counter-information operations were not performed. It was found over time that it was necessary to develop countermeasures to the information operations of the Russians.

D. The seven principles of special operations are

1) Purpose (Mission Command, Commander's Intent)

It was found over time that to effectively leverage the benefits of mission command, SOF had to incorporate the additional operational staff into the decision-making and planning of operations.

2) Simplicity in planning

In order to retain simplicity in planning, SOF reduced the stages of the mission to the following:

a. preparation

b. infil

c. actions of the objective

d. exfil

3) Security (Operational Security)

Information operations specialists became actively involved in the security of the mission by providing false information in the information space providing deception.

4) Repetition (specialized training)

It was necessary to improve/replace training equipment in the training facilities to bring the operators closer to the realities of combat and allow them to repeat this training in preparation for future missions.

5) Surprise (operational concealment/deception)

SOF learned that it was critical to choose the location of missions where the enemy does not expect it.

Operations were approved to be done under the cover of night, which incurred hardware dependency as there were only one-to-two-night vision goggles (NVGs) per SOF group. SOF was subsequently able to obtain more NVGs which then allowed more night-time operations.

6) Speed (rapid reaction to situational changes)

SOF learned that choosing an initial staging area closer to the enemy helped increase the speed of the operation.

7) Continuous operational cycle (F3EA) Find, Fix, Finish, Exploit, Assess

SOF learned during the Russian war against Ukraine that the operational planning cycle must be continuous, meaning that as one mission passes, another mission is already being planned. The process to continuously identify weak points of the enemy and identifying other useful operational information was critically important.

5. QUESTIONS FOR CONSIDERATION

A. Describe the general concepts of the organization of a special operation, a resistance movement, an informational psychological operation. Define a special operation, and a resistance movement of an informational psychological operation.

B. What were the most important lessons learned about the resistance movement in Ukraine, and how is your country prepared for similar activities?

C. How can the conclusions from the experience of Ukraine be adapted to the application of SOF and interaction with the resistance movement in your country?

D. What measures would you consider appropriate to improve the development of interaction between the SOF and the resistance movement in your country?

E. What needs to be done in your country regarding the preparation of the population for resistance to the enemy and the occupying power?

F. What should be the redistribution of tasks between SSO operators and structures of national resistance?

G. How to manage SOF units and structures in enemy-occupied territory?

H. How can the preparation and logistical support of

the structures of national resistance be carried out in the territory occupied by the enemy?

I. What aspect would you focus on when preparing for the tasks of SSO units, national resistance structures and IOS in enemy-occupied territory?

Photographer: Serhii Boiko

LESSON 22:
NCO SMALL UNIT LEADERSHIP

1. PURPOSE AND SCOPE

This two-hour lesson focuses on the adaptation of the development process of NCO leadership in Ukraine during the Russian war against Ukraine. The process adapted in new ways due to the demands of combat. This overview lesson provides students an introduction to this adaptation of Ukrainian NCO leadership development along five key components of training, manning, resources, responsibilities, and NCO/Officer relationships. When delivered alone it provides an overview of the subject. It can also be delivered as part of a group of lessons to provide the background and foundation for further discussions regarding these concepts. The target audience for this lesson are NCOs/senior enlisted/officers in their respective professional military education as well as personnel organizations or commands that influence personnel policies.

2. LESSON LEARNING OBJECTIVES

After completing this lesson, the learner will be able to:

A. SUMMARISE the lessons learned from the Ukrainian approach to NCO Training.

B. RELATE how Ukrainian decisions to the conflict impacted NCO leadership development in regards to Instructor manning and NCO trainee manning

C. EXPLAIN how the Ukrainian NCO leadership instruction had to adapt to the constant threat and/or destruction of resources during the conflict.

D. DESCRIBE the changes to the NCO responsibilities and the respective challenges during the Russian war against Ukraine.

E. DESCRIBE the adaptation of the NCO/Officer relationship in Ukraine as a result of the conflict.

3. READINGS

A. General Overview

The articles listed below provide required readings on the transformation of the Ukrainian NCO Corps and its impact leading up to and during the Ukrainian War of Russian Aggression. The first two readings below provide the background for this presentation and should be considered mandatory for use of this lesson plan.

1) Roman Kuzmenko, NCO Small Unit Leadership Presentation, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19114_download&client_id=DEEP

2) Roman Kuzmenko, NCO Small Unit Leadership Talking Paper, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19113_download&client_id=DEEP

3) "NCOs Key to Ukrainian Military Successes Against Russia. " https://www.defense.gov/News/News-Stories/Article/Article/3313982/ncos-key-to-ukrainian-military-successes-against-russia/

4) "Russians "Running Away" From Ukraine NCO Corps Is and Example to Partners, Air Force Leaders Say. Abraham Mahshie, 1 August 2022 https://www.airandspaceforces.com/russia-running-away-from-ukraine-nco-corps-is-an-example-to-partners-air-force-leaders-say/

5) Hanna Shelest. "Defend. Resist. Repeat: Ukraine's lessons for European defence." Policy Brief, European Council on Foreign Relations, Hanna Shelest. 9 November 2022. https://ecfr.eu/publication/defend-resist-repeat-ukraines-lessons-for-european-defence/

6) "The USF Navy launched a leadership course for senior NCO." 2 July 2019, *News of the Ukrainian Navy*. https://navy.mil.gov.ua/en/u-vms-zsu-rozpochato-kurs-liderstva-dlya-vyshhogo-serzhantskogo-i-starshynskogo-skladu-pid-kerivnytstvom-peredovyh-derzhav/

7) Erik Kramer and Paul Schneider, "What the Ukrainian Armed Forces Need to do to Win", *War on the Rocks*, 2 June 2023. https://warontherocks.com/2023/06/what-the-ukrainian-armed-forces-need-to-do-to-win/

8) Ukrainian Army FM (2019), "Reforms in the

NCO Corps", https://www.armyfm.com.ua/reformuvannya-serzhantskogo-korpusu/

9) Michael Kofman and Rob Lee, "Not Built for Purpose: The Russian Military's Ill-Fated Force Design, *War on the Rocks*, 2 June 2022, https://warontherocks.com/2022/06/not-built-for-purpose-the-russian-militarys-ill-fated-force-design/

10) Deborah Sanders (2023) Ukraine's third wave of military reform 2016–2022 – building a military able to defend Ukraine against the Russian invasion, *Defense & Security Analysis*, https://www.tandfonline.com/doi/full/10.1080/14751798.2023.22010177

11) Jolicoeur, P. (2018). Defence Education Enhancement Programme in Ukraine. *Connections, 17*(3), 109-119. DOI: https://www.jstor.org/stable/10.2307/26934694

12) Ukrainian Defense Bulletin. https://issuu.com/defensebulletin/docs/ov_03_2021_ukr

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson provides an overview of lessons learned from Ukrainian NCOs and their employment during the Russian war against Ukraine. The topics of these lessons learned range from examining training, manning, resources, responsibilities, as well as the NCO/Officer relationship. They provide lessons which NATO countries can potentially learn from in order to either adapt new solutions or avoid problems mentioned below.

