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Assessing Russian plans for military regeneration

Modernization and reconstitution challenges for Moscow's war machine

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Summary

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- More than two years into Russia's full-scale invasion of Ukraine, understanding potential future Russian military capabilities is vital to predicting the Kremlin's ability to continue to prosecute the war, or even to escalate hostilities. This research paper examines the post-February 2022 combat performance of Russian forces, identifies weaknesses and resource gaps highlighted by the war, and considers the achievability of Moscow's plans for military regeneration and modernization.
 - The paper looks at the implications of Russia's underlying force structure for military effectiveness. It analyses trends in Russian land, air, naval and 'asymmetric' capabilities. The paper also explores the challenges for Russia's defence industry in procuring, developing and manufacturing materiel. The overall aim of the paper is to indicate in which domains and sectors Russia will continue to be a credible military threat to Ukraine and the West.
 - Despite serious battlefield losses and blunders over the past two years, the Russian military has proven capable of maintaining substantial tactical-to operational-level pressure along much of the front line. Russian forces appear capable of absorbing losses of personnel, and of plugging holes in the line with new recruits. At the same time, the Russian high command is undertaking large-scale reforms, intended to increase conventional military capabilities in the long term. Continued pursuit of the war in Ukraine, however, will constrain Russia's ability to implement and integrate these reforms.
 - Of all Russia's military services, its Ground Forces have been the most heavily committed in the war. They have sustained the heaviest losses of personnel and equipment. As a result, their ability to regenerate will depend to an even greater extent on how and when the Russia-Ukraine war ends than is likely for other services. While the recruitment of many volunteers has improved the manpower situation, equipment losses look more difficult to sustain. Replacing equipment at sufficient volume and pace will be challenging, and Russia will struggle to conduct combined-arms operations beyond the company level effectively. However, the army has improved its reconnaissance, precision-guided munition and dynamic targeting capabilities.
 - When it comes to air power, the resources available for recapitalization and regeneration of the aircraft and weapons of the Aerospace Forces (VKS) will be constrained by urgent demand for large-scale production of equipment in other domains to support the ongoing war against Ukraine. Consequently, for the foreseeable future, the biggest threats to NATO from Russia in the air domain are likely to remain – as now – Russia's numerous, lethal and layered surface-to-air missile (SAM) systems, along with its growing long-range strike arsenal.

- Although Russian naval forces have suffered embarrassing losses at the hands of Ukrainian forces in the Black Sea, the Russian Federation Navy (RFN) remains more potent than is sometimes assumed. With two important exceptions, most of Ukraine's naval accomplishments against Russia have involved attacks on very old or limited vessels. However, the RFN has lost none of its blue-water combat capability. Ukrainian success at sea has been impressive, but this should not obscure the fact that Russia's global power projection capabilities are undiminished.
- Russia has long pursued asymmetric capabilities critical to a vision of modern, information-centric warfare – encompassing cyber tools, information and electronic warfare, unmanned and autonomous systems, counterspace operations, advanced data analytics and artificial intelligence. Since the beginning of the full-scale war with Ukraine in 2022, Russian capabilities in these areas have been tested – revealing areas of ongoing strength but also points of weakness, degradation and future uncertainty. To reduce the viability of Russia's asymmetric approach over the long term, the West must pursue policies and strategy to further degrade Russian technological capacity and undermine the Kremlin's informational strategy both in Russia and abroad.
- International targeted sanctions and the demands of the conflict have severely affected Russia's military-industrial complex (OPK). The current situation is unsustainable for Russia: the country's military industry is heading into a period of decline and stagnating innovation, and is having to simplify production in order to cope. This will affect the ability of Russian forces to recapitalize military hardware and modernize, and the speed with which they are able to do so. Despite the above issues, Western military planners need to remember that the OPK will probably continue to muddle through with production of 'good enough' systems, which will remain a significant threat to Ukraine as well as to NATO and its allies. This is especially true for stand-off and asymmetric Russian capabilities that have not yet been used in the war against Ukraine.
- The decline of the OPK will increasingly limit Russia's ability to confront Western countries and NATO symmetrically in conventional and strategic competition, especially as technology becomes an even more significant element of national power. Use of more stringent and widened sanctions will be the best tool for Western militaries and their allies to 'out-tech' Moscow and blunt Russia's ability to compete militarily and geopolitically.
- Ultimately, the single most significant factor that can impair Russia's ability to reconstitute its military in coming years will be ongoing Western support for Ukraine. Western countries must continue to work together to provide Ukraine with arms, ammunition, financial support and refugee assistance, and to show moral solidarity with the Ukrainian war effort. Denying Russia victory and forcing it to continue in a long attritional struggle will further degrade all elements of its war-making capacity.

01

Introduction

Understanding Russia's plans to upgrade its military hardware and capabilities – and the profound challenges it faces in doing so – is critical to evaluating the short- and long-term threats Russia will continue to pose to Ukraine, the US, NATO and their allies.

Mathieu Boulègue

More than two years into Russia's full-scale invasion of Ukraine, understanding prospects for the regeneration of Russian military power is crucial to predicting the Kremlin's ability to continue to prosecute the war, or even to escalate hostilities.

Moscow's war against Ukraine has clarified the extent of Russia's warfighting capabilities and the ability of the Russian Armed Forces to sustain prolonged, high-intensity warfare. Despite high rates of attrition across many domains and the destruction of substantial parts of the land forces, the Russian Armed Forces are rapidly reconstituting and continue to present a significant threat to the US, NATO and their allies.

Viewed across all domains, the Russian military remains a force capable of contesting peer and near-peer competitors. Its disregard for losses makes it a dangerous opponent even for more technologically advanced adversaries such as the US.

The question of how fast and how well Russia can rebuild its armed forces is therefore vital to understanding the future threat environment¹ in the medium term – this can be defined as the timeframe of the next round of Russia's State Armament Programme (GPV) after 2027, although the precise details and duration of the post-2027 GPV are yet to be determined.

¹ Bugayova, N. (2023), 'The High Price of Losing Ukraine: Part 2 — The Military Threat and Beyond', Institute for the Study of War, 22 December 2023, <https://www.understandingwar.org/backgroundunder/high-price-losing-ukraine-part-2-%E2%80%94-military-threat-and-beyond>.

Ongoing research on the Russian military must include deciphering current and future trends affecting, or potentially affecting, the regeneration of Russian forces in terms of manpower, force structure, and command and control. This research must also focus on the challenges and opportunities Russia faces in relation to the procurement of military hardware and platforms.

The complexity of the situation is compounded by several principal factors: the volatile nature of Russian operations in Ukraine; Western policy expectations with regard to a potential peace settlement; questions around the sustainability of international support and military assistance to Ukraine; and the impact of international sanctions on the Russian defence industry. However, this is not an exhaustive list.

