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The Evolution of Russia's Precision Strike: Adopting Mass Precision

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Methodology

This paper is based on a combination of author interviews with four subject matter experts who have focused their studies on Russia's armed forces. It also includes select interviews with two serving Ukrainian personnel, which have been anonymised where they are used. Alongside those interviews, examinations of publicly available datasets documenting Russia's use of different precision strike capabilities were used, as well as a review of secondary literature on Russian military theory and practice regarding the use of precision strike both before and during the war with Ukraine, desk-based operations analysis, and a review of Russian military literature. All research was conducted between October 2025 and June 2026. The paper was submitted on 9 June 2026 and approved for copy-editing on 10 July 2026.

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Executive Summary

In 2022, Russia went to war in Ukraine with a theoretically sophisticated approach to precision strike at the tactical and operational levels. Initially, however, shortcomings in munitions stocks and difficulties establishing effective ISTAR dominance limited the implementation of these concepts.

This paper examines how Russia's precision strike capabilities have evolved since 2022, and argues that the war has driven a fundamental shift in how Russia employs precision fires – from an initial reliance on mass firepower towards mass precision strike. Since 2022, the war has led Russia to significantly expand its precision strike capabilities in terms of quantity, quality, scale and integration. At the tactical level, this paper finds that Russia retains the ability to conduct massed artillery fires. Precision targeting, drones and reconnaissance-strike complexes have not replaced artillery but rather complement Russia's enduring preference for overwhelming firepower along key axes of advance.

Russian forces have also developed a substantial cadre of reconnaissance personnel with extensive experience locating small, mobile targets under combat conditions. If this expertise is retained after the war, it likely that Russia will enter future conflicts in a far stronger position than it had in 2022. This paper also demonstrates that, in parallel, the distinction between reconnaissance-fire and reconnaissance-strike complexes has increasingly blurred. Precision strike capabilities are now routinely employed for counter-battery missions and attritional strikes.

Russian forces have also become increasingly aggressive in the competition for ISTAR dominance. Units such as the Rubicon Centre actively target Ukrainian drone operators and electronic warfare (EW) systems while exploiting temporary gaps in air defence coverage to maximise strike effectiveness. But despite these advances, Russia is struggling to convert its growing ability to suppress enemy forces without massed fires into decisive operational breakthroughs.

This paper demonstrates that Russia has shifted from relying on mass firepower to mass precision strike. In turn, these adaptations are likely to shape future Russian doctrine and force structure, producing forces that are more lethal and effective at targeting adversaries once ISTAR superiority is established. This evolution should not, however, be conflated with UAVs alone: this paper's central argument is that UAVs are

one component of an evolving precision strike complex, alongside more accurate artillery and air-launched standoff munitions. Russia's methods of employing certain capabilities will probably prove more enduring than the munitions themselves.

At the strategic level, however, this paper finds that the war has exposed the limitations of Russia's pre-war assumptions about the 'precision revolution'. Russia's air campaign evolved from an attempted rapid knockout blow into a prolonged effort to erode Ukraine's economy and rear areas. While some lessons may not fully apply to a NATO conflict, developments such as improved unity of command, more agile mission planning and the integration of cheaper strike systems alongside exquisite capabilities are highly likely to influence Russia's future way of war.

Introduction

The Russo-Ukrainian war has driven both sides into a cycle of adaptation and counter-adaptation. This has been acute for the Russian army. At both tactical and operational-strategic levels, the conflict has tested Russia's key assumptions about the effects that could be achieved by delivering a given weight of artillery fire at the tactical level, and about how effects could be achieved at operational and strategic depth. Russia's initial concept of operations in Ukraine rested on two such theories – that frontline forces could rapidly close kill chains, and that salvos of long-range cruise missiles could throw an opponent's rear areas into disarray. Both were tested and found wanting.

In the face of these challenges, this paper explores how the Russian system has adapted at both tactical and operational-strategic levels. Central to this process of adaptation has been the employment of large numbers of comparatively cheap precision strike capabilities within the Russian order of battle. Equally important is how the Russian approach to tempo, scale and sequencing has been impacted by an abundance of cheaper, less advanced capabilities which can be used in conjunction with a small, but growing, stockpile of more sophisticated systems. The paper examines how the Russian approach to precision strike evolved between 2022 and May 2026. While existing literature has extensively documented the tactical shifts in Russian strike patterns, this paper adds to the growing body of research by evaluating which are likely to be institutionalised into Russia's long-term military doctrine.

The paper begins with a framing discussion of the theoretical constructs that underpin Russia's understanding of a battlefield. Its theorists maintain dialectical thinking, which holds that war is a perpetual balance between offensive and defensive means. This grounding is essential for assessing the technologies and adaptations that will flow into the Russian military when the Russo-Ukrainian war ends. The paper is then divided into two chapters which examine Russian adaptations at the tactical-operational and operational-strategic levels across the conflict. Each chapter is subdivided into sections that address temporal windows within which major changes are observed to have occurred. The chapters conclude by assessing how the Russian system is absorbing and identifying the lessons that are being embedded into the Russian way of war rather than being treated as adaptations to the unique circumstances in Ukraine. The paper's conclusion discusses how Russia's capabilities have evolved.

Introduction to Russian Thinking on Strike Complexes

Russian military thought divides the battlefield into five zones, which are broadly defined by their distance behind the enemy's frontline and the weapons that can be used in those zones as a result. The zones are illustrated in Table 1. In each zone, Russia expects to have the ability to conduct some form of precision targeting. For this paper, the most relevant zones are the tactical and operational. And it is worth noting that Michael Kofman identified the potential for these two zones to merge: 'As Russian fire systems gain range and precision, it is likely that reconnaissance-fire and reconnaissance-strike will be merged into one concept [the reconnaissance fires system] that integrates both tactical and tactical-operational systems'.[1] This is supported by other scholar, who have explained that the two were always expected to merge as the capabilities of weapons evolved, and that this dates back to the Ogarkov Reforms and initial concepts of the 1980s.[2]

The second set of concepts within Russian thinking relevant to the evolution of precision strike is the distinctions between types of conflict. Russia's views on the types of conflict are summarised in Table 2. This theoretical construct has strategic significance given the types of capability that Russia would look to employ in each (with nuclear weapons playing an important role in wars of a scale equal to or greater than a regional war). These distinctions also have operational ramifications when transposing lessons from the conflict in Ukraine to other types with different levels of escalation and projected timelines.

1. Michael Kofman et al., 'Russian Military Strategy: Core Tenets and Operational Concepts', CNA Research Memorandum, August 2021, p. 79, <https://www.cna.org/reports/2021/08/Russian-Military-Strategy-Core-Tenets-and-Operational-Concepts.pdf>, accessed 28 January 2026.
2. Author interview with Lieutenant Colonel Charles Bartles, Foreign Military Studies Office, Fort Leavenworth, Kansas, 3 February 2026.

Table 1: Russian Strike Concepts and Battlefield Zones

Zone Description	Distance Behind Enemy Frontline	Systems Employed
Immediate contact with enemy	Up to 7 km	Small arms, artillery
Tactical zone led by brigades and divisions	Up to 40 km	Reconnaissance fire, using loitering munitions, tube and rocket artillery
Operational zone led by corps or army level formations	Up to 200 km	Reconnaissance-strike complex using multiple-launch rocket systems (MLRS) and aircraft
Operational-strategic zone, essentially the front grouping of forces	Up to 500 km and greater	Reconnaissance-strike system using Iskander and similar missiles
Strategic zone, which encompasses the world	Greater than 500 km	Long-range cruise and ballistic missiles

Source: Michael Kofman et al., 'Russian Military Strategy: Core Tenets and Operational Concepts', CNA Research Memorandum, August 2021, p. 79, <https://www.cna.org/reports/2021/08/Russian-Military-Strategy-Core-Tenets-and-Operational-Concepts.pdf>, accessed 28 January 2026.

Taken together, Russia's division of the battlefield into five zones and different classifications of the scale of a conflict provide the basis for understanding Russia's thinking on the roles of precision strike. For instance, Russian planners might not expect to deploy theatre-level precision strike missiles in a local war. However, for a large-scale war, cruise and ballistic missiles would be essential from the outset. This distinction matters because classifying the invasion of Ukraine as a Special Military Operation (SMO) impacted the planning assumptions behind Russia's initial use of precision strike weapons.

Table 2: Russian Definitions of War and the Means Used to Win

Scale of War	Definition	Means Used
Armed conflict	An armed clash of a limited scale between states or opposing sides within a state	Relatively small formations and level of commitment
Special Military Operation[3]	A limited set of operations designed to achieve very specific goals in a certain timeframe	Single combined arms operation with some non-military methods to achieve strategic military-political goals
Local war	A war pursuing limited military-political objectives when military actions take place within the borders of the warring states	Multiple combined arms operations, economic and/or social mobilisation, deep battle and physical encirclements to achieve modest military-political goals
Regional war	A war involving several states in the same region waged by national or coalition armed forces pursuing important objectives	Multiple combined arms operations, economic and/or social mobilisation, deep battle and physical encirclements to achieve significant military-political goals; the limited use of nuclear weapons is considered probable at this stage of conflict[4]
Large-scale war	A war between coalitions of states or major states where the sides are pursuing radical military-political objectives	Significant strategic operations designed to shape an adversary population's appetite for war and convince them that they are on a path to large-scale nuclear escalation. 'It would require mobilization of all physical resources available and spiritual strength of the participating states'.

Source: President of the Russian Federation, 'The Military Doctrine of the Russian Federation', 25 December 2014, <https://rusmilsec.blog/wp-content/uploads/2021/08/mildoc_rf_2014_eng.pdf>, accessed 14 July 2026.

3. Roger N McDermott and Charles K Bartles, 'Defining the "Special Military Operation"', Russian Studies Series 05/2022, NATO Defense College, updated 14 February 2025, <https://www.ndc.nato.int/defining-the-special-military-operation/>, accessed 4 February 2026. Note that the term 'Special Military Operation' is not explicitly referenced in the 2014 military doctrine, but has been employed by the Russian government since then, in the context of the Russo-Ukrainian war.
4. Michael Kofman, Anya Fink and Jeffrey Edmonds, 'Russian Strategy for Escalation Management: Evolution of Key Concepts', CNA, 2021, p. 17, <https://www.cna.org/analyses/2020/04/russian-strategy-for-escalation-management-key-concepts>, accessed 10 August 2026.

The SMO definition was largely an internal one, with little meaning to the outside world. Russia's war in Ukraine is, according to its definitions, a local war, albeit one with regional characteristics. Russia's strike campaigns reflect that fact, even if the official Kremlin narrative maintains the SMO title.[5]

While it is important for analysts to be careful when transposing lessons from a local war to a regional or large-scale war, several years of combat in Ukraine have arguably had an impact on broader Russian planning assumptions in three areas:

1. **Effects**: Russia has experienced what is and is not possible with precision strike throughout its operational zones. It is likely that future use would be approached with different assumptions about the effects and resources involved.
2. **Resources**: Precision strike assets were limited in 2022; this is no longer the case and the upheaval caused to Russian society to address the munitions shortage is unlikely to change in the next decade.
3. **Planning**: Russia has gained valuable experience of targeting throughout its operational zones, which is unlikely to fade in the next five years.

The key question for analysts is how Russia's approach has changed across its operating zones and which of these changes are transposable to other contexts. The next chapter explores the tactical zone and how Russia's use of precision weapons has evolved to counter Ukraine's own adaptations.

5. Office of President of Russia, 'Meeting on Developments in the Special Military Operation Zone', 29 December 2025, <http://en.kremlin.ru/events/president/news/78888>, accessed 12 August 2026.

The Tactical Zone and Non-Linear Warfare

Russian military theorist Vladimir Slipchenko predicted a fragmented and non-linear battlefield like that in Ukraine. He did not foresee the widespread use of drones and focused instead on the impact of missiles.[6] Slipchenko was one of many Soviet thinkers in the 1980s who were concerned with the changing character of war. Key figures such as Marshal Nikolai Ogarkov, chief of the Soviet General Staff, acknowledged that if precision-munition-centric concepts – for example, the US' Assault Breaker – were realised as envisaged, it would fundamentally change the battlefield and character of combat.[7]

The Soviet General Staff and military theorists believed that a combination of long-range precision strike and air and space surveillance underpinning its use would create a fragmented battlefield. The precision of advanced conventional weapons would force units to disperse to present a smaller target. As a result, they anticipated that most fighting would be conducted at the battalion or regimental level, with divisions providing support but not necessarily acting as a combat formation. They expected gaps between units – to be secured with artillery, minefields and mobile formations. 'There are no safe areas, and combatants will suffer heavy attrition', Lester Grau wrote in 1990.[8] The Soviets referred to this future of combat as Non-Linear Warfare.