B. Lessons Learned from the five areas of Ukrainian NCO leadership

1) Training

a. Shortening of NCO training courses

Due to the demands of having experienced NCOs on the battlefield, once the Russian war against Ukraine started, all four levels of professional NCO leadership training were shortened: basic (squad level), intermediate (platoon/company level), advanced (battalion/HQ), and senior NCO (brigade+ levels). Squad leader training was extended for tactical topics necessary for combat operations but leadership training was shortened from 21 to 3 days.

b. Training abroad

International support of Ukrainian forces abroad has presented new challenges. Ukrainian units rotate to the same partner forces for training abroad. As each foreign force has small differences in NCO leadership and training approaches, the respective Ukrainian units develop differences between each other based on where they were trained.

Training soldiers abroad contributes significantly to the training of Ukrainian NCOs, but different training methodologies and host country specific procedures often force Ukrainians to allocate extra time for additional training/retraining in order to match the standards and procedures of the Ukrainian army.

2) Manning

a. NCO instructor manning

At the onset of the conflict, most NCO instructors were mobilized forward to operational units and suffered significant losses, resulting in a depletion of the NCO instructor cadre to continue training NCO leadership. The declaration of martial law and mass mobilization required additional training staff.

b. NCO trainee manning

The mass mobilization to support the Ukrainian military flooded units with inexperienced NCOs, requiring substantially more NCO's requiring leadership training than what would normally be necessary.

3) Resources

The complete or partial destruction of military training centres has forced a shift from classroom-based training to mobile training teams requiring Ukrainian forces to provide autonomous teaching tools for field training under extreme conditions (high-capacity energy storage devices, portable projectors, laptops etc.). These kits are built to provide effective mobile field training on a myriad of topics.

The large amount of new and unfamiliar foreign arms and equipment created challenges in how quickly and efficiently troops could be trained on the new weapons on the front line. YouTube and recorded video lessons passed along internal unit Signal chat rooms were used to facilitate the quick dissemination of procedures for learning operating instructions on the new equipment.

4) NCO Responsibilities

The loss of personnel during the battle and the reinforcement from reservists make it sufficiently difficult for the NCO to sustain the unit's effectiveness. NCOs must pay great attention to additional training without leaving the front lines. Development of squad members when there is high turnover from combat losses presents significant challenges.

5) NCO/Officer Relationship

Before the Russian war against Ukraine, squad leaders were encouraged by both juniors and mid–level officers to be decision-makers but it had yet to be fully implemented. Since the war, squad leaders have the flexibility to make decisions on the battlefield and are the most important persons on the ground.

Even though Ukrainian law that allowed NCOs to conduct squad-level training on their own was approved one year prior to the war, it was the war that solidified this law into action by the squad leaders.

Because of battlefield attrition of junior officers, NCOs are taking responsibility of small units in their place. The leadership training and experience of the NCOs are critical in stepping up into these roles when required.

C. Definitions

The definitions as used below are as used in the Ukrainian Armed Forces.

1) Non-commissioned officer (NCO) - a member of the armed forces who has achieved the rank of officer by rising from the lower ranks rather than by receiving a commission.

2) Instructor - is a non-commissioned officer in the armed forces with specific duties of teaching personnel in different skills.

3) Mobilization - is the act of assembling and readying military troops and supplies for war.

4) Basic NCO - typically new sergeants that are squad leaders.

5) Intermediate NCO - experienced sergeants and staff sergeants at the platoon and company level.

6) Advanced NCO - battalion level sergeant major (or equal) and staff brigade NCOs.

7) Senior NCO - Brigade sergeant major (or equal) and above.

5. QUESTIONS FOR CONSIDERATION

A. Describe the general structure of the Ukrainian NCO Corps organization and their approach to development as provided by NATO countries.

B. What were the most important lessons learned about the NCOs in full-scale invasion?

C. How can the conclusions from the experience of Ukraine be adapted to the NCO training system in your country?

D. How does the Ukrainian model for NCO leadership compare to the Russian model?

LESSON 23:
CYBERSECURITY AND DEFENCE LESSONS LEARNED

1. PURPOSE AND SCOPE

This two-hour lesson provides a high-level analysis of the lessons learned from the Russian war against Ukraine, specifically focusing on cybersecurity and defence. This lesson has been developed for a general audience. Through examining details of Russian cyber warfare and the corresponding cyber defence measures taken by Ukraine, the lesson will describe the impact of cyberattacks on Ukrainian entities, organizations, government functions, civilians, and critical infrastructure. The lesson outlines the functions, effects, and challenges encountered in the realm of cybersecurity and its relevance to all domains of the nation, allowing students to describe the effectiveness of different approaches.

Key lessons will be outlined for enhancing cyber resilience and capabilities (people, process, technology) in times of conflict. This lesson plan is intended to serve as source material to be adapted by curriculum developers for use in their own curriculum.

Upon completion of this lesson, the student will recognize different organizations that have roles in cybersecurity, the effects of cyberwar on the Ukrainian government, and challenges to Ukrainian cyber defence following the Russian invasion in February 2022. The student will also be able to relate that understanding to different national situations in order to identify relevant aspects for other contexts.

2. LESSON LEARNING OBJECTIVES

A. IDENTIFY the structures, roles, and responsibilities of Ukraine and Russia's cybersecurity and cyber defence organizations.

  1) Summarise Ukrainian cybersecurity organizations and their roles and responsibilities.

  2) Recognize relevant Russian organizations and their roles.

  3) Describe the role of the civilian sector in the conflict.

  4) Describe the role of the private sector in the conflict.

B. SUMMARISE the cyber warfare tactics, techniques, and procedures (TTPs) employed by Russia during the Russia-Ukraine war:

  1) Summarise the various cyber warfare techniques and strategies used by Russia, (e.g. phishing, malware attacks, supply chain, and distributed denial-of-service (DDoS) attacks).

  2) Recognize the efforts utilized by Russia to gain unauthorized access to Ukrainian systems and networks (e.g. espionage, introduction of malware via mobile devices, etc).

  3) Summarise the TTPs employed by Russia to manipulate information and spread disinformation through cyber channels and their relationship to cybersecurity.