This research paper provides a mid-term assessment of Russia's continued regeneration of its forces, and of its efforts to replenish or modernize military equipment and hardware. The paper considers the scope, scale and successes of this process since the start of the full-scale invasion of Ukraine in February 2022, as well as the challenges and setbacks Russia has encountered to date. The principal analysis, after this introductory chapter, is divided into six thematic chapters respectively covering Russia's underlying force structure, four key warfighting capabilities (land, air and naval forces, and asymmetric enablers), and the overall Russian military-industrial complex.

The intention of this research is to assist Western policymakers and military planners with understanding how Russia aims to adapt or develop its armed forces in the medium term, whether it may succeed, and especially in which domains and sectors it will continue to be a credible threat to Ukraine as well as to the US and its allies.

02 Manpower, force structure, and command and control

Russia's ongoing military reforms seek to build out the long-term capabilities of its armed forces. Russia's ability to implement these reforms effectively, however, will be bounded by the continued requirements of its war in Ukraine.

Karolina Hird

In over two years of full-scale fighting in Ukraine, the Russian Armed Forces have experienced significant shocks and repeated operational failures, which have prevented Russia from achieving its strategic objectives on the battlefield. Russia has retained its maximalist objective of the total capture and subjugation of Ukraine, however, and Russian forces have proven relatively capable of absorbing losses and maintaining constant tactical- to operational-level offensive pressure on Ukrainian defenders.²

State of play

At the time of writing in March 2024, Russia's force generation apparatus was able to deliver enough replacement troops and other service personnel to compensate for the rate of losses in Ukraine at roughly a one-to-one ratio –

² Watling, J. and Reynolds, N. (2024), 'Russian Military Objectives and Capacity in Ukraine Through 2024', RUSI Commentary, Royal United Services Institute, 13 February 2024, <https://www.rusi.org/explore-our-research/publications/commentary/russian-military-objectives-and-capacity-ukraine-through-2024>.

sufficient, in other words, to maintain Russia's current style of tactical-level attacks along the entire front line.³ Ukrainian intelligence officials estimated in December 2023 that Russian crypto-mobilization campaigns were generating about 1,000 to 1,200 new recruits per day (30,000 to 37,200 new recruits per month).⁴ Russian estimates are comparable, at around 40,000 new recruits per month.⁵ Ukrainian sources suggest that the majority of new recruits are immediately deployed to the front line – both to replenish units that have suffered losses and to staff reserve regiments – although Russian sources claim that recruits undergo between three weeks and six months of training before deployment.⁶ Some formations may immediately deploy recruits to the front line, prioritizing filling gaps in the line over investing in higher-quality troops, while others may hold recruits back for training or to prepare them for reserve formations.

The generally low quality of new recruits deployed to the front line without sufficient training will probably continue to prevent Russian forces from achieving operationally significant breakthroughs in the war in 2024.

The generally low quality of new recruits deployed to the front line without sufficient training will probably continue to prevent Russian forces from achieving operationally significant breakthroughs in the war in 2024. Ukrainian intelligence reported in January 2024 that Russia lacked the force capacity to sustain operational reserves capable of conducting simultaneous operations on multiple sectors of the front. This assessment suggests that the pace of Russian force generation is sufficient to allow Russian forces to conduct tactical- to operational-level rotations in Ukraine, but not to re-establish the well-trained, high-quality operational reserves necessary for operational-level undertakings across the front.⁷

³ RBK Ukraina (2024), 'Вадим Скибицкий: У россиян есть мотивация воевать за деньги, ежедневно в армию идет около 1000-1100 человек' [Vadym Skibitsky: Russians are motivated to fight for money; about 1,000-1,100 people join the army every day], 15 January 2024, <https://www.rbc.ua/ukr/news/vadim-skibitskiy-rosiyan-e-motivatsiya-voyuvati-1705266418.html>; and Bailey, R. et al. (2023), 'Russian Offensive Campaign Assessment', Institute for the Study of War, 7 December 2023, <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-december-7-2023>.

⁴ The Main Directorate of Intelligence of the Ministry of Defence of Ukraine, via Facebook (2023), 'На почі зростає невдоволення війною' [Dissatisfaction with the war is growing in Russia], 21 December 2023, <https://www.facebook.com/DefenceIntelligenceofUkraine/posts/pfbid02pcS7k7jqdPRQKUGcm43H6MSR V8FphJqavwxLdDDobpBrXoXkShABvhMkXzWoFh5rl>.

⁵ *Moscow Times* (2023), 'Putin demanded that 170 thousand more Russians be sent to the army', 1 December 2023, <https://www.moscowtimes.ru/2023/12/01/putin-potreboval-otpravit-varmiyu-esche-170-tisyach-rossiyan-a115027>.

⁶ RBK Ukraina (2024), 'Вадим Скибицкий: У россиян есть мотивация воевать за деньги, ежедневно в армию идет около 1000-1100 человек'; and Storozhev, S. (2022), 'Цикл обучения мобилизованных может занять до полугода' [The training cycle for mobilized personnel can take up to six months], *Readovka*, 21 September 2022, <https://readovka.news/news/112637>.

⁷ *Suspilne* (2024), 'Росія наразі не має резервів для "потужного" наступу одразу на кількох напрямках — ГУР МО' [Currently, Russia does not have reserves for a 'powerful' offensive in several directions at once—GUR], 17 January 2024, <https://suspilne.media/663644-rosia-narazi-ne-mae-rezerviv-dla-potuznogo-nastupu-odrazu-na-kilkoh-napramkah-gur-mo>.

Battlefield outcomes are not a simple function of troop numbers, but also reflect troop quality and equipment levels. Yet most new Russian recruits are both of low quality and inadequately equipped. Poor troop quality has contributed to high levels of armoured-vehicle losses (Russian forces lost at least 54 armoured vehicles, including 16 tanks, in one day during an assault near Avdiivka in February 2024, for example); this has consistently frustrated Russian forces' operational ambitions.⁸ Such losses have resulted in ground units being less mechanized and more reliant on attritional, infantry-led frontal assaults.

Ongoing Russian military reforms are in part intended to restore Russian capabilities in Ukraine in the short term. In January 2023, Russia's then defence minister, Sergei Shoigu, outlined plans for large-scale reforms that included the following: the redivision of the Western Military District (WMD) into separate Moscow and Leningrad military districts; the creation of 'self-sufficient groupings of troops' in occupied Ukraine; the formation of a new army corps, three new motorized rifle divisions and two new air assault divisions; and the reorganization of seven motorized rifle brigades into motorized rifle divisions.⁹ Russia is already implementing these changes at the military district level, creating new formations at echelons ranging from brigade level to army level, and has already deployed several such formations to Ukraine.¹⁰

Current Russian military district-level reforms are intended to remedy command and control (C2) challenges by more tightly defining and consolidating C2 headquarters and areas of responsibility (AoRs). On 26 February 2024, Russia's president, Vladimir Putin, officially disbanded the WMD and split its strategic AoR between the reformed Moscow and Leningrad military districts.¹¹ This formalized the initial plans announced by Shoigu a year earlier.