Along with Non-Linear Warfare came the assumption that conventional artillery fire missions would have to yield to greater use of guided munitions. The Soviets assessed that engagements would increase to 30 or 40 km in range, and that smaller groups of artillery would be able to converge their firepower, reducing the need for large artillery groupings. Observers also identified battlefield fragmentation as a major

6. Author interview with Lieutenant Colonel Charles Bartles, Foreign Military Studies Office, Fort Leavenworth, Kansas, 3 February 2026.
7. Michael Kofman, 'The Ogarkov Reforms: The Soviet Inheritance Behind Russia's Military Transformation', *Russia Military Analysis* blog, 11 July 2019, <https://russianmilitaryanalysis.wordpress.com/2019/07/11/the-ogarkov-reforms-the-soviet-inheritance-behind-russias-military-transformation/>, accessed 1 July 2026.
8. Lester W Grau, 'Soviet Non-Linear Combat: The Challenge of the 90s', Soviet Army Studies Office, September 1990, pp. 2–3, <https://apps.dtic.mil/sti/html/tr/ADA231789/index.html>, accessed 14 July 2026.

challenge for logistics. This led analysts to conclude that adversaries would contest lines of communication and that commanders should minimise the logistics burden.

In this period, the Soviet lexicon included the ideas of reconnaissance-strike and reconnaissance-fire complexes. The idea was to combine long-range precision fires into real-time targeting cycles focused on either operational or tactical targets for reconnaissance-strike and reconnaissance-fire complexes, respectively.[9]

Between 2014 and 2015, Russia illustrated something approximating Ogarkov's vision (albeit on a small scale) in the fighting in the Donbas. In the combat at Debaltseve and Donetsk Airport, for example, Russian units routinely closed their kill chains against Ukrainian forces within minutes.[10] However, Russia's forces in 2015 were deployed as battalion tactical groups (BTG): task-organised units built around a battalion-sized core of armour and infantry but equipped with fires and reconnaissance elements that would typically have been held at higher echelons. The success in closing reconnaissance-fire loops very quickly, combined with the compact size of the BTGs during the 2015 fighting in Ukraine, appeared emblematic of this new approach to warfare.[11]

In the early stages of the full-scale invasion of Ukraine, however, a model which had proven appropriate on a smaller scale – where Russia could both saturate an area with ISR and use the bounded geography of a theatre to limit uncertainty – rapidly fell apart. As the remainder of this chapter shows, this initially prompted Russia to revert to its sheer weight of fire to achieve results. When this approach became increasingly unviable because of the threat that Ukraine's deep precision strike capabilities posed to Russian ammunition and logistics, Russia had to adapt again. The last cycle of adaptation saw the mass adoption of precision strike munitions, such as the Lancet, for roles traditionally performed by artillery. The available evidence suggests that, even as Russian forces on the ground adapt to the problems immediately facing them, Russia's theorists are systematising these adaptations into new thinking, which will shape Russian tactics in the next wars Russia fights.

9. *Ibid.*
10. Amos C Fox, 'Battle of Debal'tseve: The Conventional Line of Effort in Russia's Hybrid War in Ukraine', *Armor* (Winter 2017), pp. 45–52.
11. See Lester W Grau and Charles K Bartles, 'Getting to Know the Russian Battalion Tactical Group', *RUSI Commentary*, 14 April 2022, <https://www.rusi.org/explore-our-research/publications/commentary/getting-know-russian-battalion-tactical-group>, accessed 8 April 2026.

2022: 'We Wanted the Best, But It Turned Out As Always'[12]

The initial phase of Russia's invasion of Ukraine might be characterised – in tactical terms – as a half-hearted attempt to execute Ogarkov's vision, followed by a rapid reversion to a more conventional model whereby the sheer weight of Russian firepower was used to try to bludgeon the Ukrainian defence into submission.

The initial Russian assault on Ukraine demonstrated, at best, mixed tactical performance. In some areas, Russian planning appears to have been generally well conducted. Captured Russian maps showed that positions of Ukraine's 59th Brigade were known and marked out, enabling an early precision bombardment which destroyed half the brigade's vehicles.[13] The Russian air force (the VKS) was used extensively to engage the brigade and reinforcements that were sent as the Russians advanced.[14] To the north, Russia managed to suppress Ukrainian air defences sufficiently to land elements of the Russian Airborne Forces (the VDV) near Hostomel Airport. However, the conflict rapidly exposed the limitations of Russia's ability to replicate its 2015 performance on a larger scale. In the air, the VKS failed to adequately suppress Ukraine's air defences for a prolonged period and demonstrated a systemic inability to plan and execute complex air packages.[15] With the VKS unable to achieve air superiority, a more accurate strike complex might have provided a functional substitute. However, while initial Russian strikes at the operational-strategic levels were generally well coordinated, they did not approximate the levels of synchronisation and precision which analysts had, understandably, expected given Russia's performance in Syria and the Donbas.[16]

After an initial push to seize Kyiv failed, Russia refocused on the Donbas. In this more positional fight, the strengths and weaknesses of the Russian tactical reconnaissance-fires complex became clear, as described below.

12. A 1993 phrase attributed to former Russian prime minister, Viktor Chernomyrdin, widely used in Russian political discourse to describe good intentions undone by poor execution.
13. Sonia Lukashova, 'Reconstructing Chronology of How Ukraine's Armed Forces Prepared to Defend the South, Mined Chonhar and Fought for Kherson Oblast', *Ukrainska Pravda*, 21 September 2023, <https://www.pravda.com.ua/eng/articles/2023/09/21/7420733/>, accessed 19 March 2026.
14. *Ibid*.
15. Justin Bronk, 'Russian Combat Air Strengths and Limitations: Lessons from Ukraine', CNA Occasional Paper, April 2023, <https://www.cna.org/reports/2023/04/Russian-Combat-Air-Strengths-and-Limitations.pdf>, accessed 14 July 2026.
16. Michael Kofman and Jeffrey Edmonds, 'Russia's Shock and Awe', *Foreign Affairs*, 22 February 2022, <https://www.foreignaffairs.com/articles/ukraine/2022-02-21/russias-shock-and-awe>, accessed 14 July 2026.

On the one hand, Russian artillery was lethal. By June 2022, Russian artillery was killing up to 100 Ukrainian soldiers per day, and wounding up to 500.[17] However, this was not Ogarkov's precision revolution. Russia increasingly relied on sheer weight of fire during this period. Ukrainian soldiers recalled round the clock Russian artillery firing, with a huge disparity in shell counts – for every round they could fire back, 10–20 came the other way.[18] Drones led Russian reconnaissance efforts, and there are reports of mobile phone signals being used for targeting.[19] However, this did not reduce the volumes of artillery expenditure. For example, one journalist recalled seeing 480 122-mm rockets from a BM-21 Grad MRL battery fired at a single position.[20]

This reflects Russia's traditional approach to artillery fire. Soviet theorists maintained that enough guns and ammunition would deliver a mathematical certainty of destruction. Tables and charts were used to explain how many batteries and rounds of ammunition were needed for each type of target, and for how long they would have to fire. Some targeting was clearly dynamic and responsive: in one instance, a Ukrainian battery was still orienting itself when it was hit by artillery fire from a Russian drone.[21] However, other Ukrainian soldiers targeted in this period remember the lag between detection and fires as taking close to three hours.[22] This chimes with other findings on the subject, indicating that Russia was inconsistent in its targeting. Occasionally, it was effective, depending heavily on whether target detection was achieved by UAVs or EW direction finding.[23] Short targeting cycles suggest that some reconnaissance-fire systems may have been in use by May and June 2022. However, plentiful ammunition meant that simpler massed barrages were possible, and Ukraine's forces – their ranks swelled by recruits – presented mostly consolidated targets.

There were also signs of organisational chaos within the Russian forces at this stage. One account holds that a Ukrainian reconnaissance platoon was engaged with three 9M79-1 Tochka-U (SS-21 Scarab-B) ballistic missiles.[24] Using ballistic missiles against a reconnaissance platoon is excessive, and there are other examples to indicate that

17. Siobhán O'Grady, Anastacia Galouchka and Paul Sonne, '"They're in Hell": Hail of Russian Artillery Tests Ukrainian Morale', *Washington Post*, 3 June 2022.
18. Scott Peterson, 'Russian War's "Phase 2": How Ukraine Troops Adapt, Giving Little Ground', *Christian Science Monitor*, 4 May 2022, <https://www.csmonitor.com/World/Europe/2022/0504/Russian-war-s-Phase-2-How-Ukraine-troops-adapt-giving-little-ground>, accessed 19 March 2026.
19. Mac William Bishop, '"They're Wiping Us from Earth": Evading Russian Artillery with a Ukrainian Military Unit', *Rolling Stone*, 12 June 2022, <https://www.rollingstone.com/culture/culture-news/ukrainian-military-unit-russia-artillery-1365021/>, accessed 19 March 2026.
20. *Ibid*.
21. Peterson, 'Russian War's "Phase 2"'.
22. Bishop, '"They're Wiping Us from Earth"'.
23. Jack Watling and Nick Reynolds, 'Ukraine at War: Paving the Road from Survival to Victory', RUSI, 4 July 2022, p. 5, <https://www.rusi.org/explore-our-research/publications/special-resources/ukraine-war-paving-road-survival-victory>, accessed 14 July 2026.
24. Joshua Yaffa, 'The Fight to Survive Russia's Onslaught in Eastern Ukraine', *New Yorker*, 7 June 2022, <https://www.newyorker.com/news/dispatch/the-fight-to-survive-russias-onslaught-in-eastern-ukraine>, accessed 19 March 2026.

scarce missiles were used against isolated platforms, including a howitzer that was struck by a 9M723 Iskander ballistic missile.[25] In another example, a single Buk air defence launcher was destroyed by an Iskander.[26] This is not entirely outside the expected use-cases for the Iskander within Russian reconnaissance-strike theory, but it does suggest that few other precision strike options were available at this time.

Russian artillery made use of the 152-mm laser-guided Krasnopol artillery round from the earliest days of the invasion, but its availability seems to have varied throughout the war. This round relies on a UAV such as the Orlan-30 or ground-based laser designator to illuminate a target and guide the munition to it. The Russian Ministry of Defence released a steady stream of video footage showing the Krasnopol's use in Ukraine, with targets generally comprising artillery, air defence systems, command posts and troop concentrations. The footage was primarily filmed from an Orlan-10 or Orlan-30, and the targets appear somewhat isolated.[27] Although incomplete, the available video imagery of Krasnopol use is a tiny selection of the targeting and strikes that were then occurring throughout Ukraine. It is clear that the laser-guided round was increasingly important for Russia's counter-battery warfare, as forces employed it in close coordination with UAVs and reconnaissance teams to track and engage dispersed Ukrainian howitzers. While the Krasnopol was playing more of a role in Russia's counter-battery warfare, Russian forces still relied on their pre-2022 methods that followed pre-existing doctrine. For example, one article published by *ANNA News* in 2023 indicated that a Zoopark radar was paired with Russian rocket artillery; once a Ukrainian gun was identified, the rocket launcher would 'iron the position out with all their tubes'.[28]

This model of ironing out a position reached the limits of its utility as Ukrainian formations dispersed and long-range strikes from the M142 High Mobility Artillery Rocket System (HIMARS) began further depleting Russia's unguided artillery stockpiles.[29] These conditions, and the transition to defensive operations, shaped much of 2023 and the evolution of tactical precision strike.

25. *Ibid*.
26. *Sky News*, 'The Russian ministry of defence shared video footage of an airstrike on a Ukrainian Buk missile system performed by an Iskander missile', X post, 27 March 2022, <https://x.com/SkyNews/status/1507980741119909892>, accessed 19 March 2026.
27. Author review of video footage showing Krasnopol strikes, posted between 24 February and 31 December 2022.
28. Maxim Tumbartsev, 'Radar 1L219M "Zoo" Western Military District in Northern Military District', *ANNA News,* 27 February 2023, <https://anna-news.info/rls-1l219m-zoopark-zvo-v-svo/>, accessed 23 March 2026.
29. *Defence Express*, 'How Many Targets Have Been Destroyed by HIMARS in Ukraine', 8 September 2022, <https://en.defence-ua.com/news/how_many_targets_have_been_destroyed_by_himars_in_ukraine-4156.html>, accessed 27 March 2026.