C. ILLUSTRATE the impact of cyberattacks on Ukrainian organizations, government functions, and critical infrastructure:

  1) Explore the specific sectors targeted by cyberattacks, including energy, transportation, banking, and government institutions.

  2) Summarise the consequences of these cyberattacks on Ukrainian organizations, such as data breaches, disruption of services, and financial losses.

  3) Recognize the broader implications of cyberattacks on critical infrastructure, including the potential for cascading effects and national security concerns.

D. SUMMARISE the cyber defence measures taken by Ukraine and their effectiveness in mitigating cyber threats:

  1) Identify key cybersecurity and defence measures implemented by Ukraine

E. IDENTIFY lessons learned from the war and infer how they may enhance cyber defence capabilities in future conflicts:

  1) Identify key insights and lessons learned from Ukraine's experience in cyber warfare, such as the importance of organizations, roles, responsibilities.

2) Recognize the cyber defence practices employed by Ukraine and their applicability to other national contexts.

3) Identify potential strategies or policies to enhance cyber defence capabilities based on the lessons learned from the Russia-Ukraine war.

3. READINGS

These readings offer a comprehensive range of materials for students to deepen their understanding of the lessons learned from the Russian war against Ukraine. By exploring these resources, students will gain valuable insights into the cyberattacks on critical infrastructure, strategic-level considerations for enhancing cyber defence, operational-level experiences in cyber warfare, and tactical-level approaches to protecting critical infrastructure assets. The first two readings under General Overview are the primary source for the Lesson Plan and must be reviewed.

A. General Overview

1) Vadym Mashtalir, Cybersecurity presentation, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19115_download&client_id=DEEP

2) Vadym Mashtalir, Cybersecurity Talking Paper, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19116_download&client_id=DEEP

3) Volodymyr Shypovskyi, Cybersecurity and Defence Presentation, Ukrainian NDUU.

4) Notre Europe - Institut Jacques Delors, Cyberattacks in Russia's hybrid war against Ukraine and its ramifications for Europe, September 2022, https://institutdelors.eu/en/publications/la-dimension-cybersecurite-de-la-guerre-en-ukraine/

5) James A. Lewis, Cyber War and Ukraine, Centre For Strategic and International Studies, June 2022, https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/220616_Lewis_Cyber_War.pdf?S.iEKeom79InugnYWlcZL4r3Ljuq.ash

B. Strategic Level Example

1) Decree of the President of Ukraine No. 447/2021 dated May 14, 2021, "On the Decision of the National Security and Defence Council of Ukraine on the Cybersecurity Strategy of Ukraine."

2) Law of Ukraine No. 1932-XII dated December 6, 1991, "On the Defence of Ukraine."

3) Law of Ukraine No. 2163-VIII dated October 5, 2017, "On the Basics of Cybersecurity of Ukraine."

4) Cyber Operations in Russia's War against Ukraine, Uses, limitations, and lessons learned so far, doi:10.18449/2023C23, https://www.swp-berlin.org/10.18449/2023C23/

5) Jon Bateman, Russia's Wartime Cyber Operations in Ukraine: Military Impacts, Influences, and Implications, 2 Carnegie Endowment for International Peace, December 2022, https://carnegieendowment.org/files/Bateman_Cyber-FINAL21.pdf

C. Operational Level Example

1) "Doctrine of the Application of Defense Forces of the State," approved by the Supreme Commander-in-Chief of the Armed Forces of Ukraine on August 17, 2018, under No. 20dsk-op.

2) "Doctrine on Operations in the Cyber Domain" VCDP 6-00(03).01, approved by the Chief of the General Staff of the Armed Forces of Ukraine under No. 198/NVHS/dsk on September 30, 2020.

3) "Temporary Doctrine of the Application of Defense Forces of the State," approved and implemented by the order of the Chief of the General Staff of the Armed Forces of Ukraine on March 31, 2020, under No. 124/dsk.

4) "Joint Planning Doctrine" SP 3-150.01, approved by the order of the Commander-in-Chief of the Armed Forces of Ukraine on December 22, 2020, under No. 225/dsk.

5) Jakub Przetacznik with Simona Tarpova, Russia's war on Ukraine: Timeline of cyberattacks, EPRS — European Parliamentary Research Service, June 2022. https://www.europarl.europa.eu/

RegData/etudes/BRIE/2022/733549/EPRS_
BRI(2022)733549_EN.pdf

D. Tactical Level Example

1) Special Report: Ukraine, An overview of Russia's cyberattack activity in Ukraine, Microsoft, 2022, https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4Vwwd

2) Taylor Grossman et al, The Cyber Dimensions of the Russia-Ukraine War - The European Cyber Conflict Research Initiative (ECCRI), April 2023. https://eccri.eu/wp-content/uploads/2023/04/ECCRI_REPORT_The-Cyber-Dimensions-of-the-Russia-Ukraine-War-19042023.pdf

4. BACKGROUND AND DISCUSSION

A. General Overview

This lesson provides a high-level analysis of the lessons learned from the Russian war against Ukraine in the context of cyber defence. It explores the cyber warfare tactics employed by Russia and the corresponding multidimensional cyber defence responses taken by Ukraine. The lesson investigates the profound impact of cyberattacks and the roles and responsibilities of Ukrainian organizations, government functions, and critical infrastructure. By examining these key aspects, the lesson identifies crucial insights and lessons that can enhance cyber defence capabilities in future conflicts.

B. Definitions

Definitions are often unique to national contexts. As such, internationally recognized or generic definitions may not have the same meaning in national contexts. Instructors should carefully consider their audience and the respective values of different definitions. Note, too, that national structures can impact definitions. For example, Ukraine's National Cybersecurity Strategy makes explicit mention of cyber defence, cybersecurity, and cyber protection. These points of definition may not be reflected in other national strategies or organizations. Along with two definitions for cybersecurity (one international, the other from Ukraine), instructors will find value in using the resources below.

1) Cybersecurity: The "activity or process, ability or capability or state whereby information and communications systems and the information

contained therein are protected from and/or defended against damage, unauthorized use or modification or exploitation." The NATO Generic Reference Curriculum contains a glossary of terms https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_10/1610-cybersecurity-curriculum.pdf

In the context of Ukraine, the Law of Ukraine No. 2163-VIII (2017) defines many aspects of cybersecurity and defence. For example:

2) Cybersecurity: "security of the vital interests of man and citizen, society and state when using cyberspace in case of which sustainable development of information society and the digital communication circle, timely identification, prevention and neutralization of real and potential hazards of homeland security of Ukraine in cyberspace are provided." https://cis-legislation.com/document.fwx?rgn=101792

C. Strategic Level

1) Case Studies evaluating the cyber strategies implemented by Ukraine and their effectiveness in mitigating cyber risk.

    a. This subsection provides an overview of Ukraine's comprehensive strategies for cybersecurity and defence. It explores the national approach to cybersecurity, including policies, frameworks, and initiatives aimed at protecting critical infrastructure and countering cyber threats.