The WMD's strategic focus had previously stretched between Ukraine's northeastern border, Belarus, the Baltic states and Finland.¹² The Northern Fleet covered the rest of Russia's borders with northeastern Finland, Norway and the Arctic. The new Moscow Military District (MMD) will now cover northeastern Ukraine, and is intended to streamline C2 for the war in Ukraine; meanwhile,

⁸ Axe, D. (2024), 'The Clock Is Ticking As Ukraine Destroys More Russian Vehicles, Faster. The Kremlin Could Run Out Of Fighting Vehicles In Six Months', *Forbes*, 4 February 2024, <https://www.forbes.com/sites/davidaxe/2024/02/04/the-clock-is-ticking-as-ukraine-destroys-more-russian-vehicles-faster-the-kremlin-could-run-out-of-fighting-vehicles-in-six-months/?sh=7ea18662c5e2>; and Michel, Y. and Gjerstad, M. (2024), 'Equipment losses in Russia's war on Ukraine mount', International Institute for Strategic Studies, 12 February 2024, <https://www.iiss.org/online-analysis/military-balance/2024/02/equipment-losses-in-russias-war-on-ukraine-mount>.

⁹ Russian Ministry of Defence, via Telegram, (2023), 'Министр обороны РФ провел совещание по вопросам увеличения численности Вооруженных Сил РФ' [The Minister of Defense of the Russian Federation held a meeting on increasing the size of the Armed Forces of the Russian Federation], 17 January 2023, https://t.me/mod_russia/23498.

¹⁰ Hird, K. (2023), 'Russia's Military Restructuring and Expansion Hindered by the Ukraine War', Institute for the Study of War, 12 November 2023, <https://www.understandingwar.org/backgrounder/russia%E2%80%99s-military-restructuring-and-expansion-hindered-ukraine-war>.

¹¹ TASS (2024), 'Путин воссоздал Московский и Ленинградский военные округа' [Putin recreated the Moscow and Leningrad military districts], 26 February 2024, <https://tass.ru/armiya-i-opk/20085959>.

¹² RBK RU (2010), 'Подписан указ о слиянии ЛенВО с Московским военным округом' [A decree was signed on the merger of the Leningrad Military District with the Moscow Military District], 21 September 2010, https://www.rbc.ru/spb_sz/21/09/2010/559298c79a794719538c0143.

the Leningrad Military District (LMD) is meant to provide an anti-NATO posture following the accession of both Finland and Sweden to the alliance.¹³

Putin's February 2024 decree also announced the absorption of the four partially Russian-occupied Ukrainian oblasts into the Southern Military District (SMD), a move likely to tighten C2 links with Russian units in occupied Ukraine. The wording of Shoigu's original announcement about the formation of 'self-sufficient groupings of troops' in occupied Ukraine suggests that Russia seeks to establish a permanent basing and command infrastructure *within Ukraine*.¹⁴

Russia is also creating entire new formations below the military district level, many of which have already rapidly deployed to Ukraine to replenish forces following front-line losses. For example, the 25th Combined Arms Army (CAA) was established in the Russian Far East in mid-May 2023.¹⁵ Elements from the 25th CAA – including the 67th Motorized Rifle Division and 164th Motorized Rifle Brigade – have been fighting alongside other unnamed regiment-level formations of the 25th CAA on the border between Kharkiv and Luhansk oblasts since at least September 2023.¹⁶

The 25th CAA's rapid deployment to this axis allowed some Central Military District and Airborne Forces (VDV) elements to redeploy laterally to other critical axes to support Russian defensive operations in southern Ukraine and offensive preparations near Avdiivka, in Donetsk Oblast.¹⁷ Russia also formed the 18th CAA in occupied Crimea as part of the SMD in around June 2023.¹⁸ Elements of the 18th CAA have been committed in Kherson Oblast since the summer of 2023 in an attempt to prevent Ukrainian forces from establishing an enduring presence in east (left) bank Kherson Oblast.¹⁹

Russia additionally formed the 104th VDV Division – a fifth VDV division – in 2023.²⁰ The 104th VDV Division has been deployed in Kherson Oblast, alongside elements of the 18th CAA, likely since the summer of 2023. UK military intelligence

¹³ Sokirko, V. (2023), 'Сработал план Шойгу. Москве вернули военный округ' [Shoigu's plan worked. Moscow gets back its military district], *AIF RU*, 2 June 2023, https://aif.ru/society/army/srabotal_plan_shoygu_moskve_vernuli_voennyi_okrug.

¹⁴ Russian Ministry of Defence (2023), 'Министр обороны России провел совещание по вопросам увеличения численности Вооруженных Сил РФ' [Russia's Minister of Defence held a meeting on increasing the size of the Armed Forces of the Russian Federation], press release, 17 January 2023, https://function.mil.ru/news_page/country/more.htm?id=12451669.

¹⁵ People of Baikal via Telegram (2023), 'В России «возрождают» 25-ю армию, которая воевала в Великой Отечественной войне. Туда начали вербовать офицеров из Бурятии и срочников из Иркутской области' [The 25th Army, which fought in the Great Patriotic War, is being revived in Russia. They began to recruit officers from Buryatia and conscripts from Irkutsk Oblast], 17 May 2023, https://t.me/Baikal_People/2529; and Mikhailov, D. (2023), 'На Купьянскому напрямую РФ не наращуе силы, а проводить ротацию — Буданов' [The Russian Federation is not building up its forces in the Kupyansk direction but conducting a rotation — Budanov], *Suspilne*, 1 September 2023, <https://suspilne.media/563677-na-kupianskomu-napramku-rf-ne-narosue-sili-a-provodit-rotaciu-budanov>.

¹⁶ Nakhimov, S. (2023), 'Новая 25-я армия России: формирование частей на Дальнем Востоке и участие в спецоперации на Украине. Мнение' [The new 25th army of Russia: formation of units on the Far East and participation in the special operation in Ukraine, Opinion], *AMALNEWS*, 3 August 2023, <https://amalantra.ru/25-armiya-rossii>.

¹⁷ Mikhailov (2023), 'На Купьянскому напрямую РФ не наращуе силы, а проводить ротацию — Буданов'.