Late 2022–23: The Battlefield Evolves, Taking the Reconnaissance-Fire Complex With It

Although Russian firepower proved its lethality, accounting for more than 70% of all Ukrainian losses in 2022, the mass-based Russian approach encountered several constraints which forced it to adapt.[30] First, the arrival of Western multiple-launch rocket systems (MLRS) on the battlefield forced Russia to disperse its stores of ammunition. As a result, it traded the tempo of fire for survivability. Second, Ukrainian forces increasingly dispersed to avoid providing concentrated targets for Russian firepower. Third, a combination of massive shell expenditure and the destruction of ammunition stores by systems such as HIMARS from mid- to late 2022 presented Russian forces with incentives to economise on their munitions expenditure.[31]

Ukraine's Western-supplied tube artillery compounded these challenges as it proved considerably more accurate than Russian counterparts and sometimes enjoyed a range advantage, a point regretted by Russian analysts and public figures, including former Chief of the General Staff General Yuri Baluyevsky.[32] Russian forces had the Krasnopol and other laser-guided rounds, but their laser-guidance systems struggled with low-lying clouds. Furthermore, the Krasnopol has a maximum range of 25 km. While this would have sufficed if Russia could bring its guns to the frontline, doing so risked counter-battery fire. Meanwhile, Ukraine's counter-battery capability improved throughout 2023. By the end of the year, it consisted of M777s and other 155-mm guns firing conventional munitions and M982 Excalibur GPS-guided shells, as well as M30-series guided rockets from the GMLRS family of munitions. Combined with improved targeting software and counter-battery radars, Ukraine was able to focus on Russia's counter-battery radars – blinding its adversary's target acquisition efforts – and target its guns.

Brigadier General Serhii Baranov, chief of Ukraine's Main Directorate of Rocket Forces and Artillery, said: 'We don't wait for enemy artillery to open fire; we detect it

30. Aaron Epstein et al., 'Putting Medical Boots on the Ground: Lessons from the War in Ukraine and Applications for Future Conflict with Near-Peer Adversaries', *Journal of the American College of Surgery* (Vol. 237, No. 2, 2023), pp. 364–73.
31. Mykhaylo Zabrodskyi et al., 'Preliminary Lessons in Conventional Warfighting from the First Six Months of the War in Ukraine', RUSI, November 2022, pp. 30–35, <https://www.rusi.org/explore-our-research/publications/special-resources/preliminary-lessons-conventional-warfighting-russias-invasion-ukraine-february-july-2022>, accessed 27 March 2026.
32. V M Burenok, « О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции » ['On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation'], *Вооружения и экономика* (Vol. 2, No. 8, 2024), pp. 5–8; *Новороссиня*, « Что показала СВО: 20 трлн выброшены на ветер. Генерал Балуевский не сдержался и раскрыл правду об армии » ['What the SVO Revealed: 20 Trillion Rubles Wasted. General Baluyevsky Couldn't Resist Revealing the Truth About the Army'], 9 February 2023, <https://www.novorosinform.org/chto-pokazala-svo-20-trln-vybrosheny-na-veter-general-baluevskij-ne-sderzhalsya-i-raskryl-pravdu-ob-armii-125031.html>, accessed 27 March 2026.

beforehand and destroy it before the enemy is ready to strike our positions. The enemy cannot get our long-range assets while we can hit theirs'.[33] He added that Russia was no longer able to conduct effective counter-battery fire as a result of the Ukrainian 'fire fist' approach. Instead, Russian mobile artillery, fearing the reach of Ukraine's M777s and M142 HIMARS, was occupying bed-down positions tens of kilometres behind the frontline. Guns would move closer to the front to conduct missions, but the pressure exerted by Ukraine's artillery meant that the Krasnopol was unable to reach Ukraine's systems. Russia then had to develop the means to find and engage Ukrainian guns at increased depth along the frontline.

In this context, it is clear why Russian tactical formations increasingly used the Lancet loitering munition. The Lancet provided up to 40 km of range in its earlier versions and is typically paired with reconnaissance UAVs such as the Z-16, which boasts a range greater than 75 km and four hours of endurance. The Z-16s, which were used to hunt for targets and to serve as a signal retransmitter for the Lancet, maintained contact until a Lancet – with a much shorter endurance of 40 minutes – reached the area. The Z-16 operator then observed the Lancet strike and ordered follow-on strikes if unsuccessful. In other examples, Lancets were deployed independently to hunt for a target using the munition's onboard camera.[34]

LostArmour, a pro-Russia website that tracks Ukraine's losses, claims to have tracked a total of 777 Lancet strikes in 2023. It recorded a low of 23 strikes in January and a peak of 134 in August.[35] This coincides with Ukraine's counteroffensive to push through Robotyne to Tokmak.[36] By the end of the year, a Ukrainian spokesperson was reporting that the Lancet's range had been increased, enabling strikes at ranges up to 70–100 km.[37] The increased range was accompanied by a dramatic increase in the number of UAVs available to Russian forces and the use of automated terminal guidance.[38] Units dedicated to UAV use had been deployed and Russian state media reported that 1,700 UAV crews had been trained, and that drone production had increased by a factor of nearly 17.[39]

33. Olena Roshchina, 'Ukrainian Armed Forces Say Long-Range "Fire Fist" Hinders Russia's Counter-Battery Warfare', *Ukrainska Pravda*, 6 October 2023, <https://www.pravda.com.ua/eng/news/2023/10/06/7422941/>, accessed 27 March 2026.
34. As indicated by author observation of videos from Russian news outlets, interviews with colleagues and Ukrainians, and press coverage of its use.
35. LostArmour, 'Use of the "Lancet" UAV: General Summary of Strikes', <https://lostarmour.info/tags/lancet#general>, accessed 27 March 2026.
36. *Reuters*, 'Ukraine Says It Gains Foothold in Strategic Southeastern Village', 22 August 2023.
37. *Espreso TV*, 'Upgraded Russian Lancet Drones Can Fly Up To 70 km – OC South', 11 October 2023, <https://global.espreso.tv/upgraded-russian-lancet-drones-can-fly-up-to-70-km-oc-south>, accessed 27 March 2026.
38. David Hambling, 'Russian Kamikaze Drone Now Seems to Identify Its Own Targets', *Forbes*, 1 March 2024, <https://www.forbes.com/sites/davidhambling/2024/03/01/russian-kamikaze-drone-now-seems-to-identify-its-own-targets/>, accessed 27 March 2026.
39. *РИА Новос*ти, « Главные события 2023 года в военной сфере » ['Key Military Events of 2023'], 27 December 2023, <https://ria.ru/20231227/voenka-1918392790.html>, accessed 27 March 2026.

The Lancet seems to have been adopted primarily for use as a counter-battery tool. It aimed to compensate for the Ukrainian accuracy advantage in tube artillery and Russia's growing inability to win by weight of fire alone.[40] The Lancet apparently had a modest but discernible impact in mitigating these challenges. There appears to be a small correlation (see Table 3), between Lancet employment on the frontline and a reduction in the volumes of Russian artillery use, with a P-value (a measure of certainty) low enough to rule out this correlation being a matter of chance.

Table 3: Correlation Between Lancet Employment and Russian Shelling

Sector	ρ	P[41]	Weeks
Donbas	-0.314	0.000314	128
Zaporizhzhia	-0.276	0.00151	130
Kharkiv	-0.287	0.000965	129

Source: Author calculations based on data from LostArmour website, https://lostarmour.com, and ACLED (Armed Conflict Location & Event Data). ACLED data retrieved via Kaggle. See Kaggle, 'Ukraine Conflict Event Dataset 2022–2025', <https://www.kaggle.com/datasets/sangampaudel530/ukraine-conflict-event-dataset-20222025?select=russia_ukraine_conflict.csv>, accessed 10 March 2026.

This does not, of course, rule out the possibility that Russia is using the Lancet to backfill unavailable artillery rather than reduce expenditure. However, the longitudinal assessment in Table 5 on specific sectors of the front suggests that reductions in volumes of fire follow a rise in the intensity of Lancet employment rather than the other way round.

Table 4: Longitudinal Lag Test: Does Lancet Precede Shelling?

Lag	ρ	SE[42]	95% CI (low)	95% CI (high)
t-1	-0.112	0.225	-0.552	0.329
t-2	-0.155	0.161	-0.469	0.160
t-3	-0.280	0.181	-0.636	0.075

Source: Author calculations based on data from LostArmour website, https://lostarmour.com, and ACLED. ACLED data retrieved via Kaggle. See Kaggle, 'Ukraine Conflict Event Dataset 2022–2025'.

Notes: Ordinary Least Squares with sector and month fixed effects; dependent variable is log(1+shelling events). Regressors are log(1+Lancet) at lags t-1 to t-3 (1 to 3 weeks). Data processed by authors with Python code generated by Google Colab AI. Model parameters and specification are the authors' own.

40. Data collated and reviewed by authors.
41. ρ is the correlation coefficient and P conveys the likelihood of the correlation occurring on a random basis.
42. ρ is the correlation coefficient while SE is the standard error, the high and low bounds of the confidence intervals (CI) are upper and lower bound values for the correlation coefficient.

The results point to a small statistical effect, technically below statistical significance. This may be a function of the noisiness within the data, although it is notable that the effect increases over time. However, Russia also made considerable efforts to increase shell production and procurement and resorted to other tools – such as glide bombs – which suggests that the Lancet only partially resolved its challenges. This should be viewed as a basis for caution in assuming that cheap precision strike will eliminate the burden of Russian artillery logistics.

To some extent, the Lancet's range also blurred the lines between tactical and operational targeting. Russian units put this increased range to work against more operational targets, striking a MiG-29 at an airfield near Kryvyi Rih in September 2023, and several air defence radars in October.[43] However, the Lancet's primary function was to supplement Russia's counter-battery fight. There is stronger qualitative evidence that this had deleterious effects on Ukrainian artillery:

- Guns that relocated after firing risked being engaged on the move.
- Stationary guns and other systems were forced to erect counter-drone nets around their positions.
- Gun crews would leave their guns after an engagement to minimise the risk of Lancet strikes.[44]
- It caused intense attrition of Ukraine's limited artillery assets, making the movement of MLRS and HIMARS particularly risky.

Russia still used conventional artillery, but Ukraine's counteroffensive marked a turning point for Russia. Its forces had relied on the massed use of precision munitions to blunt and stop Ukraine's offensive. This is not to say that Russian forces had moved away from their preference for massed firepower. In the Battle for Bakhmut, for example, Russia used glide bombs, artillery and drones extensively. This pattern was repeated in other urban battles, including those for Avdiivka in early 2024 and Chasiv Yar into 2025. However, for the first time, units designed to support the reconnaissance-fires fight extended their reach, developing the overall targeting of much larger formations. Moreover, the drivers that led to the extensive use of these weapons – dispersion, declining stocks of ammunition, a static frontline – remained into 2024. This set the conditions for Russia to improve on and extend its use of precision strike.

43. Polymarket Intel, '#Ukraine: A Ukrainian MiG-29 fighter aircraft was damaged by a Russian Lancet loitering munition at the airfield of Kryvyi Rih. The closest Russian positions are located more than 65 kilometers away', X post, 19 September 2023, <https://x.com/PolymarketIntel/status/1704157972937498935>, accessed 28 March 2026.
44. Olga Vikarchuk, « Цей розрахунок Paladin зупинив колону техніки окупантів » ['This Paladin Calculation Stopped the Column of Occupiers' Equipment'], *армія Inform*, 31 August 2023, <https://armyinform.com.ua/2023/08/31/czej-rozrahunok-paladin-zupynyv-kolonu-tehniky-okupantiv/>, accessed 27 March 2026.

During 2024, Russian operators refined their Lancet employment at the tactical level. Typically, the procedure for employing Lancets followed three steps:

- **Phase 1:** Conventional artillery shelling of a position to suppress guns and other forces.
- **Phase 2:** A daisy-chain of Lancet or Scalpel loitering munitions, launched one after the other until a strike was achieved.
- **Phase 3:** If Lancet was unsuccessful, an Orlan-30 might be deployed in coordination with artillery firing Krasnopol-M2, an improved version of the munition.