2) Assessments of strategic-level lessons learned in terms of enhancing cyber capabilities.

D. Operational Level

1) Case studies highlighting the operational-level lessons learned from Ukraine's cyber defence efforts during the war:

    a. This part presents detailed case studies that analyse specific incidents and operational-level responses to cyberattacks in Ukraine. It explores the challenges, successes, and best practices in developing and implementing operational cyber defence strategies.

2) Analyses of the challenges and successes in developing and implementing operational cyber defence strategies:

a. This section delves into the operational-level challenges faced by Ukraine in developing and implementing effective cyber defence strategies. It examines the successes, failures, and lessons learned during the war, providing insights into the operational aspects of cyber defence.

E. Tactical Level

1) Case studies illustrating the tactical-level lessons learned from Ukraine's critical infrastructure and cyberspace protection during the war:

a. This part presents case studies that focus on the tactical-level lessons learned from protecting critical infrastructure and cyberspace during the conflict. It examines specific instances, defensive measures, and resilience strategies employed by organizations to safeguard cyberspace and critical infrastructure assets.

2) Analyses of the defensive measures and resilience strategies employed at the tactical level:

a. This section analyses the tactical-level defensive measures implemented by organizations to protect critical infrastructure. It explores the use of technologies, incident response procedures, and risk management strategies to ensure effective cyber defence at the tactical level.

5. QUESTIONS FOR CONSIDERATION

These questions aim to spark critical thinking and encourage students to explore various dimensions of the Russia-Ukraine cyberwar, including motivations, consequences, challenges, collaboration, emerging technologies, and policy considerations.

A. What were the primary motivations behind Russia's cyberwar and TTPs during the Russian war against Ukraine? How did these align with their military and political objectives?

B. How did the cyberattacks on Ukrainian organizations and critical infrastructure impact the economy and daily lives of Ukrainian citizens? Discuss both immediate and long-term consequences.

C. What were the key challenges faced by Ukraine in defending against cyberattacks during the war? How did they adapt their strategies and defences in response to evolving cyber threats?

D. What role did international cooperation and support play in Ukraine's cyber defence efforts during the conflict? Discuss any collaborations with other nations or cybersecurity organizations.

E. How did Ukraine's cyber defence measures prioritize the protection of critical infrastructure, and what strategies were employed to safeguard these vital assets?

F. What steps were taken by Ukraine to raise cybersecurity awareness among the general public and promote a culture of cyber hygiene? Evaluate the effectiveness of these awareness campaigns.

G. What should be the future considerations regarding further cyber operations of the Russian Federation, what are the ways to ensure prevention, detection and countermeasures against operations in cyberspace?

H. Reflecting on the lessons learned from the Russian war against Ukraine, what policy recommendations would you propose to enhance international cooperation and coordination in countering cyber warfare and protecting critical infrastructure?

I. In what ways did the Russian war against Ukraine serve as a wake-up call for other nations in terms of cyber defence preparedness? Discuss any global implications and lessons learned beyond the Ukraine context.

LESSON 24:
NATIONAL LEVEL CYBERSECURITY IN UKRAINE — KEY PRINCIPLES

1. PURPOSE AND SCOPE

The main objective of the cybersecurity two-hour lesson is to familiarize participants with the key principles and concepts related to ensuring cybersecurity in the context of Ukraine, taking into account the lessons and practical experience from the Russian war against Ukraine. This lesson is aimed at a general audience. Given the complexity and importance of cybersecurity in the modern world, the lesson aims to raise awareness about its significance, identify cybersecurity challenges and threats faced by Ukraine, and introduce the main directives and measures implemented to ensure national cybersecurity in the country during times of war.

Considering the significance of cybersecurity in the context of modern conflicts, the lesson provides participants with an opportunity to actively explore and analyse the issues related to national cybersecurity. Participants can collaborate in searching for innovative solutions and strategies to enhance the resilience and protection of Ukraine's national cyber resources. Discussions can also involve potential improvements and innovations that can be implemented in the field of cybersecurity, aligning with planned initiatives for national security and digital transformation.

2. LESSON LEARNING OBJECTIVES

Learning objectives for a session on the basics of cybersecurity in national security may include:

A. EXPLAIN the key concepts and principles of Ukraine's national cybersecurity.

B. SUMMARISE the main threats and challenges related to cybersecurity in Ukraine's governmental organizations and the roles and responsibilities of different sectors and entities.

C. RECOGNIZE the strategies, policies, and principles of ensuring national cybersecurity for Ukraine.

D. IDENTIFY the roles and responsibilities of various stakeholders in ensuring Ukraine's national cybersecurity.

3. READINGS

The first two readings under General Overview form the basis for this Lesson Plan and should be considered mandatory readings.

A. General Overview

1) Vadym Mashtalir, Cybersecurity at the State Level in Ukraine: Key Principles presentation, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19117_download&client_id=DEEP

2) Vadym Mashtalir, Cybersecurity at the State Level in Ukraine: Key Principles Talking Paper, National Defence University of Ukraine, 2023. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19118_download&client_id=DEEP

3) Singer, P.W. and Friedman, A., 2014. *Cybersecurity: What everyone needs to know*. OUP USA.

4) Basin, D., 2021. *The cybersecurity body of knowledge*. University of Bristol, ch. Formal Methods for Security, version.[Online]. Available: https://www.cybok.org

B. Strategic Level Examples

1) Decree of the President of Ukraine No. 392/2020 dated March 14, 2020, "On the decision of the National Security and Defense Council of Ukraine dated September 14, 2020, 'On the Strategy of National Security of Ukraine.'"

2) Decree of the President of Ukraine No. 121/2021 dated March 25, 2021, "On the decision of the National Security and Defense Council of Ukraine dated March 25, 2021, 'On the Strategy of Military Security of Ukraine.'"

3) Decree of the President of Ukraine No. 447/2021 dated August 26, 2021, "On the decision of the National Security and Defense Council of Ukraine dated May 14, 2021, 'On the Strategy of Cybersecurity of Ukraine.'"

4) Law of Ukraine "On the Fundamental Principles of Ensuring Cybersecurity of Ukraine" dated October 5, 2017.

5) Decree of the President of Ukraine No. 32/2017 dated February 13, 2017, "On the decision of the National Security and Defence Council of Ukraine dated December 29, 2016, 'On Cybersecurity Threats to the State and Urgent Measures for their Neutralization.'"