¹⁸ Nakhimov, S. (2023), '18-я Крымская общевойсковая армия Сухопутных войск России с двумя армейским корпусами' [The 18th Crimean Combined Arms Army of the Russian Ground Forces with two army corps], *AMALNEWS*, 22 August 2023, <https://amalantra.ru/18-armiya-rossii>.

¹⁹ Nakhimov (2023), '18-я Крымская общевойсковая армия Сухопутных войск России с двумя армейским корпусами'; and Andriyushchenko, P. via Telegram (2023), 'Кринки. Херсонська область. 26-й мотострілецький полк в/ч 12267' [Krynky, Kherson Oblast, 26th Motorized Rifle Regiment, military unit 12267], 21 January 2024, <https://t.me/andriyshTime/17300>.

²⁰ *Izvestia* (2023), 'Источник раскрыл сроки воссоздания 104-й гвардейской дивизии в ВДВ' [A source revealed the timing of the re-establishment of the 104th Guards Division in the Airborne Forces], 14 August 2023, <https://iz.ru/1558640/2023-08-14/istochnik-raskryl-sroki-vozzozdaniia-104-i-gvardeiskoi-divizii-v-vedv>.

reported in December 2023 that the division suffered 'exceptionally heavy losses' during its combat debut in Krynky, Kherson Oblast due to the inexperience of its troops.²¹ The VDV's commander, Colonel General Mikhail Teplinsky, intimated in December 2023 that the April 2023 graduate cohort from the Ryazan Higher Airborne Command School had deployed with the 104th VDV Division before the intended autumn deployment date, and that this cohort had likely skipped training to deploy to Krynky.²²

Prospects for Russian military regeneration and adaptation

The continued requirements of maintaining the war in Ukraine limit the Russian Armed Forces' scope for fully integrating lessons learned and capitalizing on ongoing reforms. Individual Russian units and formations, up to the army echelon, are undoubtedly learning lessons, innovating and adapting in Ukraine, and the Russian military command is gaining a valuable sample set of *lessons observed*. It remains to be seen, however, whether the Russian command can *internalize, institutionalize and disseminate* these lessons throughout the entire force. For now, the West has the opportunity to observe the ways in which Russian forces are either adapting to or being constrained by the contemporary battlefield situation. This could further help Ukraine to exploit gaps and weaknesses both in Russia's overall project of military regeneration and in the ability of Russian units to adapt on the battlefield. In contrast, a Russian force that had learned, internalized and institutionalized lessons from the conflict in Ukraine would be an even more serious adversary than has been the case to date.

This is a point particularly worth noting by Ukrainian and Western military planners because, as mentioned, systemic weaknesses have not universally translated into Russian combat failures. Military learning and adaptation remain siloed in individual formations and army commands, despite the fact that individual formations have proven resilient and flexible in learning from battlefield mistakes. The 58th CAA, for example, employed doctrinally sound defensive tactics against the Ukrainian counteroffensive in Zaporizhzhia Oblast in the summer of 2023. The 58th CAA prepared strong defensive lines in the south, and conducted 'elastic' defensive manoeuvres that contributed to the ultimate failure of the Ukrainian counteroffensive; this allowed the 58th CAA to regain the initiative and then pursue its own localized offensive in southern Ukraine.²³

²¹ Ministry of Defence (@DefenceHQ) via X (formerly Twitter) (2023), 'Latest Defence Intelligence update on the situation in Ukraine, 14 December 2023', <https://twitter.com/DefenceHQ/status/1735224074391998689?s=20>.

²² Evans, A. et al. (2023), 'Russian Offensive Campaign Assessment, December 23, 2023', Institute for the Study of War, 23 December 2023, <https://www.understandingwar.org/backgroundunder/russian-offensive-campaign-assessment-december-23-2023>.

²³ Bigg, M. (2023), 'Russian Troops Cede Ground and Strike Back, Frustrating Ukraine's Counteroffensive', *New York Times*, 3 October 2023, <https://www.nytimes.com/2023/10/03/world/europe/russia-ukraine-elastic-defense-counteroffensive.html>; and Russian Ministry of Defence via Telegram (2023), 'Подробности ночного боя на Запорожском направлении. С передовой докладывает командующий 58-й армией ЮВО генерал-майор Иван Попов' [Details of the night battle in the Zaporizhzhia direction. Major General Ivan Popov, commander of the 58th Army of the Southern Military District, reports from the front line], 8 June 2023, https://t.me/mod_russia/27226.

Put another way, the West's chronic under-resourcing of Ukrainian forces has essentially allowed Russian forces free rein to experiment militarily and gain combat experience on a wide scale against a NATO-supplied adversary. Russian forces are currently able to pursue offensive operations uncontested throughout most of the Ukrainian theatre. Ominously, the lessons that Russian forces have the opportunity to learn under these circumstances might also assist Russia in a potential future large-scale conventional war against NATO.

The West's chronic under-resourcing of Ukrainian forces has essentially allowed Russian forces free rein to experiment militarily and gain combat experience on a wide scale against a NATO-supplied adversary.

That said, Russia's ability to exploit this knowledge is hampered by several factors.

First, Russia's command culture – embodied in the approaches taken both by former defence minister Shoigu and by the chief of the General Staff, Army General Valery Gerasimov – prioritizes pushing forward and attacking everywhere along the entire front line at all times. This is in contrast to concentrating on meaningful penetration of the adversary's defences, on breaking through into Ukrainian-held terrain, and on exploiting any achieved penetration in one operationally significant area. The current Russian command culture also punishes failure, and in some cases honesty, if either is inconvenient to the perceptions of the military leadership. This encourages the development of a cadre of incompetent but loyal leaders endemically resistant to learning and adapting.²⁴

An example of this culture occurred in July 2023, when the Russian high command dismissed the commander of the 58th CAA, Major General Ivan Popov, after Popov had reportedly expressed grievances over the lack of support and rotations for troops defending positions against the Ukrainian counteroffensive in Zaporizhzhia Oblast.²⁵ Popov's firing undermined the Russian command's ability to internalize valuable lessons learned by the 58th CAA in southern Ukraine and disseminate them among the wider force.

Second, the practice of rapidly committing under-strength and undertrained new formations to Ukraine is inhibiting Russian forces' ability to take the time to integrate battlefield lessons into wider force reforms. This practice undermines Russia's investment in rebuilding and restoring existing formations to make them more self-sustaining and capable in the long term, and it limits the utility of reforms in the short term.

²⁴ Bailey, R. and Stepanenko, K. (2023), 'Russian Offensive Campaign Assessment, April 30, 2023', Institute for the Study of War, 30 April 2023, <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-april-30-2023>.