This combination became very effective, forcing Ukrainian gunners to build shelters for their vehicles and guns, protected by multiple layers of anti-drone netting.[45] They worked between 'cold' and 'hot' hides. Cold hides were used to shelter the gun in between missions, keeping it out of sight and protected to some extent. Hot hides were used for firing. There would ideally be several hot hides, to reduce the chances of the gun being detected. Furthermore, Russian reconnaissance was increasingly conducted from the air, using drones to spot muzzle flashes. Its forces had also moved away from larger counter-battery radars to much smaller ones. This contributed to general situational awareness, as both drones and artillery were detected. The evolving ISR element of Russia's precision strike arsenal was coupled with a dramatic increase in the number of available Lancet munitions. LostArmour documented just over 1,800 uses of the munition in 2024, compared with 898 recorded uses for 2022 and 2023 combined.[46] Some 1,300 of those strikes were against artillery systems, including rocket launchers. This reflects the Lancet's core role in counter-battery warfare, where much of Russia's tactical precision strike was clearly focused in 2024.

Russia's invasion of Kharkiv Oblast in May 2024 is also indicative of how Lancets were used, and their potential impact. Russian forces had been collecting on the border of the Kharkiv region for some time. In early 2024, Western intelligence agencies warned repeatedly of an impending attack from that direction. Those forces finally acted on 10 May, crossing the border at multiple points near the town of Vovchansk and quickly advancing around 6 km into Ukraine.[47] By this stage of the war, Ukraine's lack of manpower was having an impact, and the border with Russia in that sector was not heavily defended despite the prior warnings. To stem the advance, Ukraine sent reinforcements to the area, including heavy vehicles and artillery. As they arrived, many vehicles and howitzers were caught out in the open or even on heavy equipment transports. It is not clear how successful the Lancet was in destroying Ukrainian armour, but the strikes were relentless. 'One comes, then a second one comes, 10

45. Serhiy Zgurets, 'When Russia Will Intensify Its Offensive', *Espreso TV*, 9 April 2024, <https://global.espreso.tv/military-news-when-russia-will-intensify-its-offensive-serhiy-zguretss-column>, accessed 29 March 2026.
46. Sam Cranny-Evans, 'In-Depth Briefing #86: From Mass to Mass-Precision', CHACR, 23 January 2025, <https://chacr.org.uk/2025/01/23/in-depth-briefing-86-from-mass-to-mass-precision/>, accessed 29 March 2026.
47. Daniel Sabbagh, 'How Russia Has Advanced in Kharkiv Despite Warnings Attack Was Coming', *The Guardian*, 16 May 2024.

minutes later a third one comes', a Ukrainian artillery officer told *Reuters* in May 2024.[48] He added that he had never seen Lancets in such densities, despite having served at Chasiv Yar, another focus for Russia at the time. There were 302 Lancet strikes documented throughout May, 108 of them in the Kharkiv region.[49] The data available from LostArmour suggests that Lancets were concentrated on Russia's main line of effort, with only a few made available to other units.

Figure 1: The Lancet UAV

Source: Wikimedia Commons.

Furthermore, the Lancet was increasingly employed as part of a more diversified Russian tactical strike complex, alongside glide bombs and a replenished artillery park. Throughout 2024, Russia deployed more than 40,000 guided glide bombs, an average of 109 per day.[50] One Ukrainian commander indicated that more than 660 glide bombs had been deployed in the Kharkiv area alone between May and June.[51] Russia's artillery also received more ammunition during the summer months. Partially fuelled by supplies of artillery munitions

48. Max Hunder, 'Russia Ramps Up Strike Drone Use on Kharkiv Front, Ukrainian Artillery Crew Says', *Reuters*, 16 May 2024.
49. Sam Cranny-Evans, 'Russia Reaches New Monthly Record for Lancet Use in Ukraine', *Shephard Media*, 2 July 2024, <https://www.shephardmedia.com/news/uv-online/russia-reaches-new-monthly-record-for-lancet-use-in-ukraine/>, accessed 29 March 2026.
50. Ministry of Defence of Ukraine, « За 11 місяців росія скинула майже 44 000 КАБів » ['In 11 Months, Russia Dropped Almost 44,000 KABs'], 2 December 2025, <https://mod.gov.ua/news/za-11-misyaciv-rosiya-skinula-majzhe-44-000-ka-biv>, accessed 29 March 2026.
51. Siobhán O'Grady, Kostiantyn Khudov and Serhiy Morgunov, 'Ukrainian Attacks on Supply Lines Slowed Russians in Kharkiv, Intercepts Show', *Washington Post*, 8 July 2024.

from North Korea, Russian units fired 45,000 rounds of all types per day.[52] Overall, this meant that Russian units could deploy considerable amounts of firepower at the tactical and operational levels. The Lancet and Krasnopol provided precision out to 70 km and 25 km, respectively (although Lancets were usually used at shallower depths). The glide bombs became a relatively accurate and effective tool to quickly reduce Ukraine's defensive positions. Additionally, the employment of artillery fire was reasonably constant along Russia's main lines of effort. All of this was accompanied by the greater use of drones and small packets of infantry for offensive operations. During this period, Russia also introduced other tactical UAVs, such as the plywood mass-producible Molniya, which has become a real threat to Ukrainian drone crews.[53]

In one operation near Pokrovsk, a Ukrainian soldier explained that hundreds of Russian drone operators were brought into the area using drones with a new frequency that Ukrainian countermeasures were not prepared for and unleashing an offensive on a weaker unit. It took some time for the Ukrainian forces to adapt to these changes, by which time several villages had fallen.[54] The first-person view (FPV) drone became the first line of offence in some Russian operations; one Ukrainian unit suffered 80% casualties in four days – without ever seeing the Russians – due to FPVs. One survivor explained that FPVs would be sent first. If they did not get through, the Russians would follow up with conventional mortar and artillery fire.[55]

Russia's increased use of glide bombs is also worth examining. Primarily guided by satellite navigation, the bombs could not be expected to replicate the dynamic targeting of the Lancet, Krasnopol or Iskander, but their accuracy was adequate when it came to hitting fixed positions, partly because Russia added course-correction kits to larger bombs, such as the 3,000-kg FAB-3000. This meant that even if the bomb missed the target building, it might still collapse. Ukrainian soldiers started to suffer concussions; one remembered an experience of a glide bomb detonating near his vehicle:

> You can feel your organs shaking around inside you … I started bleeding from my ears and nose. Vomiting. I was really struggling to speak for two days from the concussion.[56]

52. *Defense Express,* 'Two Weeks of Ukrainian Drone Strikes Achieve More Than Two Years of Sanctions: Russian Artillery Fire Rate Dropped by 1.5x', 24 October 2024, <https://en.defence-ua.com/analysis/two_weeks_of_ukrainian_drone_strikes_achieve_more_than_two_years_of_sanctions_russian_artillery_fire_rate_dropped_by_15_times-12298.html>, accessed 29 March 2026; Sam Cranny-Evans, 'Brothers in Arms: Assessing North Korea's Contribution to Russia's War in Ukraine', *RUSI Commentary,* 6 May 2025, <https://www.rusi.org/explore-our-research/publications/commentary/brothers-arms-assessing-north-koreas-contribution-russias-war-ukraine>, accessed 10 August 2026.
53. Author interview with Ukrainian soldier, conducted remotely, June 2026.
54. Maxim Tucker, 'US Combat Vehicles Keep the Russians at Bay — But for How Long?', *The Times,* 25 July 2024.
55. Asami Terajima, 'With All Eyes on Kharkiv, Russian Troops Take One Donbas Village After Another', *Kyiv Independent,* 4 June 2024, <https://kyivindependent.com/with-all-eyes-on-kharkiv-russian-troops-take-one-donbas-village-after-another/>, accessed 31 March 2026.
56. George Grylls, 'Why Russia's Glide Bomb Assault is Changing the War in Ukraine', *The Times,* 30 March 2024.

Russia's Su-34s can release the bombs at a range of 40 to 70 km from their target, placing them beyond the reach of most air defences. Moving scarce air defences to positions where they could target aircraft placed them at risk, as the loss of Patriots near the frontline in early 2024 illustrates.[57]

There is another element to consider from Russia's use of precision weapons: the role of the attack helicopter. Despite heavy losses in 2022, Russian officers developed plans for the use of attack aviation in defensive battles. Helicopters such as the Ka-52 loaded with Vikhr-1 anti-tank guided missiles (ATGM) with a range of 9 km, as well as other attack helicopters, were used to respond to 'tank-threatened areas' during Ukraine's summer counteroffensive. The firepower of Russia's attack helicopters, together with Lancets, minefields, conventional artillery, guided glide bombs and ground-based ATGMs, meant that Ukraine's advances incurred heavy losses. As Ukraine's units moved beyond the protective elements of their air defences, the combination of Ka-52s with Lancet and FPV drones proved problematic.[58] Vehicles that had been immobilised by mines were often struck and destroyed. Any vehicles detected in the open could expect multiple attempts to hit them with Lancets.[59]

Between 2023 and 2024, the Russians therefore developed the elements of a multilayered standoff system at the tactical level by combining artillery, Lancets, glide bombs and helicopters. This system is imperfect and evolving, but it presents far more dilemmas to an opponent than the single-vector, artillery-centric Russian army which entered Ukraine. In addition to the combination of different capabilities, Russian operators also developed their tradecraft for precision strike considerably. This is best illustrated by the case study of the Rubicon Centre.

The Rubicon Centre as a Case Study in Tactical-Operational Strike

As a unit of the Russian military, the Rubicon Centre blurs the boundaries between the tactical and operational levels. It was established to develop new tactics and break with Russia's established doctrine on the use of drones.[60] Actions attributed to it range from

57. David Axe, 'A Russian Drone Spotted a Ukrainian Patriot Air-Defense Crew Convoying Near the Front Line. Soon, A Russian Hypersonic Missile Streaked Down', *Forbes*, 9 March 2024, <https://www.forbes.com/sites/davidaxe/2024/03/09/a-russian-drone-spotted-a-ukrainian-patriot-air-defense-crew-convoying-near-the-front-line-soon-a-russian-hypersonic-missile-streaked-down/>, accessed 31 March 2026.
58. Michael Kofman and Rob Lee, 'Perseverance and Adaptation: Ukraine's Counteroffensive at Three Months', *War on the Rocks*, 4 September 2023, <https://warontherocks.com/2023/09/perseverance-and-adaptation-ukraines-counteroffensive-at-three-months/>, accessed 27 March 2026.
59. Alex Horton and Serhii Korolchuk, 'Russia Ramps Up Drone, Guided Bomb Attacks to Thwart Counteroffensive', *Washington Post*, 13 September 2023.
60. Dmytro Putiata and Rob Lee, 'Rubicon Structure', Two Marines, 5 June 2026, <https://twomarines.substack.com/p/rubicon-structure>, accessed 6 August 2026.

concerted campaigns against Ukraine's logistics and lines of communication in Kursk, through to strikes against HIMARS launchers and even Ukrainian natural gas shipping and storage sites. Furthermore, the unit appears to have devoted much of its efforts to hunting Ukrainian drones and drone teams. The unit is a valuable case study for the evolution of Russia's tactical precision strike. In addition, with Russia's stated plans to develop and deploy specialised uncrewed systems units throughout its armed forces, it is likely that those units will borrow from Rubicon's template.

Rubicon's focus as a unit is arguably to combat the battlefield advantages that Ukraine has established. It does this by targeting the following core capabilities that enable Ukraine to defeat Russian advances at ranges up to 40 km behind the frontline. Using the data collected by LostArmour, it becomes clear that the most important targets for Rubicon when its units operate on the frontline are:

- drones and drone teams;
- tactical radars used for drone detection;
- EW equipment;
- communications equipment;
- logistics routes.[61]

The overall effect of these actions is to diminish Ukraine's understanding of the battlefield. When EW systems are pushed further from the frontline, it becomes harder to detect drones through their electronic signals, and the impact of jamming declines. Destroying radars denies Ukraine another means of detecting drones and movement.[62] However, targeting drone crews and their drones is arguably one of the most damaging effects exerted by the Rubicon Centre. Furthermore, it is important to note that all these tactics probably occur as part of the same operation. For example, pushing EW units further back from the frontline enables more strikes against drone crews. The unit makes extensive use of electronic reconnaissance to identify high-power drone antennas, which is probably essential to locating camouflaged drone teams. The Rubicon Centre forces also appear to have access to a variety of strike drones, including FPVs, the Lancet and Molniya, as well as a range of interceptor drones. As a demonstration of its efficacy, Rubicon has succeeded in destroying 70% of drone units within a Ukrainian brigade.[63] Maria Berlinska from Ukraine's Centre for Aerial Intelligence Support said that Rubicon had destroyed thousands of pieces of Ukrainian equipment and wounded many soldiers.[64]

61. Rob Lee and Dmytrio Putiata, 'Inside Rubicon: The Structure of Russia's Elite Drone Centre', Foreign Policy Research Institute, 12 June 2026, <https://www.fpri.org/article/2026/06/inside-rubicon-the-structure-of-russias-elite-drone-center/>, accessed 8 July 2026.
62. Author interview with Michael Kofman, Senior Fellow in the Russia and Eurasia Program at the Carnegie Endowment for International Peace, conducted remotely, 28 January 2026.
63. Mark Krutov, Sergey Dobrynin and Yevgeny Legalov, 'Russia's Secret "Rubicon". What It Does, Where It is Based and How It Achieves Success on the Battlefield', *Radio Free Europe / Radio Liberty*, 17 September 2025, <https://www.radiosvoboda.org/a/rubikon-rf-bpla-spetsnaz-rozsliduvannya/33532747.html>, accessed 13 March 2026.
64. *Ibid*.