C. Operational Level Examples:

1) Nocetti, J., 2018. The darkening web: the war for cyberspace; The virtual weapon and international order.

2) Macaulay, T. and Singer, B.L., 2011. *Cybersecurity for industrial control systems: SCADA, DCS, PLC, HMI, and SIS*. CRC Press.

3) Cappelli, D.M., Moore, A.P. and Trzeciak, R.F., 2012. *The CERT guide to insider threats: how to prevent, detect, and respond to information technology crimes (Theft, Sabotage, Fraud)*. Addison-Wesley.

4. BACKGROUND AND DISCUSSION

A. General Overview

The context and discussion about the subject of the lesson, "National Level Cybersecurity in Ukraine: Key Principles" aims to explore important aspects and principles of cybersecurity in Ukraine. The lesson is designed to provide students with understanding of national strategies, doctrines, policies, and organizations.

Within this lesson, the following questions may be discussed:

1) Defining Cybersecurity: What does the term "cybersecurity" mean in the national context, and what are the key aspects it encompasses? What is the importance and impact of cybersecurity on national security?

2) Cybersecurity Threats: What types of threats and risks exist in cyberspace? What can be the consequences of cyberattacks, operations, and incidents? Which sectors of society are most vulnerable to cyber threats?

3) Means and Methods of Protection: What are the fundamental principles and methods used to ensure national cybersecurity? What encryption, authentication, monitoring, and threat detection technologies are employed and by which authorities? How can social engineering and phishing be prevented?

4) National Cybersecurity: How does cybersecurity impact national security? What are the key aspects of cybersecurity in the national context, and the importance of protecting critical infrastructure? How do nations cooperate to ensure cybersecurity at the international level?

This lesson provides an opportunity for students to study the fundamental aspects of cybersecurity, expand their knowledge of digital security, and develop skills to protect against cyber threats. The discussion will help students exchange thoughts and ideas on the importance of cybersecurity and the role it plays in the modern world.

B. Definitions

Definitions are often unique to national contexts. As such, internationally recognized or generic definitions may not have the same meaning in national contexts. Instructors should carefully consider their audience and the respective values of different definitions. Note, too, that national structures can impact definitions. For example, Ukraine's National Cybersecurity Strategy makes explicit mention of cyber defence, cybersecurity, and cyber protection. These particular definitions may not be reflected in other national strategies or organizations. Along with two definitions for cybersecurity (one international, the other from Ukraine), instructors will find value in using the resources below.

1) Cybersecurity: The "activity or process, ability or capability or state whereby information and communications systems and the information contained therein are protected from and/or defended against damage, unauthorized use or modification or exploitation." The NATO Generic Reference Curriculum contains a glossary of terms https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_10/1610-cybersecurity-curriculum.pdf

In the context of Ukraine, the Law of Ukraine No. 2163-VIII (2017) defines many aspects of cybersecurity and defence. For example:

2) Cybersecurity: "security of the vital interests of man and citizen, society and state when using cyberspace in case of which sustainable development of information society and the digital communication circle, timely identification, prevention and neutralization of real and potential hazards of homeland security of Ukraine in cyberspace are provided." https://cis-legislation.com/document.fwx?rgn=101792

C. Strategic Level

1) Development of Policy and Strategy: The government develops comprehensive policies and strategies specifically designed to address cybersecurity issues in the military domain. This includes formulating regulatory documents that govern cybersecurity practices and provide strategic direction to all military units.

2) Collaboration and Partnership: The government facilitates cooperation and partnership with internal and international entities such as cybersecurity organizations, defence enterprises, and allied countries, with the aim of exchanging threat intelligence, sharing best practices, and enhancing overall defence capabilities.

3) Risk Assessment and Management: Comprehensive risk assessments are conducted to identify vulnerabilities and potential threats to military networks and systems. Risk management strategies are employed to prioritize and effectively mitigate risks, taking into account the potential impact on military operations and national security.

4) Cybersecurity Training and Education: A comprehensive training and education programme is established to equip civilians and government personnel with the necessary knowledge and skills to identify, prevent, and respond to cyber threats. This includes regular training with an educational component on cybersecurity, specialized technical training for cybersecurity professionals, and ongoing education to adapt to evolving threats.

5) Incident Response and Recovery: A clear incident response plan is developed, outlining procedures and responsibilities for detecting, analysing, and responding to cyber incidents. This includes establishing incident response teams, implementing incident reporting mechanisms, and conducting post-incident analysis to enhance response capabilities.

6) Research and Development: The government invests in research and development to stimulate innovation in the field of cybersecurity. This includes exploring new technologies such as artificial intelligence and machine learning to enhance threat detection, automate response processes, and develop advanced encryption methods. Ensuring cybersecurity in Ukraine, taking into account the experience gained during the repulsion of large-scale armed aggression by the Russian Federation, has led to a total digital transformation of the entire system, including the establishment of the IT Army of Ukraine, the "eEnemy" anomaly detection system, the network of systems for identifying RF military personnel "Clearview AI," and others.

D. Operational Level

1) Information Sharing: different sectors and entities share responsibility for cybersecurity. As such, robust information sharing mechanisms must be implemented to ensure timely response, action, and resilience. In the context of Ukraine, national authorities have responsibility for collecting and sharing information on cybersecurity.

2) Incident Response and Cyber Defence: Ukraine CERT (CERT UA) has national responsibility for incident response. Likewise, for the defence and security sectors a military unit establishes a team and procedures for prompt response to cyber incidents. This includes clear roles and responsibilities, incident reporting mechanisms, and predefined response measures to mitigate the impact of cyber incidents and restore normal operations. Drawing from the experience of February 23, 2022, when the adversary compromised the websites of the Verkhovna Rada (Parliament), the Cabinet of Ministers of Ukraine, and the Ministry of Foreign Affairs, measures are taken to repair the damage. The Ministry of Education and Science restricted access to its website. Websites of the Security Service of Ukraine (SBU), Ministry of Strategic Industries, Infrastructure, and Agrarian Policy also suffered damages

3) Training and Awareness: Ongoing training programmes and awareness campaigns are conducted to educate civilian and governmental personnel on best practices in cybersecurity, methods of social engineering, and the importance of adhering to secure procedures. This includes training on detecting phishing attempts, safe online practices, and reporting suspicious activities.

5. QUESTIONS FOR CONSIDERATION

These questions aim to spark critical thinking and encourage students to explore various national cybersecurity dimensions of the Russia-Ukraine cyberwar, including motivations, consequences, challenges, collaboration, emerging technologies, and policy considerations.