²⁵ Gurulev, A. (2023), 'Командующего 58-й армией Ивана Попова отстранили за критику Минобороны РФ. Вот что он сказал своим подчиненным' [The commander of the 58th Army, Ivan Popov, was suspended for criticizing the Russian Ministry of Defence. Here's what he told his subordinates], *Meduza*, 13 July 2023, <https://meduza.io/feature/2023/07/13/komanduyuschego-58-y-armiey-ivana-popova-otstranili-za-kritiku-minoborony-rf-vot-chto-on-skazal-svoim-podchinennym>.

Rapid deployment of new formations into existing command AoRs further blurs already complicated C2 distinctions on the ground in Ukraine. It is often unclear where the lines between military-district and group-of-forces command lie, and deploying a new army-level formation into a certain AoR may have tactical-to operational-level impacts on C2 in that AoR. Russian forces have the opportunity to learn and refine sound C2 practices, but have not displayed a propensity to do so thus far.

Finally, current Russian force structure and tactics on the battlefield have eroded distinctions between the size and structure of units of various echelons.²⁶ This practice means that most front-line and currently forming units essentially operate as under-strength and low-quality motorized rifle units. This has prevented Russian forces from gaining experience of conducting sound conventional combined-arms operations at scale.

Russian forces have, however, displayed a propensity to integrate certain technological capabilities. This has implications for regeneration and adaptation efforts, as it could result in Russian forces being better prepared for future wars. Russian forces' competent use of electronic warfare (EW) and drones contributed to the failure of Ukraine's 2023 counteroffensive. Russian forces have also been able to innovate in their use of long-range strike packages to exploit gaps in Ukraine's air defence umbrella, maximizing the effectiveness of Russia's front-line and rear-area strike campaigns.²⁷

Lessons and policy implications for the US and NATO

Russian forces are facing constraints on learning, adaptation and restructuring in the short term because of the way they are fighting in Ukraine. Western military planners would do well to remember that these constraints are not indefinite, however. Russia's military, if allowed the time and breathing space to do so, could yet take the opportunity to start overcoming its many systemic challenges while exhausting Ukrainian forces and weakening them by attrition.²⁸

Russian force generation efforts will continue to deliver sufficient manpower to compensate for the existing rate of losses, provided the Russian economy and defence industrial base can keep up. Shoigu stated in his January 2023 address that Russia plans to increase the size of its military to 1.5 million personnel (from 1.35 million in 2022).²⁹ In the coming years, force generation and training capacity will likely increase, alongside the planned increase in personnel, irrespective

²⁶ Watling, J. and Reynolds, N. (2023), *Meatgrinder: Russian Tactics in the Second Year of Its Invasion of Ukraine*, Research Paper, London: Royal United Services Institute, <https://static.rusi.org/403-SR-Russian-Tactics-web-final.pdf>.

²⁷ Bailey, R. and Kagan, F. (2024), *SPECIAL REPORT: RUSSIAN STRIKES MORE EFFECTIVE AS UKRAINE EXHAUSTS DEFENSES*, Washington D.C.: Institute for the Study of War, 12 April 2024, <https://www.understandingwar.org/backgrounder/special-report-russian-strikes-more-effective-ukraine-exhausts-defenses>.

²⁸ Ryan, M. (2024), 'Russia's Adaptation Advantage', *Foreign Affairs*, 5 February 2024, <https://www.foreignaffairs.com/ukraine/russias-adaptation-advantage>.

²⁹ Russian Ministry of Defence (2023), 'Министр обороны России провел совещание по вопросам увеличения численности Вооруженных Сил РФ'.

of any additional partial mobilization waves that Putin has the power to call up. The implication is that the Russian army could become much larger and more competent – and thus a more formidable adversary – within the current decade if Russian forces continue to operate unimpeded in Ukraine, and if Ukrainian forces are unable to challenge that growth with the aid of proper Western resourcing.

The wider message for Western policymakers is the importance of observing the Russian military carefully and not underestimating its capacity to learn and adapt. The longer Russian forces can hold the initiative uncontested in Ukraine, the better they can rebuild their forces and learn. Put another way, Ukraine perhaps is now fighting a smaller-scale version of the war that Russia may be preparing to fight against NATO within the next 10 years. This understanding needs to fundamentally shape NATO and Western planning and policy in the coming decade.

03

Ground forces

Russia's ground-based offensive capabilities may continue to become degraded, but its forces can still make it difficult for Ukrainian troops to advance from strong defensive positions. Expecting that the Russian ground forces will simply collapse at some point due to heavy losses is not a safe assumption.

Rob Lee

Of all of Russia's armed services, its Ground Forces³⁰ have been the most heavily committed in the war on Ukraine. These forces have also sustained the heaviest losses, both to personnel and equipment. As a result, their ability to regenerate will depend to an even greater extent on how and when the Russia–Ukraine war ends than is likely with the other services. While Russia has improved its manpower situation by recruiting many volunteers, equipment losses are likely to prove more difficult to sustain. Russian forces also struggle to conduct combined-arms operations beyond the company level effectively. Nonetheless, capabilities have improved in reconnaissance, precision-guided munitions and dynamic targeting.

State of play

One of the most significant factors in the Russia–Ukraine war in 2023 was Russia's success in improving the manpower situation in its various ground forces. In 2022, manpower was the most acute problem for the Russian military in Ukraine, and was a key factor behind Ukraine's successful offensives in Kherson and Kharkiv oblasts. After mobilizing 300,000 personnel in the autumn of 2022, Russian officials reportedly set a target of recruiting 400,000 volunteer soldiers in 2023.³¹ While that figure is unlikely to have been reached, Russia probably managed to recruit 300,000 or more soldiers last year, sufficient to make up for losses and

³⁰ The author of this chapter uses the term 'Russian Ground Forces' or 'Ground Forces' when specifically addressing the Russian Army and its subordinate elements, and lower case 'ground forces' as a broader term when mentioning the Russian Ground Forces, Airborne Forces (VDV), naval infantry and other formations.