It appears that the unit is somewhat separate from the Russian Ministry of Defence and allowed to develop its own tactics.[65] This includes coordinated attacks with swarms of drones, designed to overwhelm air defences and EW assets. In other cases, Rubicon has experimented with using a larger strike drone, such as the Molniya, to transport smaller FPVs into combat.[66] However, it could be argued that the unit continues to fulfil the missions originally expected from the reconnaissance-fires complex. Writing in 2018, Charles Bartles and Lester Grau outlined the core roles that Russian academics had assigned to artillery. They included:

- 'conducting highly maneuverable combat with motorized rifle (and tank) subunits …;
- inflicting fire destruction of enemy subunits (or targets) throughout the depths of … combat formation;
- … suppressing and destroying command posts and weapons, radar, electronic combat systems and air defense.'[67]

In Ukraine, FPV drones now perform a larger portion of roles against soft-skinned targets than artillery. An FPV drone is effectively a precision munition. It may not be as reliable as a laser-guided artillery round, but it becomes immune to jamming when fibre-optic cable is used for control and guidance. However, FPVs are an inefficient (though effective) tool given the volume required to achieve an effect. For reference, a typical 155-mm shell in service with the US Army is expected to have a reliability rate of 99%.[68] FPVs are nowhere near as reliable; one pro-Ukrainian source indicates that just 43% of FPV missions resulted in a hit.[69]About 31% failed because of jamming, and another 10% failed to detonate. Vladimir Shamanov, former head of the VDV, estimates that FPVs fall between unguided and guided rounds in terms of effectiveness.[70]

Russia's shift to loitering munitions and FPVs was partially driven by necessity. So, the specific reliance on these tools may ebb. However, the focus on precisely stripping

65. Maxim Butchenko, « Особый центр дронов. Чем опасно российское элитное подразделение БПЛА Рубикон, от которого страдают некоторые части ВСУ » ['A Special Drone Center. The Dangers of Russia's Elite Rubicon Drone Unit, Which is Affecting Some Units of the Ukrainian Armed Forces'], *NV*, 14 November 2025, <https://nv.ua/ukraine/events/rubikon-elitnyy-otryad-rf-kto-vozglavlyaet-kakaya-struktura-strategiya-i-ugroza-obyasnenie-specsluzhb-50560648.html>, accessed 18 March 2026.
66. *TASS*, 'The Rubicon Center is Using the Tactic of Delivering FPV Drones Using Unmanned Aerial Vehicles (UAVs)', 22 September 2025, <https://tass.ru/armiya-i-opk/25125295>, accessed 18 March 2026.
67. Lester W Grau and Charles K Bartles, 'The Russian Reconnaissance Fire Complex Comes of Age', Changing Character of War Centre, University of Oxford, 30 May 2018, <https://www.ccw.ox.ac.uk/blog/2018/5/30/the-russian-reconnaissance-fire-complex-comes-of-age>, accessed 6 August 2026.
68. Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, 'Defense Science Board Task Force on Munitions System Reliability', September 2005, p. 23, <https://stib.cto.mil/wp-content/uploads/reports/2000s/ADA441959.pdf>, accessed 6 August 2026.
69. Jakub Jajcay, 'I Fought in Ukraine and Here's Why FPV Drones Kind of Suck', *War on the Rocks*, 26 June 2025, <https://warontherocks.com/2025/06/i-fought-in-ukraine-and-heres-why-fpv-drones-kind-of-suck/>, accessed 30 March 2026.
70. V A Shamanov et al., « Экономическая эффективность беспилотных летательных аппаратов и их влияние на передовую и на изменение баланса сил » ['Economic Efficiency of Unmanned Aerial Vehicles and Their Impact on the Front Line and the Transformation of the Balance of Power'], *Бюллетень Российской академии ракетных и артиллерийских наук* (Vol. 141, No. 1, 2026), pp. 3–10.

away the layers of an opponent's ISR capability is likely to be institutionalised. Consequently, the most important feature of Rubicon may be its processes rather than the drones that its units use. In the future, it is likely that longer-range guided rounds, guided rockets and quasi-cruise missiles – such as the Banderol – will be more widely used by Russian units. However, these methods will remain relevant even if the utility of FPVs or loitering munitions proves transient.

'So What Did We Learn?': Russian Thinkers Try to Systematise Lessons from the Front

Over the past three years, multiple capabilities have helped Russia to overcome the challenges that its original reconnaissance-fires complex faced in Ukraine. UAVs, including loitering munitions such as the Lancet, are viewed as providing the means to solve two inter-related issues. First, given their relative precision and long loiter times, loitering munitions can limit an opponent's freedom to employ capabilities such as counter-battery radar and artillery.[71] This is particularly important given Russia's acknowledged relative limitations with respect to artillery accuracy.[72] Second, as these have a single-shot probability of kill that is considerably higher than that of an artillery battery using unguided shells, loitering munitions and UAVs reduce the logistical outload on frontlines by replacing roles previously played by artillery. This could help to resolve the problem of Russian forces being less able to sustain large salvos due to the vulnerability of logistical nodes.[73] Other potentially viable means of suppression include the use of glide bombs at standoff distances to target UAV crews. Russian analysts also theorise about the use of larger UAVs such as the Inkhodets, equipped with longer-ranged standoff missiles likes the low-cost banderol cruise missile.[74]

This has driven a change in how the role of artillery is conceptualised. Figures such as former Chief of the General Staff Yuri Nikolayevich Baluyevsky argue that, instead of being used in batteries, artillery will increasingly have to be employed in small

71. T A Biryukov, A A Timokhin and S I Makarenko, « Бригады сухопутных войск, вооруженные беспилотными летательными аппаратами: обоснование создания, предложения по их конструкции, методы боевого применения и техническая поддержка с учетом опыта специальных военных операций на Украине » ['Land Forces Brigades Armed with Unmanned Aerial Vehicles: Rationale for Creation, Proposals for Their Structure, Methods of Combat Use, and Technical Support Taking into Account the Experience of the Special Military Operation in Ukraine'], *Системы управления, связи и безопасности* (Vol. 2, 2024), pp. 43–71.
72. Burenok, « О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции » ['On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation'].
73. A A Selivanov and P A Dunlev, « Общие оперативные и стратегические принципы использования беспилотных систем » ['General Operational and Strategic Principles for Using Unmanned Systems'], *Бюллетень Академии военных наук* (Vol. 4, No. 93, 2025), pp. 14–26.
74. *Ibid.*

numbers and often as single pieces, with a heavy emphasis on more precise munitions like the Krasnopol and guided rockets.[75]

Opinions differ on the precise future use of UAVs with artillery. Some (mostly civilian) authors argue for UAV brigades without tube artillery.[76] Others see them as an enabler for the use of artillery in a different way.[77] Russia's future approach, in broad strokes, appears to be the partial displacement of artillery from a suppressive role by uncrewed precision strike, as well as a growing role for loitering munitions in counter-battery fire.[78] This, in turn, alters the role of tube artillery in a way that emphasises precision over mass to target key enemy enablers, many of which currently have to be struck by UAVs. In effect, UAVs are not viewed as superseding artillery; instead, they are part of a shift which will see artillery become more precise as the focus of operations shifts towards the precise destruction of an opponent's ISR.

However, while these interlocking developments can allow Russian forces to degrade an opponent at depth without the huge volumes of firepower Russia employed at the war's outset, they do not prevent an opponent from doing the same to Russian forces as they attempt to advance. This has created a positional deadlock in Ukraine, which is a matter of considerable concern in Russian military theory. Broadly speaking, the answer Russian theorists appear to have come up with is to replace the echelonment of units with precision strike. Russian authors regard the continuous use of precision strike capabilities as a necessary precondition for suppression of an opponent's forces. Such use creates tunnels for highly mobile units to move from 'depth to depth': that is, penetrate deep into an opponent's lines from positions deep behind Russia's own.[79] Russia is increasingly developing the technical ability to achieve suppression, but it has no means of exploiting breaches with skilled, highly mobile troops. As illustrated in the

75. Burenok, « О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции » ['On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation']; *Новороссиня*, « Что показала СВО » ['What the SVO Revealed'].
76. Biryukov, Timokhin and Makarenko, « Бригады сухопутных войск, вооруженные беспилотными летательными аппаратами» ['Land Forces Brigades Armed with Unmanned Aerial Vehicles'].
77. Burenok, « О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции » ['On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation'].
78. Biryukov, Timokhin and Makarenko, « Бригады сухопутных войск, вооруженные беспилотными летательными аппаратами » ['Land Forces Brigades Armed with Unmanned Aerial Vehicles'].
79. A Kalistratov, « По вопросу о тупиковой ситуации в позициях » ['On the Issue of Positional Impasse'], *Обзор армии* (Vol. 9, 2024), pp. 187–97; A V Ananayev et al., « Разведывательно-ударный комплекс с беспилотными летательными аппаратами типа FPV для поддержки действий экипажей армейской авиации » ['Reconnaissance Strike Complex with FPV Type Unmanned Vehicles to Support the Actions of Army Aviation Crews'], *Воздушно-космические силы. Теория и практика* (Vol. 32, 2024), pp. 54–63.

fighting around Kupyansk, those infiltrations it does make often result in its forces being encircled.[80]

One consequence of this focus on suppression at depth is that Russian analysts increasingly view aircraft as having only one role in contested airspace: as standoff carriers for frontline forces.[81] This has led Russian experts to suggest that frontal aviation should be more closely subordinated to reconnaissance-strike complexes.[82]

The assumption among Russian authors is that they will be at least matched by opponents. Several authors acknowledge that Ukraine is currently at least as well equipped with UAVs as Russia.[83] Considerable attention has been paid to the requirement for credible counter-UAS. Solutions mooted include an all-arms approach where effectors of choice are enabled by sensor networks and shorter-ranged – and thus cheaper – interceptors.[84] Russian authors, however, recognise that suppression will be achieved in relatively limited windows and that infiltration will need to be achieved by smaller units. This raises the question of how momentum and resupply can be achieved. Academics cite interviews with Russian soldiers who served in sectors such as Krynky suggesting that the ubiquity of adversary FPVs makes sustainment and resupply difficult.[85]

As envisioned by Ogarkov, the current deadlock on the battlefield requires mobile and self-sustaining units. Many Russian analysts see helicopters as an integral part of this solution,[86] but they are known to be vulnerable. Some authors regard UAVs as a potential means of mitigating part of the threat to helicopters: operators of man-portable air defence systems (MANPADS). In these analysts' view, forward detachments of UAV operators can be carried to the edge of the battlefield by air and dismounted ahead of an air movement. They can then effectively create channels for vertical lift assets to exploit by both suppressing the MANPADS threat and countering adversary FPVs. However, the

80. *New Voice of Ukraine,* 'Military Officer Details Trapped Russian Troops in Kupyansk and What Ukrainian Troops Hear in Enemy Intercepts', 25 December 2025, <https://english.nv.ua/nation/ukrainian-armed-forces-soldier-says-russians-in-kupyansk-are-blocked-and-will-not-be-able-to-escape-50571170.html>, accessed 10 August 2026.
81. Burenok, « О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции » ['On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation'].
82. V G Kazakov and V N Kiryushin, « Военно-воздушные силы » ['Air Power'], *Военная мысль* (Vol. 6, 2023), pp. 53–62.
83. Biryukov, Timokhin and Makarenko, « Бригады сухопутных войск, вооруженные беспилотными летательными аппаратами » 'Land Forces Brigades Armed with Unmanned Aerial Vehicles'.
84. Burenok, « О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции » ['On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation'].
85. S I Makarenko, « Преодоление позиционного тупика в современных боевых операциях за счет массового использования беспилотных летательных аппаратов » ['Overcoming the Positional Impasse in Modern Combat Operations Through the Massive Use of Unmanned Aerial Vehicles'], *Воздушно-космические силы. Теория и практика* (Vol. 32, 2024), pp. 25–42.
86. *Ibid.*

viability of this approach is open to question given that the degree of implied preparation would limit the tempo of resupply by helicopter.[87] Precision strike capabilities of different kinds are viewed as a means of securing the flanks of an advancing force temporarily to enable its movement.[88] Other analysts argue that low-profile vehicles can partially mitigate the risks posed by pervasive ISR.[89] There is no evidence that these solutions are conclusive or that Russia is close to an institutionally agreed answer to the challenge of how tunnels built by precision strike can be exploited.