A. What are the main cyber threats that pose the greatest risk to national cybersecurity in Ukraine?

B. Which sectors of Ukraine's critical infrastructure, such as energy, transportation, or finance, are considered the most vulnerable to cyberattacks based on the practical experience of the Russian war against Ukrainian?

C. How did the war impact the cybersecurity system of government organizations in Ukraine in terms of protecting their information systems from cyber threats?

D. How does Ukraine collaborate with international partners and organizations, such as the European Union or NATO, to ensure national cybersecurity?

E. What legislative measures and policies have been implemented in Ukraine to enhance the level of cybersecurity?

F. What educational programmes and initiatives exist in Ukraine to train government professionals and raise awareness among users and civilians about cybersecurity?

G. How do emerging technologies like artificial intelligence or the Internet of Things impact cybersecurity in Ukraine? What challenges do they pose, and how can they be addressed?

H. What are the prospects for cybersecurity development in Ukraine considering the practical experience of the Russian war against Ukraine? What potential threats and challenges could arise in the future?

I. How can citizens and businesses in Ukraine actively contribute to improving national cybersecurity? What best practices can be recommended?

LESSON 25:
KEY PRINCIPLES OF ENSURING CYBERSECURITY AND CYBER DEFENCE IN THE MILITARY SPHERE

1. PURPOSE AND SCOPE

The concepts of cybersecurity and defence in the military sphere have gained particular importance and relevance based on the experience acquired during the Russian war against Ukraine. This two-hour lesson for staff colleges emphasizes the necessity of familiarizing students with key principles for cybersecurity and defence in the context of military operations. These principles illustrate the need for integrity, confidentiality, and the availability of information resources, command systems, communication networks, and other critical infrastructures utilized in military actions.

Within this framework, key principles, methods, and strategies will be described that are necessary for the effective protection of the military cyberspace (the information environment) from potential cyberattacks and threats. Participants will be able to recognize various aspects of cybersecurity, such as detection, analysis, and mitigation of cyber threats, utilization of defensive technologies and techniques, vulnerabilities, and risks, as well as the strategies to respond to cyberattacks.

At the conclusion of this lesson the student will be able to describe cybersecurity threats within military situations and list ways of effectively responding to them. This includes those threats to critical infrastructure.

2. LESSON LEARNING OBJECTIVES

The primary objectives of the lesson are to educate participants as competent cybersecurity professionals in the military sphere who can effectively protect information resources and critical infrastructure from cyber threats in a military context. They cover the basic principles of cybersecurity and defence in the military sphere to include the following:

A. DESCRIBE the threats and vulnerabilities of cyber-security threats that can impact the military sphere. This includes studying potential cyberattacks, various types of malicious software, and other harmful actions that can damage military systems and operations.

B. SUMMARISE how to detect and respond to cyberattacks: This involves developing methods for threat detection, analysing their impact, and taking effective measures to minimize the consequences of cyberattacks.

C. USE practical skills: to protect the military sphere from cyber threats. This includes training in preventive measures, the use of cryptographic methods, incident management, and other cybersecurity practices.

D. OUTLINE critical infrastructure in the military context and how to safeguard critical military infrastructure from cyber threats. This includes understanding key principles for protecting networks, command systems, communication channels, and other vital infrastructure components.

E. RECOGNIZE key lessons in crisis response management of cyber crises and how to quickly respond to ensure the safety of military operations.

3. READINGS

A. General Overview

These readings offer a comprehensive range of materials for students to deepen their understanding of the lessons learned from the Russian war against Ukraine. By exploring these resources, students will gain valuable insights into the cybersecurity and defence in the military sphere. Examples to consider within this framework are critical infrastructure, strategic-level considerations for enhancing cyber defence, operational-level experiences in cyber warfare, and tactical-level approaches to protecting critical infrastructure assets. The first two readings below provide the foundation for this Lesson Plan and should be considered mandatory readings.

1) Vadym Mashtalir, Key Principles of Ensuring Cybersecurity of the State in the Military Sphere presentation, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19119_download&client_id=DEEP

2) Vadym Mashtalir, Key Principles of Ensuring Cybersecurity of the State in the Military Sphere

Talking Paper, National Defence University of Ukraine. https://deepportal.hq.nato.int/ilias/goto.php?target=file_19120_download&client_id=DEEP

3) Notre Europe - Institut Jacques Delors, Cyberattacks in Russia's hybrid war against Ukraine and its ramifications for Europe, September 2022, https://institutdelors.eu/en/publications/la-dimension-cybersecurite-de-la-guerre-en-ukraine/

4) James A. Lewis, Cyber war and Ukraine, Centre For Strategic and International Studies, June 2022, https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/220616_Lewis_Cyber_War.pdf:S.iEKeom79InugnYWlcZL4r3Ljuq.ash

5) Cyber Operations in Russia's War against Ukraine, Uses, limitations, and lessons learned so far, doi:10.18449/2023C23, https://www.swp-berlin.org/10.18449/2023C23/

6) Jon Bateman, Russia's Wartime Cyber Operations in Ukraine: Military Impacts, Influences, and Implications, 2 Carnegie Endowment for International Peace, December 2022.

7) J. Nocetti, The darkening web: the war for cyberspace; The virtual weapon and international order 2018.

8) T. Macaulay and B. L. Singer, Cybersecurity for industrial control systems: SCADA, DCS, PLC, HMI, and SIS. CRC Press, 2011.

9) D. M. Cappelli it al. The CERT guide to insider threats: how to prevent, detect, and respond to information technology crimes (Theft, Sabotage, Fraud). Addison-Wesley, 2012.

B. Strategic Level Example

1) Decree of the President of Ukraine No. 121/2021 dated March 25, 2021, "On the Decision of the National Security and Defence Council of Ukraine dated March 25, 2021, "On the Strategy of Military Security of Ukraine."

2) Decree of the President of Ukraine No. 447/2021 dated August 26, 2021, "On the Decision of the National Security and Defense Council of Ukraine dated May 14, 2021, "On the Strategy of Cybersecurity of Ukraine."

3) Law of Ukraine "On the Basic Principles of Ensuring Cybersecurity in Ukraine" dated October 5, 2017.

4) Decree of the President of Ukraine No. 32/2017 dated February 13, 2017, "On the Decision of the National Security and Defence Council of Ukraine dated December 29, 2016, "On Cybersecurity Threats to the State and Urgent Measures to Neutralize Them."

5) Decree of the President of Ukraine No. 446/2021 dated August 26, 2021, "On the Decision of the National Security and Defence Council of Ukraine dated May 14, 2021, "On Urgent Measures for Cyber Defence of the State."