³¹ Sergeev, I. (2023), 'Российские власти готовятся к набору 400 тысяч контрактников' [Russian authorities are preparing to recruit 400 thousand contract soldiers], Ura, 10 March 2023, <https://ura.news/articles/1036286412>.

generate new units for its winter offensive.³² The primary motivation for many volunteers is financial. New-contract soldiers are offered a signing bonus and a starting monthly salary of R204,000 (US\$2,280 as of 3 June 2024)³³ or higher depending on the position.³⁴ This is more than twice the average salary in Russia as a whole, and more than five times the average in some regions. Signing bonuses have increased even further in 2024, reaching more than \$15,000 in some cases. As a result, the Russian military began 2023 with approximately 360,000 soldiers in Ukraine, but had an estimated 460,000–470,000 in the country at the beginning of 2024.³⁵ Russia reportedly continued to recruit an estimated 30,000 contract soldiers per month at the beginning of 2024, likely sufficient to sustain the current rate of assaults.³⁶ However, it is unclear whether Russia will be able to sustain this rate of recruitment of volunteers. According to an announcement in December 2022 by Sergei Shoigu, at the time Russia's minister of defence, the ambition is to increase the size of the overall Russian Armed Forces to 1.5 million personnel.³⁷

Nonetheless, the quality of Russia's ground forces varies considerably. This is partially a consequence of the delay in announcing mobilization in 2022, which led to the formation of a variety of volunteer, paramilitary and regular units in response to Russia's manpower shortage. Russia now has a disparate force. This includes the 1st and 2nd Army Corps – previously part of the Russian proxy Luhansk and Donetsk People's Republics – which have now been formally incorporated into the Russian Ground Forces. There are also BARS reserve units, volunteer battalions, Storm Z and V units made up of convicts, and varied paramilitary units, some of which operate under the aegis of the GRU, Russia's military intelligence agency.³⁸ The organization and subordination of these units often change.³⁹

This has contributed to a lack of standardization across Russia's ground forces, and units are often sent piecemeal to different parts of the front; this exacerbates coordination and command and control issues. Russia's elite naval infantry, Airborne Forces (VDV) and *spetsnaz* (special operations forces) units are still a priority for the supply of equipment; they also receive higher-quality soldiers who are given more training before deployment into combat. Even though these units incorporated

³² Estonian Foreign Intelligence Service (2024), *Russia's Lessons from the War in Ukraine: Force Generation and Reinforcement on the Ukrainian Front*, p. 14, <https://raport.valisluureamet.ee/2024/en/1-russian-armed-forces-and-the-war-in-ukraine/1-1-russias-lessons-from-the-war-in-ukraine-force-generation-and-reinforcement-on-the-ukrainian-front>.

³³ *Financial Times* (2024), 'Currencies: Russian Rouble/US Dollar FX Cross Rate', <https://markets.ft.com/data/currencies/tearsheet/summary?s=RUBUSD> (accessed 3 June 2024).

³⁴ Rustamova, F. (2023), 'How Russian Officials Plan to Recruit 400K New Contract Soldiers in 2024', *Moscow Times*, 22 December 2023, <https://www.themoscowtimes.com/2023/12/22/how-russian-officials-plan-to-recruit-400k-new-contract-soldiers-in-2024-a83509>.

³⁵ Watling, J. and Reynolds, N. (2024), 'Russian Military Objectives and Capacity in Ukraine Through 2024', RUSI Commentary, Royal United Services Institute, 13 February 2024, <https://www.rusi.org/explore-our-research/publications/commentary/russian-military-objectives-and-capacity-ukraine-through-2024>.

³⁶ Denisova, K. (2024), 'HUR: Russia Mobilizing Around 30,000 Soldiers Monthly', *Kyiv Independent*, <https://kyivindependent.com/hur-russia-mobilizing-around-30-000-soldiers-monthly>; and Ministry of Defence (@DefenceHQ) via X (formerly Twitter) (2024), 'Latest Defence Intelligence update on the situation in Ukraine – 30 March 2024', 30 March 2024, <https://x.com/DefenceHQ/status/1774049069322682668>.

³⁷ Associated Press (2022), 'Russian military announces plan to expand, create new units', 21 December 2022, <https://apnews.com/article/putin-finland-sergei-shoigu-ee953abf7f9bf217ccdaa61ec1b35ddd>.

³⁸ Schemes and Systema, (2023), 'How Russia's GRU Set Up A Fake Private Military Company For Its War In Ukraine', Radio Free Europe/Radio Liberty, 10 October 2023, <https://www.rferl.org/a/russia-gru-fake-private-military-company-ukraine-redut-investigation/32630705.html>.

³⁹ Fokht, E. et al. (2023), 'Part-time army: Who controls the Russian irregular forces fighting in Ukraine?', BBC research, BBC, 20 November 2023, <https://www.bbc.com/russian/news-67454788>.

newly mobilized personnel in 2022–23, and their overall quality has decreased, they remain effective. It is a similar picture for some motorized rifle and tank units. However, a significant share of Russia's ground forces consists of regiments of territorial troops; these regiments were initially formed with mobilized soldiers and are a lower priority for receipt of training, experienced leaders and high-quality equipment. Battalions and companies from territorial regiments have been attached piecemeal to regular motorized rifle units; in some cases, such units are used to replenish the ranks of motorized rifle regiments that have incurred combat losses.

Equipment losses have become the greater problem. Russian assaults are often limited in size by the number of soldiers who can fit on top of tanks or armoured vehicles.

Heavy attrition among officers has also forced Russia to rapidly promote junior officers and condense the training for cadets. These factors, along with limited individual and unit training, have exacerbated the inability of Russian units to conduct effective combined-arms operations above the company level. The military leadership has responded by introducing greater specialization through the establishment of semi-permanent and permanent assault and storm units, which receive more training and better equipment. Initially, this programme involved the introduction of storm detachments or companies in each regiment or brigade, and then the assignment of one company per battalion to assault operations. But Russia has also formed assault battalions and is now reportedly forming assault brigades.⁴⁰ This was in part a response to the varied quality of Russian forces in 2023, many of which were insufficiently trained or equipped for assaults. Naval infantry and VDV units remain more capable of assault operations, but they are too few in number to meet Russia's offensive demands and have also been used for defending key parts of the front line. As a result, Russia continues to rely on Storm Z and V convict units as well as territorial-troop formations for assaults as well, often in conjunction with more elite VDV or regular storm units. Given these force quality issues, Russian units typically require a significant advantage in manpower, artillery and aviation to overcome Ukrainian defences. Although Russia has been able to sustain its personnel losses since the autumn of 2023, the war's demands limit the amount of training that new units receive.

Equipment losses have become the greater problem. Russian assaults are often limited in size by the number of soldiers who can fit on top of tanks or armoured vehicles. Significant armour losses have resulted in Russian units relying on older T-62 and T-55 tanks for transporting infantry into assaults. Western officials estimate that Russia can likely 'generate' an additional 100–125 tanks per month, but this primarily consists of refurbishing Soviet-era tanks and armoured

⁴⁰ Kretsul, R. and Ramm, A. (2023), 'Системный взлом: в ВС России появится новый тип бригад' [System hack: a new type of brigade will appear in the Russian Armed Forces], *Izvestia*, 25 September 2023, <https://iz.ru/1578825/roman-kretsul-aleksei-ramm/sistemnyi-vzлом-v-vs-rossii-poiavitsia-novyy-tip-brigad>.

vehicles retrieved from storage.⁴¹ In contrast, Russia produces perhaps only 15 T-90M tanks – a more modern design – per month.⁴² Russia still has armour in its stockpiles, but the longer the war progresses, the more shortages are likely further to constrain the size and number of assaults that Russia can conduct across the front line. In some cases, Russia has responded to this problem by forming motorized rifle battalions and other units equipped with unarmoured vehicles. In other cases, Russian units will have to be supported with armoured vehicles from adjacent units for assaults. This trend is likely to continue.