Broadly speaking, current Russian military theory appears to emphasise restoring the ability to manoeuvre. Relatively cheap precision strike can support this by reducing the logistical outload, itself achieved by reducing the requirement for massive preparatory fires. It can also keep key adversary defences suppressed and peel away ISR. However, sustaining momentum in the face of adversary precision strike is a considerable challenge, as the force contemplates how it can break the current positional deadlock and avoid future ones.[90] Russian theorists appear to see the solution in highly mobile units designed to exploit lower-risk tunnels created by precision strike. The realism of these theories and the extent to which fighting arms of the Russian military accept them is currently uncertain. Even so, military theory is usually a useful guide to future practice.[91]

87. S I Makarenko et al., « Усовершенствованные методы штурма и штурмовые действия с использованием беспилотных летательных аппаратов » ['Improved Methods of Assault and Assault Actions Using Unmanned Air Vehicles'], *Воздушно-космические силы. Теория и практика* (Vol. 35, 2025), pp. 17–31.
88. Makarenko, « Преодоление позиционного тупика в современных боевых операциях за счет массового использования беспилотных летательных аппаратов » ['Overcoming the Positional Impasse in Modern Combat Operations Through the Massive Use of Unmanned Aerial Vehicles'].
89. Burenok, « О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции » ['On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation'].
90. Kalistratov, « По вопросу о тупиковой ситуации в позициях » ['On the Issue of the Positional Impasse'].
91. See, for example, the long debate about independent naval operations in Kofman et al., 'Russian Military Strategy', p. 48.

Strategic Strikes: The Relentless Barrage

Before the conflict in Ukraine, Russia had built a conceptual framework for the use of long-range precision strike capabilities at operational and strategic depths. In the 1990s, figures such as Makhmut Gareev (former deputy chief of the General Staff) and Slipchenko contributed to a growing body of Russian literature on the subject of what is varyingly described as 'Sixth Generation Warfare' and 'non-contact warfare' – the large-scale use of precision strike capabilities at operational-strategic depths in both counterforce and countervalue roles.[92]

While the emphasis on long-range precision strike predominates in post–Cold War Russian strategic thinking, there are subtle variations in how the strategic role of long-range strike was conceived by different schools of thought within Russia. The first school, to which Gareev and Slipchenko belong, views long-range strike primarily as a means of defeating an opponent's society rather than its fielded forces, although the need to cripple air defences is acknowledged. Thinkers from this school assert that US precision bombing of Iraq robbed the Iraqi state of 85% of its economic potential and echo claims made by Serbian economists that NATO bombing during the breakup of Yugoslavia effectively deindustrialised the Serbian state.[93] Gareev's estimates of US capabilities were extraordinary: it would be able to launch 1,000 cruise missile raids for a period of up to 60 days by the 2020s, while Slipchenko estimated that Russia would need up to 9,000 long-range precision-guided munitions (PGMs).[94] The more modest dynamic targeting requirements involved in a campaign against critical infrastructure could partially resolve this challenge for a Russia which, during this period, had few PGMs.

92. Makhmut Gareev and Vladimir Slipchenko, *Future War* (Fort Kansas, KS: Foreign Military Studies Office, 2005), p. 13.
93. Gareev and Slipchenko, *Future War*; Steven Erlanger, 'Economists Find Bombing Cuts Yugoslavia's Production in Half', *New York Times*, 30 April 1999.
94. Clint Reach et al., *Russia's Evolution Towards a Unified Strategic Operation* (Santa Monica, CA: RAND, 2023), p. 26.

The second school of thought – which appears to have been sanctioned to some degree by both Russian political leaders and General Staff officers – envisages a highly time-bound use-case for precision strike capabilities against an opponent such as NATO. Russian forces might – pre-emptively or during the early stages of a conflict – use conventional precision strike capabilities to target the opponent's assets that are most relevant to a large-scale air and space attack against Russia. Later, as conflict escalated, commanders would target civilian infrastructure to signal an imminent transition to nuclear use.[95] However, if a conflict does not de-escalate, the assumption is that conventional strike could not take the place of non-strategic nuclear weapons. These would need to be employed on a large scale against both civilian and military targets.[96] As a result, this school maintains that conventional precision strike is a capability to be used for a limited period against select targets requiring a high degree of effectiveness. A smaller number of missiles with a higher probability of penetration (for example, the KH-47M2 Kinzhal or the 3M22 Zircon) would be consistent with this approach, since magazine depth matters less than certainty of effect.

Third, some Russian authors state that Russia needs the ability to strike dynamic targets with conventional long-range weapons at operational-strategic depths, echoing Ogarkov's arguments in the 1980s.[97] They emphasise the use of long-range strike for tasks such as disabling adversary air defences.[98] Members of this school typically allude to the requirement for levels of low-latency space and air-based ISR to which Russia does not have access, but rarely offer specific solutions.[99] This approach corresponds to a wider desire to give conventional strike a larger role than nuclear weapons. It is likely that Russia's capacity to deliver this vision without considerable Chinese support will be mixed. That said, Russia's use of Chinese commercial ISR in Ukraine and its ability to strike dynamic targets such as Patriot batteries at depth intermittently suggest that this vision is – in part – plausible. And while these schools of thought are not mutually exclusive, they do imply different priorities.

95. A A Protasov, S V Kreidin and I A Kublo, « Современные аспекты развития инструментов силового воздействия и концепции стратегического сдерживания » ['Current Aspects of the Development of Force Instruments and the Concept of Strategic Deterrence'], *Военная мысль* (Vol. 3, No. 76, 2021), pp. 44–45.
96. A A Sterlin, A A Protasov and A V Kreidin, « Современные трансформации И концепций и силовых инструментов стратегического сдерживания » ['Modern Transformations of the Concept and Force Instruments of Strategic Deterrence'], *Военная Мысль* (Vol. 8, 2019), pp. 7–17.
97. Mary C Fitzgerald, *Marshal Ogarkov on the Modern Theatre Operation* (Arlington, VA: CNA, 1986).
98. A A Glushak and D A Peresypkin, « Пространственно-временная модель поражения объектов противоракетной обороны противника оперативно-тактической авиацией с применением высокоточного оружия » ['A Spatial and Temporal Model of the Defeat of Missile Defence Facilities of the Enemy by Use of Operational Tactical Aviation with the Use of High Precision Weapons'], *Военная мысль* (No. 10, 2023), p. 49.
99. V Kuzmin and V Frolov, « Прогноз тенденций развития и перспектив будущих военных конфликтов и оценка их влияния на военную космическую деятельность в мире в XXI веке» ['Forecast of Trends in the Development of and Future of Future Military Conflicts and an Assessment of Their Impact on Military Space Activities in the World in the 21st Century'], *Бюллетень Академии военных наук* (Vol. 1, 2025), pp. 36–42.

In Ukraine, Russia has sought to address the requirement for sustained strategic effects by adopting the Shahed / Geran, as well as through adaptations to campaign planning and command arrangements. The resulting campaign has aimed to gradually wear down Ukraine's critical infrastructure and air defence interceptor stockpiles. It does this by employing a high–low mix of capabilities to deliver more sustained effects against specific targets.

The transferability of each aspect of this model to a war with NATO is uncertain. Russian concepts for regional war are closer to the second and third schools of thought. They continue to prioritise the rapid suppression of key military targets during the initial period of conflict. This limits the utility of an extended attritional strike campaign using munitions with a low individual probability of penetration. While Russia will probably seek the capacity for sustained operations at scale, the means of achieving this may differ substantially from those employed in Ukraine. Rather than prioritising ever-larger numbers of one-way attack UAVs, Moscow may place greater emphasis on expanding the production of cruise and ballistic missiles capable of delivering a higher confidence of effect against defended targets.

Mission planning – that meaningful damage requires sustained attacks – may be the most important lesson that Russia has drawn. While one-way munitions derived from the Geran may be an additional means of delivering this, they are likely to converge technologically with cruise missiles, as Russia requires both the magazine depth for sustained attack and a reasonably high capacity for penetrating air defences. In addition, it is likely that Russia will carry forward enduring lessons on the importance of the unity of command in a strike campaign.

As with the tactical battle, the most enduring lesson of the war may therefore be organisational rather than technological: it is likely that the experience of planning, coordinating and sustaining large-scale strike campaigns will outlast the specific munitions through which those lessons were learned.

2022: The Opening Test of the Russian Approach to War at Operational-Strategic Depths

Russia's opening strikes in Ukraine were relatively under-resourced. During the first month of the war, for example, there were roughly 150 recorded cruise missile strikes on Ukrainian soil. Short-range ballistic missiles were employed on a larger scale, but often against tactical targets. By way of comparison, the 1991 Gulf War began with the employment of 300 Tomahawk cruise missiles during the first three days of a conflict in a much smaller theatre.[100] While Russian cruise missile attacks were well sequenced

100. Steve Froggett, 'Tomahawk in the Desert', *USNI Proceedings* (Vol. 118/1/1067, January 1992), 24 June 2025.

with electronic and cyber effects, they also appear to have been highly scripted, used against known – rather than dynamic – targets.

Furthermore, the number of cruise missiles employed against individual military targets appears to be relatively small. For example, airbases such as Ozerne, Starokostiantyniv and Vasylkiv were struck with 5–9 cruise missiles in contrast with the 59 cruise missiles that the US and its allies used to strike Syria's Shayrat Airbase in 2017.[101] While this comparatively smaller-scale approach can, to some extent, be ascribed to Russia's initial institutional contempt for the Ukrainian armed forces, the modest number of weapons allocated to targets also aligns with what is known about Russian pre-conflict assumptions. For example, relatively authoritative Russian voices writing before the war suggested that roughly 18 cruise missiles would be needed to destroy a well-defended airbase and that the temporary blunting of Allied airpower in the initial period of a war could be achieved with 500 cruise and ballistic missiles (although this was a lower-bound estimate).[102] While Russian planners were never deluded about the scale of PGM expenditure that a purely conventional campaign would entail, it does appear that their pre-war assumptions about how many PGMs would be needed to inflict critical damage on military infrastructure were relatively optimistic. They also underestimated probable rates of interception and adversary mitigations.[103]

Early in the conflict, for example, Russian cruise missile strikes on airbases such as Ozerne involved limited numbers of up to eight cruise missiles per salvo. There were few truly large salvos per target, despite considerable expenditure of missiles overall. Nevertheless, some attacks did have a significant impact on individual airbases. For example, Vasylkiv Airbase appeared to suffer significant damage to both ammunition depots and fuel storage.[104] However, the Ukrainian air force remained active during this phase of the war and the dispersion of ammunition, air defences and aircraft appears to have mitigated the effects of strikes on major airbases.[105]

The major observable difference between Russian airbase attacks and comparable US attacks on airbases such as Shayrat appears to be a much narrower target set. Russian