6) Law of Ukraine No. 1932-XII dated December 6, 1991, "On the Defence of Ukraine."

7) Law of Ukraine No. 2163-VIII dated October 5, 2017, "On the Basics of Cybersecurity of Ukraine."

8) Cyber Operations in Russia's War against Ukraine, Uses, limitations, and lessons learned so far, doi:10.18449/2023C23, https://www.swp-berlin.org/10.18449/2023C23/

9) Jon Bateman, Russia's Wartime Cyber Operations in Ukraine: Military Impacts, Influences, and Implications, 2 Carnegie Endowment for International Peace, DECEMBER, 2022. https://carnegieendowment.org/files/Bateman_Cyber-FINAL21.pdf"

C. Operational Level Example

1) "Doctrine of the Application of Defence Forces of the State," approved by the Supreme Commander-in-Chief of the Armed Forces of Ukraine on August 17, 2018, under No. 20dsk-op.

2) "Doctrine on Operations in the Cyber Domain" VCDP 6-00(03).01, approved by the Chief of the General Staff of the Armed Forces of Ukraine under No. 198/NVHS/dsk on September 30, 2020.

3) "Temporary Doctrine of the Application of Defence Forces of the State," approved and implemented by the order of the Chief of the General Staff of the Armed Forces of Ukraine on March 31, 2020, under No. 124/dsk.

4) "Joint Planning Doctrine" SP 3-150.01, approved by the order of the Commander-in-Chief of the Armed Forces of Ukraine on December 22, 2020, under No. 225/dsk.

5) Jakub Przetacznik with Simona Tarpova, Russia's war on Ukraine: Timeline of cyberattacks, EPRS | European Parliamentary Research Service, June 2022. https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733549/EPRS_BRI(2022)733549_EN.pdf

D. Tactical Level Example

1) Special Report: Ukraine, An overview of Russia's cyberattack activity in Ukraine, Microsoft, 2022, https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4Vwwd

2) Taylor Grossman et al, The Cyber Dimensions of the Russia-Ukraine War - The European Cyber Conflict Research Initiative (ECCRI), April 2023. https://eccri.eu/wp-content/uploads/2023/04/ECCRI_REPORT_The-Cyber-Dimensions-of-the-Russia-Ukraine-War-19042023.pdf

4. BACKGROUND AND DISCUSSION

A. General Overview

It is worth noting that in the first year of the war, the number of critical information security events originating from Russian IP addresses increased by 35 times compared to the previous quarter of the year preceding the outbreak of the war. The number of detected cybersecurity events related to active scanning, originating from Russian IP addresses, has almost doubled. Thus, the cybersecurity of the state in the military sphere is focused on the importance of protecting information systems and critical infrastructure of military organizations. The military sector requires special attention to cybersecurity since cyberattacks can hinder operational activities, result in the loss of confidential information, or even lead to serious consequences for national security. Participants in the discussion can delve into the following topics:

1) Cyber Threats in the Military Sphere: Defining various types of cyber threats, including state-sponsored cyberattacks, cyber espionage, and cyber terrorism, that can target military systems and data during the Russian war against Ukraine.

2) Concept of Cybersecurity in Military Organizations: Describing the principles and strategies of cybersecurity that were employed during the war to protect the information systems and data of military organizations.

3) Critical Infrastructure: Identifying the key components of critical infrastructure in the military forces that require special attention in terms of cybersecurity. Citing examples of enemy cyberattacks on Ukraine's critical infrastructure based on the experience of the Russian-Ukrainian war. According to processed data, XakNet, NoName057, Russian Hackers Team, RaHDit, and Free Civilian are the most active pro-Russian hacker groups; the number of attacks organized by them during the first quarter of 2023 accounts for 90% of the total recorded attacks by similar groups during the reporting period.

4) Threats and Vulnerabilities in military systems: Describing the major threats and vulnerabilities faced by military systems, such as communication systems, automated management systems, and unmanned vehicles, during the Russian-Ukrainian war.

5) Cyber Defence Measures and Cybersecurity Practices: Examining cybersecurity measures such as encryption, authentication, network segmentation, monitoring, incident detection, and response.

6) Cybersecurity Management: Describing methods for planning, implementing, and managing cybersecurity in military organizations, including policy development, personnel training, and coordination with other security forces.

B. Discussion

Participants in the discussion can share their experiences, express views on the importance of cybersecurity in military organizations and discuss strategies and practical aspects of ensuring cybersecurity. Such a discussion can help raise awareness of cybersecurity in the military context and facilitate the exchange of best practices.

C. Definitions

Definitions are often unique to national contexts. As such, internationally recognized or generic definitions may not have the same meaning in national contexts. Instructors should carefully consider their audience and the respective values of different definitions. Note, too, that national structures can impact definitions. For example, Ukraine's National Cybersecurity Strategy makes explicit mention of cyber defence, cybersecurity, and cyber protection. These points of definition may not be reflected in other national strategies or organizations. Along with two definitions for cybersecurity (one international, the other from Ukraine), instructors will find value in using the resources below.

1) Cybersecurity: The "activity or process, ability or capability or state whereby information and communications systems and the information contained therein are protected from and/or defended against damage, unauthorized use or modification or exploitation." The NATO Generic Reference Curriculum contains a glossary of terms https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2016_10/1610-Cybersecurity-curriculum.pdf

In the context of Ukraine, the Law of Ukraine No. 2163-VIII (2017) defines many aspects of cybersecurity and defence. For example:

2) Cybersecurity: "security of the vital interests of man and citizen, society and state when using cyberspace in case of which sustainable development of information society and the digital communication circle, timely identification, prevention and neutralization of real and potential hazards of homeland security of Ukraine in cyberspace are provided."   https://cis-legislation.com/document.fwx?rgn=101792

D. Strategic Level

The strategic objective is to ensure the cybersecurity of systems and military operations in order to preserve national security and support combat readiness.

1) Risk Assessment: Conduct comprehensive risk assessments to identify vulnerabilities, potential attack vectors, and critical assets in military cyberspace infrastructure. This analysis will help prioritize resource allocation and effectively allocate cybersecurity measures.

2) Cybersecurity Strategy Development: Develop a comprehensive cybersecurity strategy tailored to the specific needs of military structures. This strategy should encompass goals, policies, procedures, and guidelines for enhancing cybersecurity at the strategic level. It should also address incident response, crisis management, and coordination with other governmental entities.

3) Cyber Threat Intelligence: Establish a robust cyber threat intelligence system for Cyber Threat Intelligence: Establish a robust cyber threat intelligence system for gathering, analysing, and disseminating information on potential cyber threats targeting military structures. This includes monitoring adversaries' activities, tracking emerging cyber threats, and collaborating with intelligence agencies.