The Russian Ground Forces are still an artillery-dominant force, and their quantitative advantage in ammunition and number of artillery pieces available remains a critical factor on the battlefield. The reconnaissance-fire complex has also improved.⁴³ The Russian military began the war with too few uncrewed aerial vehicles (UAVs) and precision-guided munitions, and struggled with dynamic targeting. But greater quantities of Orlan, Zala and Supercam-series UAVs now provide persistent coverage behind Ukrainian lines, while widescale adoption of commercial UAVs (mostly DJI Mavics) has drastically improved Russian surveillance of the front line. Krasnopol laser-guided artillery rounds are also being employed in larger quantities, along with Orlan-30 UAVs that can laser-designate targets for them.

For targets at operational depths, Russia is achieving greater success pursuing dynamic targets with Iskander-M ballistic missile systems, Tornado-S multiple-launch rocket systems and Lancet loitering munitions, the latter of which have increased range. Russia has increased production of missiles for the Iskander-M system and continues to improve the Lancet, which has become Russia's primary counterbattery weapon. Lancets were initially only employed by units from Russia's Special Operations Forces (SSO), but they are now available to a variety of conventional forces, and their production has expanded. In 2023, Russian forces also began to procure and employ kamikaze first-person-view (FPV) UAVs at scale, and this led to Russia achieving a quantitative advantage in such UAVs along key parts of the front line by the autumn of 2023. These strike UAVs provide a greater capability in terms of organic precision fires at the tactical level, complementing the use of artillery and enabling ground units to defeat armour and other targets. Russia will likely continue its procurement of UAVs in larger quantities, while improving their capabilities and battlefield employment. Overall, Russia's intelligence, surveillance, target acquisition, reconnaissance and precision fires capabilities have improved at the operational and tactical level, and will likely continue to develop.

⁴¹ Ministry of Defence (@DefenceHQ) via X (formerly Twitter) (2024), 'Latest Defence Intelligence update on the situation in Ukraine – 29 January 2024', 29 January 2024, <https://twitter.com/DefenceHQ/status/1751898118436655191>; and Bo Lillis, K. et al. (2024), 'Exclusive: Russia Producing Three Times More Artillery Shells than US and Europe for Ukraine', CNN, 11 March 2024, <https://www.cnn.com/2024/03/10/politics/russia-artillery-shell-production-us-europe-ukraine/index.html>.

⁴² Zayvoronok, V. (2024), 'ГУР дізналося плани і спроможності росії щодо модернізації та виробництва танків' [HUR learned about Russia's plans and capabilities for the modernization and production of tanks], *Armiya Inform*, 11 March 2024, <https://armyinform.com.ua/2024/02/16/gur-diznalosya-plany-i-spromozhnosti-rosiyi-shhodo-modernizacziyi-ta-vyrobnycztva-tankiv>.

⁴³ Grau, L. and Bartles, C. (2018), *The Russian Reconnaissance Fire Complex Comes of Age*, Report, Oxford: University of Oxford Changing Character of War Centre, 30 May 2018, <https://www.cw.ox.ac.uk/blog/2018/5/30/the-russian-reconnaissance-fire-complex-comes-of-age>.

Other branches of the Russian Ground Forces continue to play an important role in the war. The engineer troops build robust defences, extensively using mines, as well as employing pontoon bridges and ferries in support of manoeuvre forces.⁴⁴ After coordination problems at the beginning of the war, the Ground Forces Air Defence Troops (PVO-SV) have improved. They have had success countering HIMARS GMLRS munitions and other missiles; however, friendly fire against Russian aviation has been a critical problem, and continued losses of Buk- and Tor-series air defences could degrade the PVO-SV's capabilities.⁴⁵ Russian logistics were a significant problem at the beginning of the invasion as well; this, too, was largely a result of the lack of time to prepare and the number of axes of advance. Russia's material-technical support troops have adapted throughout the war, including to the threat posed by HIMARS multiple-launch rocket systems, and this has enabled Russian artillery to sustain a very high expenditure rate. Electronic warfare (EW) troops provide an important capability as well. EW jamming of GPS capabilities has reduced the effectiveness of Western-provided precision-guided munitions such as the Excalibur, GMLRS and JDAM. EW systems play a critical role in locating targets for Russian fires, disrupting Ukrainian tactical communications, and – arguably most importantly – countering Ukrainian FPV and other UAVs. Notably, personnel from support branches such as EW troops and the PVO-SV generally sustain fewer casualties and are a higher priority for receiving technically capable recruits, and so will likely continue to improve and institutionalize lessons from the war.

Structural changes and regeneration prospects

The regeneration of Russia's ground forces will be highly dependent on how and when the war in Ukraine ends. Aside from conscripts, the majority of Russia's ground units are deployed to Ukraine or near the Russia–Ukraine border. The longer the war lasts, the longer most of Russia's ground forces will be tied down in or near Ukraine, and the more difficult it will be to regenerate them given higher casualties and limited time to conduct unit training at the battalion level or higher. Russian ground forces now have a large pool of manpower, but the quality of this pool varies. Many mobilized men and volunteers are in their 40s or older, and many are in poor physical shape or have health problems. Furthermore, it is unclear how long financial incentives will be sufficient to recruit large numbers of volunteers each month. At some point, Russia may need to conduct another round of mobilization, particularly if the military leadership intends to sustain the current pace of costly offensive operations. As with equipment, manpower could become a limiting factor in the coming years, hindering future offensives. Russia is experiencing a national labour shortage, with the unemployment rate at less than 3 per cent.⁴⁶ Furthermore, heavy losses from the current pace of offensive operations will make it more difficult for Russia to form newly announced units.

⁴⁴ Watling, J. and Reynolds, N. (2023), *Meatgrinder: Russian Tactics in the Second Year of Its Invasion of Ukraine*, Special Report, London: Royal United Services Institute, 19 May 2023, pp. 9–10, <https://www.rusi.org/explore-our-research/publications/special-resources/meatgrinder-russian-tactics-second-year-its-invasion-ukraine>.

⁴⁵ *Ibid.*, pp. 20–21.

⁴⁶ Marrow, A. and Korsunskaya, D. (2023), 'Russian industrial output growth slows as unemployment drops to record low', Reuters, 29 November 2023, <https://www.reuters.com/markets/russian-industrial-output-growth-slows-unemployment-drops-record-low-2023-11-29>.