101. Ian Williams, *Putin's Missile War* (Washington, DC: Center for Strategic & International Studies, 2023), p. 37; GlobalSecurity, 'Starokostiantyniv AB', <https://www.globalsecurity.org/military/world/ukraine/starokostiantyniv-ab.htm>, accessed 23 June 2025.
102. Konstantin Sivkov, « Небесные бастионы » ['Sky Bastions'], *ВПК*, 2 February 2019, <https://vpk.name/news/250171_nebesnye_ bastiony.html>, accessed 23 May 2026.
103. S V Dronov et al., « Особенности авиационной тактики в современных боевых действиях и способы ее совершенствования » ['Features of Aviation Tactics in Modern Combat Operations and How to Improve Them'], *Военная мысль* (Vol. 1, 2024), pp. 17–27.
104. Interfax Ukraine, 'Airport Completely Destroyed Due to Missile Attacks by Invader in Vasylkiv, Kyiv Region – Mayor', 12 March 2022, <https://en.interfax.com.ua/news/general/811960.html>, accessed 23 May 2026.
105. Williams, *Putin's Missile War*, p. 6; Justin Bronk, Nick Reynolds and Jack Watling, 'The Russian Air War and Ukrainian Requirements for Air Defence', RUSI, November 2022, p. 28, <https://www.rusi.org/explore-our-research/publications/special-resources/russian-air-war-and-ukrainian-requirements-air-defence>, accessed 23 May 2026.

attacks focused on key points such as fuel storage, munitions and, to a lesser extent, runways. US missile strikes on Shayrat involved 44 targets, including hangars and shelters, fuel and munitions storage sites, workshops and nearby surface-to-air missile (SAM) systems.[106] The Russian approach appears consistent with a wider war plan that presupposed a short conflict and had the key aim of limiting the tempo of Ukrainian air activity. Such aims did not necessarily require the mass destruction of Ukrainian aircraft. Moreover, Ukrainian sortie rates during this period were relatively low. Analytically, juxtaposing the initial low missile use against individual Ukrainian airbases with pre-war Russian discussions implies that temporally bounded functional defeat – rather than destruction – of airbases was the central guiding principle of Russia's initial strike campaigns. By extension, the number of targets was much more bounded than would be the case in a US air campaign. This approach appears not to have taken full account of adversary mitigations, such as dispersion, which might prove challenging if a conflict dragged on and functionality could be restored at some bases. Long-range strikes on SAM systems were also a priority during this period. However, these strikes appear to have been constrained by a relatively slow targeting cycle that required data to be passed to the strategic command architecture in Moscow and then passed to military districts to incorporate into a 24-hour strike plan.[107]

Following the Russian withdrawal from Kyiv in spring 2022, the Russian target set shifted. There was then a greater focus on operational-level targets which played an important role in Ukraine's defence industrial capacity and its ability to move forces. Targets during this phase of activity were roughly split between rail hubs (which made up 30% of strikes), military infrastructure such as depots (25%) and fuel storage (15%). The remainder appear to have largely been allocated to targets within cities with no observable military role (although the use of urban terrain by both sides makes this data noisy).[108] The pattern of activity during this period implies both a very broad focus and a limited number of munitions used per target. Roughly 2,000 missiles of all types were used in Ukraine between April and July 2022, with the number of missiles employed against individual nodes typically in the range of 4–10 per strike. This, coupled with a relatively weak revisit rate for targets, probably accounts for the limited impact of Russia's bombing campaign.[109]

The inability to use fixed-wing aircraft in a more direct bombing role – given that Ukraine's air defences had not been entirely suppressed – may also have contributed. Ukraine's air defences forced the Russians to rely on more expensive standoff capabilities. In contrast, during the 78-day Kosovo operation, the US employed 6,700

106. Caroline Houck, 'Here's What US Missiles Hit at the Syrian Airbase', *DefenseOne*, 2017, <https://www.defenseone.com/threats/2017/04/heres-what-us-missiles-hit-syrian-airbase/136865/>, accessed 23 May 2026.
107. Bronk, Reynolds and Watling, 'The Russian Air War and Ukrainian Requirements for Air Defence', p. 28.
108. Data gathered from Appendix I of Williams, *Putin's Missile War*, p. 6.
109. *Ibid.*

PGMs and a further 18,000 unguided munitions.[110] Moreover, the NATO campaign involved a much more focused target set and repeat attacks on key facilities such as Novi Sad. Russia largely did not attempt such attacks during this period in Ukraine. In sum, the Russian strike campaign during this period appears to have lacked focus and to have employed far fewer munitions than would be needed to achieve operational interdiction (noting that even NATO's success in Serbia was mixed, despite its more focused approach).

The availability of PGMs may partially account for this. Before the war, Russia's production rate for missiles such as the KH-101 had been relatively low: only 56 KH-101s were produced in 2021.[111] The employment of missiles such as the KH-22, originally an anti-ship missile, in strikes against land targets further suggests a lack of PGMs. However, an alternative interpretation is that the heavy 1,000-kg warhead of the KH-22 was deemed capable of doing more lasting damage than that of the KH-101 and KH-55, which still made up a majority of strikes.[112] Either interpretation indicates an effort to offset the effects of Russia's tactical improvisation, which was necessitated by the inability of small-scale KH-101 cruise missile barrages to inflict lasting damage. As targeting was still, at this juncture, conducted at the military district level might also account for the somewhat incoherent approach to targeting. This is consistent with pre-war assessments by Russian officers who argued that joint strategic commands – dominated by ground force officers – typically lacked both the staffing and processes to coordinate air campaigns.[113]

Late 2022: The Introduction of Cheap Precision Strike

In late 2022, General Sergey Surovikin, previously deputy head of the VKS, became the commanding general of the SMO following the short-lived tenure of General Alexander Dvornikov.[114] Surovikin's assumption of authority appears to have corresponded with

110. Benjamin S Lambeth, *NATO's Air War for Kosovo: A Strategic and Operational Assessment* (Santa Monica, CA: RAND, 2001), p. 88.
111. Jack Watling and Gary Somerville, 'A Methodology for Degrading the Arms of the Russian Federation', *RUSI Occasional Papers* (June 2024), p. 8, <https://www.rusi.org/explore-our-research/publications/occasional-papers/methodology-degrading-arms-russian-federation>, accessed 23 May 2026.
112. On KH-22 strikes, see Williams, *Putin's Missile War*, p. 9.
113. I A Fedotov, « Направление развития оперативно-стратегического командования военного округа на современном этапе строительства Вооруженных Сил Российской Федерации » ['The Direction of Development of the Operational-Strategic Command of the Military District at the Current Stage of Development of the Armed Forces of the Russian Federation'], *Вестник Академии военных наук* (Vol. 4, No. 57, 2016), p. 67.
114. John Hardie, 'Moscow Shakes Up Command of Its Forces Again', *Long War Journal*, January 2023, <https://www.longwarjournal.org/archives/2023/01/moscow-shakes-up-command-of-its-forces-in-ukraine-again.php>, accessed 30 May 2026.

greater unity of command in the conduct of air operations. This is most clearly visible in targeting patterns. After October 2022, the Ukrainian energy grid accounted for 70% of Russia's strike campaign. This was a logical choice both operationally and strategically. From an operational standpoint, the electrification of the Ukrainian rail system was a greater specific weakness than other areas of transportation infrastructure – since railheads are robust and easily repaired.[115] Moreover, a clear focus on specific parts of the energy grid – substations – can be observed during this period.[116] While it cannot be confirmed, the behavioural shift during this period may correspond to the emergence of organisations such as the Joint Centre for Planning and Coordination for Fire Defeat of the Enemy. This Joint Centre appears to be a task-organised body not unlike those which the VKS set up at Khmeimim Airbase during the Syrian campaign, in which Surovikin participated. They acted as a relay between Russia's National Defense Management Center and forces in theatre, coordinating all air activity.[117]

At the same time, the arrival of the Iranian Shahed-136 provided Russia with a cheap precision strike capability which could be employed on a greater scale than cruise missiles. Its arrival, along with the apparent unification of command and control over the Russian strike campaign, significantly increased the scale, focus and tempo of Russian strikes on Ukraine. From late 2022, the Ukrainian energy grid comprised a far larger proportion of targets (50–70%, based on the time of year). Furthermore, the time between Russian strikes decreased significantly. The target revisit rate also increased and an approach to weapons matching saw Shaheds used against smaller targets, such as substations. Missiles, such as KH-101 and KH-55, were reserved for major power plants.

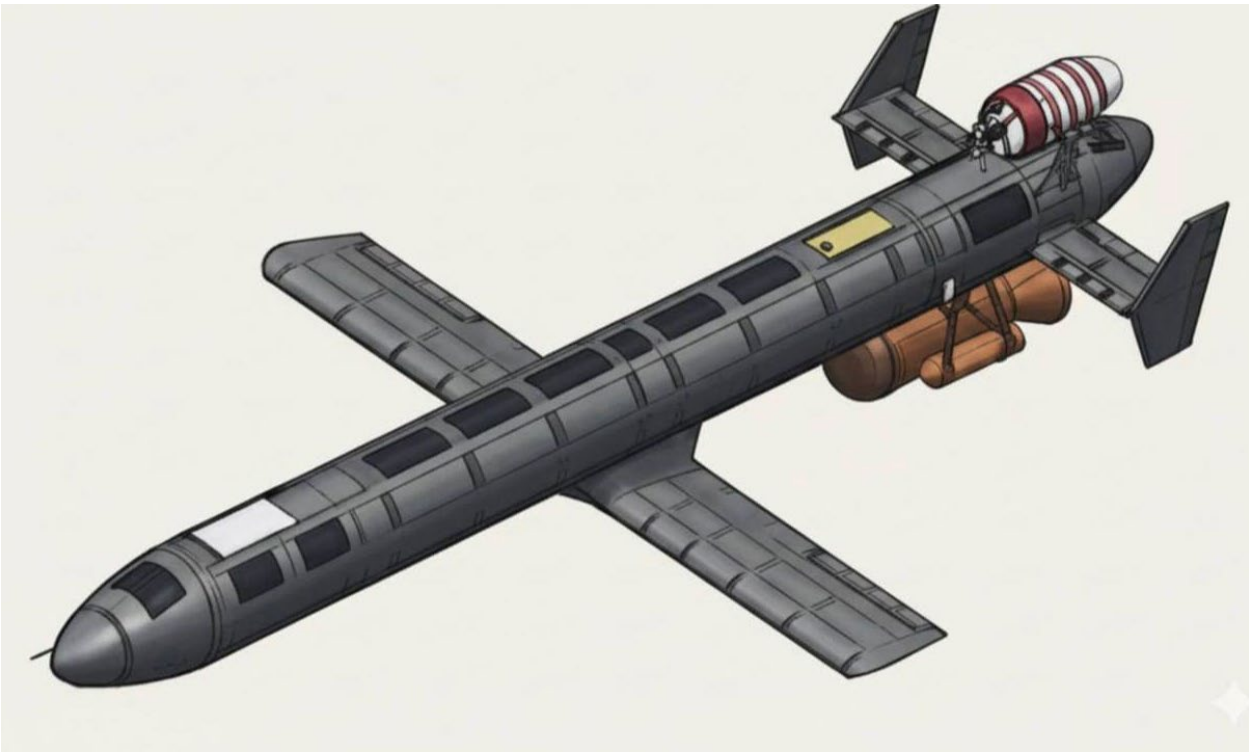
2023–25: The Russian Strategic Campaign Continues to Adapt

Between 2023 and 2025, the core elements of Surovikin's reforms remained in place. The Russian precision strike complex saw several qualitative improvements during this period including the mass production of the Geran, a domestically produced version of the Shahed which offered significant improvements, particularly in jamming resistance.[118] Russia also began fielding multiple variants of the Geran, including the

115. Author interview with Lieutenant Colonel Charles Bartles, Foreign Military Studies Office, Fort Leavenworth, Kansas, 3 February 2026.
116. Data gathered by authors based on public reporting across multiple outlets, available on request.
117. The existence of the centre can be deduced from accusations which have since been made by Ukrainian officers. See, for example, *New Voice of Ukraine*, 'SBU Charges Four Russian Officers in Deadly April Missile Strike', 24 November 2025, <https://english.nv.ua/nation/sbu-charges-four-russian-generals-for-deadly-attack-on-kryvyi-rih-on-april-4-50563112.html>, accessed 30 May 2026.
118. Fabrice Wolf, 'Geran-2: Ukrainian Defence Against Russian Adaptation', *Meta Defence*, 28 November 2024, <https://meta-defense.fr/en/2024/11/28/geran-2-defense-ukraine-asaptation-ru/>, accessed 30 May 2026; controlled reception pattern antennae are multi-element antennae that make a UAV more resilient to jamming.

jet-powered Geran-3, capable of flying at altitudes which make interception by anti-aircraft artillery (AAA) fire more difficult, and the Gerbera, a decoy UAV. Tactically, the Russian strike arsenal of one-way attack UAVs became progressively more expensive as it sought to reduce the effects of cheap countermeasures including AAA fire, EW and interceptor UAVs. At the operational level, many core elements of the Russian approach remained in place.