4) Partnerships and Alliances: Establish partnerships and alliances with internal and international cybersecurity organizations, defence enterprises, and technology companies. Collaborate on research, information sharing, and joint training to enhance cyber defence capabilities and improve resilience against emerging threats.

E. Operational Level

Consider a scenario that demonstrates the operational level of cybersecurity in the military domain.

1) Secure Communication Networks: Implement robust encryption protocols and authentication mechanisms to protect the communication networks used by the military. This includes using secure Virtual Private Networks (VPNs), encrypted radio communications, and secure messaging systems to prevent unauthorized access and interception of sensitive information.

2) Cyber Hygiene Practices: Train all personnel in best cyber hygiene practices, such as effective password management, regular software updates, and awareness of social engineering methods. Emphasize the importance of adhering to security protocols and reporting any suspicious activities or potential vulnerabilities.

3) Vulnerability Assessments: Regularly conduct vulnerability assessments of the military's network systems, including UAVs, command centers,

and logistics management systems. Identify and address vulnerabilities or weaknesses that could be exploited by cyber adversaries.

4) Incident Response Planning: Develop a comprehensive incident response plan that defines procedures for incident detection, analysis, and mitigation. This includes establishing a dedicated incident response team, defining escalation procedures, and coordinating with higher-level cybersecurity authorities.

5) Information Sharing on Cyber Threats: Foster collaboration and information sharing with other military units, intelligence agencies, and cybersecurity organizations to exchange intelligence on cyber threats and track emerging threats in the operational environment. This promotes proactive defence and rapid response to potential cyberattacks.

6) Red Team Simulations: Conduct red team simulations to model realistic cyberattack scenarios and assess the readiness and response capabilities of the military unit. This includes testing incident response procedures, evaluating the effectiveness of defensive measures, and identifying areas for improvement.

7) Continuous Monitoring: Implement continuous monitoring systems that provide real-time monitoring of network traffic, system logs, and user activities. Utilize intrusion detection and prevention systems to detect and block any suspicious or unauthorized activities within the network.

8) Training and Cybersecurity Awareness: Continuously train and raise awareness among personnel about new cyber threats, attack methods, and defence measures specific to the operational environment. This includes regular cybersecurity awareness campaigns, conducting seminars, and simulations to reinforce cybersecurity skills.

An operational-level example focuses on ensuring and supporting the operational capability of the military unit in the face of cybersecurity threats. By implementing reliable cybersecurity measures, conducting regular assessments, and fostering a cybersecurity culture, the military unit can effectively mitigate cyber risks and protect critical assets and operations.

F. Tactical Level

Consider a scenario that demonstrates the tactical level of cybersecurity in the military domain:

1) Secure Mobile Devices: Implement device-level security measures on all mobile devices used by the platoon, such as encryption and strong authentication mechanisms. Ensure that devices are protected with robust passwords and have necessary security settings to prevent unauthorized access.

2) Secure Wireless Communications: Use secure wireless communication protocols and encryption methods to protect the platoon's wireless communications. This includes secure voice and data transmission over encrypted channels to minimize the risk of interception or unauthorized access by adversaries.

3) Endpoint Protection: Implement endpoint security measures on all platoon devices to safeguard against malware, unauthorized access, and data leakage. This includes using antivirus software, device-level firewalls, and intrusion detection/prevention systems to control and protect devices from cyber threats.

4) Network Segmentation: Implement network segmentation to isolate different types of devices and sensitive data within the platoon's network. This helps limit potential intrusions and restrict lateral movement by adversaries, enhancing overall security.

5) Regular Software Updates: Ensure that all software and hardware on platoon devices are regularly updated with the latest security patches and bug fixes. This helps eliminate known vulnerabilities and reduces the risk of exploitation by adversaries.

6) Training and Cybersecurity Awareness: Provide comprehensive training to all platoon members on the importance of cybersecurity, safe computer practices, and recognizing and reporting potential cyber threats. This includes education on phishing attacks, social engineering methods, and proper handling of sensitive information in the field.

7) Tactical Cyber Defence Measures: Implement tactical cyber defence measures, such as network monitoring tools, intrusion detection systems, and incident response capabilities, to detect and respond to

potential cyber threats in real-time. This allows the platoon to quickly identify and mitigate the consequences of cyber incidents that may occur during their operations.

8) Contingency Planning: Develop contingency plans for various cybersecurity scenarios, including communication loss, device compromise, or cyberattacks. These plans should define alternative communication channels, backup systems, and response procedures to ensure operational continuity for the platoon in the face of cyber threats.

By implementing tactical cybersecurity measures, the platoon can enhance their operational security, protect critical data, and maintain situational awareness in hostile environments. The combination of device security measures, secure communications, and proactive cyber defence measures helps mitigate risks and ensures successful mission execution.

5. QUESTIONS FOR CONSIDERATION

A. What are the main threats and challenges related to cybersecurity in the military sphere? How can these threats impact the security and operational readiness of military forces, considering the experience of the Russian war against Ukrainian?

B. What are the key principles and strategies that should be implemented in the cybersecurity of military organizations? What measures for ensuring cybersecurity are most effective in this context?

C. What is the role of awareness and training of personnel in cybersecurity for military forces? What methods of training and increasing awareness regarding cybersecurity can be utilized during the Russian war against Ukraine?

D. How can critical infrastructure of military organizations be protected from cyberattacks and cyber espionage? What technical and organizational measures can be taken to ensure the security of this infrastructure?

E. What challenges arise in the use of advanced technologies such as artificial intelligence, Internet of Things, and unmanned systems in the military sphere from a cybersecurity perspective? How can the security of these technologies be ensured?

F. What challenges and opportunities arise in the cooperation and exchange of cyber information between military organizations of different countries? How can security and trust be ensured in such exchanges, considering the experience of the Russian-Ukrainian war?

G. What principles and practices of cybersecurity can be applied during military operations in the cyberspace against Russia? How can the protection of military communications and information be ensured during such operations?

H. What roles and responsibilities do various stakeholders, including military leadership, cybersecurity teams, and individual soldiers, have in ensuring cybersecurity in the military sphere?

I. How can continuous monitoring and detection of cyber threats in the military sphere be ensured? What tools and technologies can be used for these purposes, considering the experience of the Russian war against Ukrainian?

J. What challenges and opportunities are associated with future trends in cybersecurity for military organizations, such as quantum cryptography, cyber-physical systems, and 5G networks? How can preparations be made for these challenges?

Photographer: Eduard Kryzhanivskyi

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