Figure 2: The Geran One-Way Attack UAV



Source: Wikimedia Commons.

Over 2023 and 2024, mixed salvos continued to characterise the Russian approach. Missiles and one-way attack UAVs have been used in several mutually reinforcing ways. For example, Gerans can be used as pathfinders to force radar to emit, thus informing route planning. The mass employment of both missiles and UAVs to saturate radar is another way that Russian planners have sought to combine the effects of the two capability types. The data, however, suggests that the most common pattern of activity is the use of missiles such as the KH-101 at the beginning of a pulse of activity. UAVs commonly followed such strikes. In 2024, an average of 3.6 UAV strikes followed a missile strike in a given area. In 2026, this had increased to seven.[119]

This implies that UAVs are being employed to exploit the initial impact of missile attacks, potentially by revisiting the same targets and preventing repair. An alternative interpretation of the data is that cruise missiles can be launched more promptly from

119. Author-generated data based on public reporting, available on request.

mobile platforms such as aircraft, while UAVs must be set up in launch positions. Sequential use is thus easier to plan than simultaneous employment. Notably, gaps of 4–8 days typically occur between pulses of activity, suggesting that the Russian system has not necessarily become quicker at generating air tasking order equivalents. Rather, each order now corresponds to a more sustained surge in activity, followed by a lull as the next one is generated. In other words, air activity is more sustained not because it is planned on a more rapid kilter but because each pulse of air activity lasts longer. The system may still have become more agile, but it is possible that the scale of resource management has grown more quickly than the system's bandwidth.

Between 2023 and 2025, there were also several strikes on key targets using missiles such as the 9A-7760 Kinzhal, the 3M22 Zircon cruise missile and, at the end of the period, the Oreshnik intermediate-range ballistic missile. These missiles have typically been employed against hardened and buried targets or time-sensitive high-value targets.[120] When a target requires considerable pattern of life or a certainty of penetrating layered air defences, highly expensive munitions still appear to be employed.

Learning the Right Lessons from Russia's Strike Campaign

The Russian strategic strike campaign does not appear to have used one-way attack munitions merely as a cheap means of soaking up interceptors. They also allowed Russia to plan air activity to achieve more sustained effects through repeated follow-on attacks. This emphasis is likely to be highly transferable in a conflict with NATO. However, the missiles needed to achieve sustained effect do not need to be as cheap or as limited as the early variants of the Geran / Shahed.

Broadly, it is unclear whether the model of long-range strikes used in the Russo-Ukrainian war will have utility beyond the confines of Ukraine. In Ukraine, Russia is fighting a positional and extended war which for several reasons it could not necessarily plan for in the context of a conflict with NATO. First, the parameters of escalation are relatively bounded in Ukraine. This is not true of a regional war where Russian planners anticipate having to face 'massed aerospace attacks' which they cannot withstand indefinitely. Moreover, the nuclear dimension – the use of non-strategic weapons – is mostly irrelevant in a local war. However, in a regional war, figures such as the former head of the Main Operations Directorate of the General Staff and President Vladimir Putin himself have indicated that Russia's nuclear arsenal

120. Sidharth Kaushal, 'Conventional Prompt Strike in European Military Power', *RUSI Research Papers* (February 2026), <https://www.rusi.org/explore-our-research/publications/research-papers/conventional-prompt-strike-european-military-power>, accessed 12 April 2026.

would play a more prominent role at the substrategic level.[121] Russian military literature envisages regional wars being decided early. This is a different proposition from the attritional approach which was eventually adopted in Ukraine, where Russia believes it has time on its side.

Munitions with a low probability of striking a target, but which might reduce interceptor stockpiles and stress air defence layouts over time, have more limited value in a regional conflict. Consequently, much of Russian literature appears to focus more heavily on ensuring that small numbers of missiles have a high single-shot probability of kill so that Russia does not have to coordinate massive salvos over an extended period. This sentiment is captured, for example, in recent articles which allude to the utility of hypersonics as a means of effecting deep penetration.[122]

The Strategic Rocket Forces (RVSN) also appear inclined to emphasise the utility of conventionally armed strategic hypersonic missiles in delivering effects with small numbers of missiles. Figures such as Major General Nogin and Colonel Tikhonov made this point in two articles.[123] It is likely that this reflects a wider bureaucratic struggle to give the force a greater operational role, which it has sought for some time. Notably, the emphasis on RVSN capabilities, such as Oreshnik, has been echoed by Defence Minister Andrei Belousov, suggesting that this messaging has been effective.[124]

That said, Russian military thought does not universally accept that one-way attack munitions can only serve a limited role. Some articles published in outlets such as the *Bulletin of the Academy of Military Sciences* are far more favourable on the strategic role of UAVs, suggesting that drones should be a separate branch of arms at each level of warfare.[125] The creation of the Unmanned Systems Forces appears to align with this intent. These articles are outliers, however. In general, the emphasis of Russian

121. Sterlin, Protasov and Kreidin, « Современные трансформации И концепций и силовых инструментов стратегического сдерживания » ['Modern Transformations of the Concept and Force Instruments of Strategic Deterrence'].
122. O V Yermolin et al., « Использование ударной авиации Воздушно-космическими силами в будущих военных конфликтах » ['The Use of Strike Aviation by the Aerospace Forces in Future Military Conflicts'], *Военная мысль* (Vol. 2, 2023), pp. 1–11; E V Evsyukov and S V Khryapin, « Роль новых стратегических систем вооружения в стратегическом сдерживании » ['The Role of New Strategic Weapon Systems in Strategic Deterrence'], *Военная мысль* (Vol. 12, 2020), p 21–27.
123. R O Nogin, « О роли и месте стратегических ракетных сил в будущей системе всеобъемлющего стратегического ядерного сдерживания против возможной агрессии против Российской Федерации » ['On the Role and Place of the Strategic Missile Forces in the Future System of Comprehensive Strategic Nuclear Deterrence Against Possible Aggression Against the Russian Federation'], *Военная мысль* (Vol. 7, 2022), pp. 41–48; M L Tikhonov, 'Key Areas for Improving the Theory of the Operational Art of the Strategic Missile Forces at the Turn of the 2020s', *Военная мысль* (Vol. 7, 2023), pp. 25–32.
124. Ivan Rodin, 'Belousov Does Not Rule Out a Conflict Between Russia and NATO in the Next Decade', *Невасимая Газета*, 2024, <https://www.ng.ru/politics/2024-12-16/1_9157_belousov.html>, accessed 30 July 2026.
125. Selivanov and Dunlev « Общие оперативные и стратегические принципы использования беспилотных систем » ['General Operational and Strategic Principles for Using Unmanned Systems'].

military analysis on targets at operational-strategic depth appears to be on smaller numbers of highly capable munitions.

Still, the 'mass precision' phenomenon is not likely to disappear from Russian planning. The phenomenon's most important lessons will relate to planning and organisation. Russia has clearly learned from the conflict in Ukraine that it needs to conduct repeated strikes on the same target to keep it suppressed. Even if the initial phases of a Russian strike campaign are likely to involve more expensive munitions, cheaper ones may well be used in follow-on waves to maintain disruption.

A war with NATO would be far more escalatory. As such, there will only be a short period when conventional precision strike is expected to be used – before a war has either terminated or escalated. In a shorter war, it follows that more expensive capabilities can be used to achieve sustained effect since the conventional strike campaign will not last as long.

Instead of looking to make capabilities such as the Geran cheaper and even more scalable, Russia will probably continue its policy of increasing numbers of KH-101 and Iskander missiles, the production of which has already expanded considerably.[126] Additionally, where one-way attack munitions such as Gerans are used to support sustained activity, the costs of these munitions might be expected to grow as Russia seeks ways to increase the probability of penetrating a defence and striking targets. As an example, consider the potential emergence of turbojet-powered versions of the Geran and attempts to build cheap cruise missiles, such as the Banderol. Since some cruise missile components are being built at scale in China, Russia is strongly incentivised to look for options that are cheaper than its current cruise missiles but have a higher probability of penetration than munitions such as the Geran / Shahed.[127] In effect, having veered towards a search for the lowest possible price point in its efforts to support an attritional war, Russia will probably now seek a mid-point solution. Such a solution would augment the cruise missile strikes that it would rely on in the early stages of a conflict with NATO.

The ability to employ precision strike capabilities en masse is consistent with the vision of warfare which characterises the Russian understanding of conventional deterrence. This vision requires conventional precision strike to be used in both a counterforce and a countervalue role. Scalable and cheap strike capabilities can play a role in closing the gap between Russia's concepts of operations and its real operational needs. However, strike at scale also involves complexity at every level. Munition simplicity can rapidly impose system complexity by increasing the number of moving parts. This must be operationally justifiable. Moreover, repeated strikes with an 8–10% penetration rate are of limited value in a context where it is necessary to blunt

126. Watling and Somerville, 'A Methodology for Degrading the Arms of the Russian Federation'.
127. China Defence, 'TRD-50', <https://www.militarydrones.org.cn/c/turbofan-engines_0084>, accessed 30 July 2026.

adversary air and missile power and inflict economic costs sufficient to give an opponent pause. An increase in the probability of penetration is probably required to make cheap strike consistent with a Russian vision of warfare that is still dominated by early success in the initial period. Within this context, Russia is more likely to seek to make the Geran a cheap cruise missile – even if this means fielding fewer – than it is to field more one-way attack UAVs.

However, the experience of planning missile raids on a far greater scale than was envisioned at the war's outset will probably shape the institutional capacity of the Russian system. Moreover, the transition from a scattered and ineffectual targeting campaign to a far more focused one under unified command – as well as firsthand experience of what can and cannot be achieved at operational-strategic depth – will undoubtedly shape Russian planning for a war with NATO. The institutional muscle memory which Russia has built may thus prove more important than the specific capabilities it has employed.

Although there are enduring lessons for Russia from the conflict in Ukraine, they may not be transposed to a conflict with NATO in the same way. Russian thinking about a regional war seems to emphasise high precision, certainty of effect and the penetration of integrated air and missile defence, which cheap strike does not provide. Moreover, a vision that heavily weights the decisive initial period of war does not favour an attritional tool. Cheap strike can still play a role in imposing multiple dilemmas on an opponent. However, it appears more likely that Russia will invest more heavily in survivable munitions, and that cheaper munitions will increasingly converge with more expensive cruise missiles in both characteristics and costs.

Conclusion: How Have Russia's Precision Strike Capabilities Evolved?

The war in Ukraine has significantly expanded Russia's precision strike capabilities at both the tactical and operational levels.

At the tactical level, precision strike has complemented – rather than replaced – Russia's traditional reliance on massed artillery fire. Drones, precision targeting and reconnaissance-strike complexes remain integrated into a system centred on overwhelming firepower. Russia has also developed a substantial cadre of reconnaissance personnel with extensive experience locating small, mobile targets, while units such as the Rubicon Centre have specialised in the aggressive pursuit of ISTAR dominance by attacking drone crews, radars and EW systems. The distinction between reconnaissance-fire and reconnaissance-strike complexes has also increasingly blurred. Systems once reserved for high-value targets are now routinely employed for counter-battery and attritional missions. However, UAVs are part of a mixed system including guided shells and glide bombs. The shift from mass to precision may matter more than the specific systems used in Ukraine. Moreover, Russian thinkers are still grappling with the problem of mutual deadlock brought about by a battlefield dominated by tactical precision.

At the strategic level, Russia's experience in Ukraine exposed the limitations of pre-war assumptions about the 'precision revolution' and the belief that a relatively limited number of precision strikes could produce rapid strategic collapse. Instead, Russian planners learned that key targets and systems often require repeated strikes over time, demanding larger stockpiles, sustained sortie generation and more adaptive mission planning processes. Russia's strike campaign has evolved from an attempted rapid paralysis strategy into a prolonged effort to degrade Ukraine's economy, logistics and rear areas through cumulative pressure.

However, the applicability of these lessons to a conflict with NATO may be limited. Russian analysts continue to view the initial period of war as decisive, particularly given the entanglement of conventional and nuclear escalation. This creates incentives to prioritise systems that maximise penetration probability and immediate effect rather than cheaper capabilities designed for prolonged attritional campaigns. Nevertheless, it is likely that the organisational and doctrinal adaptations seen in Ukraine – including improved unity of command, more agile targeting processes and the integration of cheaper and more exquisite strike systems – will shape Russia's future way of war.

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