The length of the war will also affect how the ground forces continue to develop. This will partly determine structural changes, as well as priorities for defence production and spending. For example, the semi-permanent structure of assault units may make sense during wartime, but not necessarily in a peacetime military. Additionally, future procurement will likely give preference to quantity over quality given high rates of losses from the war and the need to equip new units. Instead of procuring the Armata, Kurganets-25 and Bumerang families of tanks, infantry fighting vehicles and armoured personnel carriers in large numbers, Russia will likely opt to prioritize procurement of larger quantities of existing vehicles such as the T-72B3, BMP-3 and BTR-82, but with additional modernizations. Similarly, Russia's artillery will be dominated by Soviet-era systems, in preference to the new Koalitsiya-SV, for the foreseeable future given the need to make up losses and equip new units. The share of light units equipped primarily with unarmoured or lightly armoured vehicles is likely to grow.

Many of the new or reinforced formations will be based in the Leningrad, Moscow or Southern military districts, but it is unclear if or when Russia can assemble sufficient manpower, leadership and equipment to actually form these units.

Announced structural changes include: the re-establishment of the Leningrad and Moscow military districts; the ending of the independent status of the Western Military District and Northern Fleet; the reinforcement of the 11th and 14th Army Corps into armies; and the formation of the 18th and 25th Combined Arms Armies and the 3rd and 40th Army Corps. In March 2024, Shoigu announced that another new army corps (likely the 44th, which is already in action in Kharkiv), two additional combined-arms armies, a motorized rifle division, 14 other divisions and 16 brigades would be formed this year.⁴⁷ Many of the new or reinforced formations will be based in the Leningrad, Moscow or Southern military districts, but it is unclear if or when Russia can assemble sufficient manpower, leadership and equipment to actually form these units. Russia may transfer personnel from territorial-troop regiments to create the new formations, but these would not be properly equipped to serve as motorized rifle or tank units. Russia is continuing to prioritize the creation of divisions and regiments instead of brigades. It is forming or strengthening tank units, and reinforcing or forming new artillery units, including five high-power artillery brigades with heavy 2S7M Malka artillery and 2S4 Tyulpan mortars.⁴⁸

⁴⁷ BMPD (2024), 'Шойгу на заседании Коллегии Министерства обороны Российской Федерации' [Shoigu at a meeting of the Board of the Ministry of Defence of the Russian Federation], 20 March 2024, <https://bmpd.livejournal.com/4812197.html>.

⁴⁸ Ramm, A. and Stepovoy, B. (2023), 'Бригады подряд: ВС РФ усилят артиллерийские соединения большой мощности' [More and more brigades: the Russian Armed Forces will strengthen high-power artillery formations], *Izvestia*, 29 November 2023, <https://iz.ru/1612479/aleksei-ramm-bogdan-stepovoi/brigady-podriad-vs-rf-usiliat-artilleriiskie-soedineniia-bolshoi-moshchnost>.

The Russian military is likely to have drawn the lesson that this war has been manpower-intensive, and to have identified the lack of well-trained infantry as a key problem. The authorized strength of Russian motorized rifle battalions was reduced before the war, and each tank regiment had its motorized rifle battalion reduced to a company. Each regiment and brigade is supposed to be able to form two battalion tactical groups (BTGs) using contract soldiers, but many battalions began the war significantly under-strength. This meant that Russian BTGs were often unable to perform their tasks, especially after sustaining losses. Furthermore, Russian motorized rifle units struggled to perform in a dismounted role, and BTGs lacked sufficient command and control to properly employ their combined-arms assets.⁴⁹ Ultimately, this forced Russia to rely heavily on naval infantry, VDV and even *spetsnaz* units to perform these missions, but they were too few in number. Russia responded to this problem by increasing the size of squads and battalions, and by adding a fourth battalion to some regiments. Compared to the apparent authorized strength of approximately 345 personnel before the invasion, some new motorized rifle battalions have more than 500 personnel.⁵⁰ BTGs proved to be too small to handle losses and remain in the fight, and they lacked sufficient command and control to employ their attached assets properly. Russia is likely to re-evaluate the BTG concept after the war.

Russia is also strengthening the naval infantry and VDV. In 2022, as defence minister, Shoigu announced plans to turn each of Russia's five naval infantry brigades into divisions⁵¹ – the 55th Naval Infantry is already in the process of being formed from the 155th Naval Infantry Brigade. Compared to brigades, the shift to divisions will improve command and control, logistics and organic artillery capabilities. The VDV is also being strengthened, with plans under way to form two air assault divisions (the 104th Air Assault Division has already been established, based on the 31st Air Assault Brigade), add a third regiment to the 106th and 98th Airborne Divisions, and establish an artillery brigade.⁵² The purpose of the VDV is being rethought as well. The airborne-capable BMD armoured vehicles are insufficiently armoured for ground combat, and VDV units have been receiving BMPs and forming additional tank battalions. Russia has brought back plans to strengthen the VDV with a helicopter brigade equipped with Ka-52M, Mi-28MN and Mi-8AMTSH-VN helicopters.⁵³ Russia has also begun re-establishing air assault brigades in the Ground Forces; these brigades are capable of conducting helicopter-based operations.⁵⁴ While heliborne air assault remains a priority, the VDV may deprioritize its airborne capabilities in order to better structure itself for assault operations. Of course, expanding the size of elite units risks lowering their standards and quality.

⁴⁹ Watling and Reynolds (2023), *Meatgrinder*, p. 3.

⁵⁰ Kofman, M. and Lee, R. (2022), 'Not Built for Purpose: The Russian Military's Ill-Fated Force Design', War on the Rocks Commentary, 2 June 2022, <https://warontherocks.com/2022/06/not-built-for-purpose-the-russian-militarys-ill-fated-force-design>.

⁵¹ Russian Ministry of Defence (2022), 'В Москве под руководством Верховного Главнокомандующего ВС РФ Владимира Путина прошло расширенное заседание Коллегии Минобороны России' [An extended meeting of the Board of the Russian Ministry of Defence was held in Moscow under the leadership of the Supreme Commander-in-Chief of the Armed Forces Vladimir Putin], 21 December 2022, https://function.mil.ru/news_page/country/more.htm?id=12449212.

⁵² *Ibid.*

⁵³ Ramm, A. and Stepovoy, B. (2023), 'Силы с небес: ВДВ усилят танками и вертолетами' [Forces from the Sky: the Airborne Forces will be reinforced with tanks and helicopters], *Izvestia*, 2 October 2023, <https://iz.ru/1582538/aleksei-ramm-bogdan-stepovoi/sily-s-nebes-vdv-usiliat-tankami-i-vertoletami>.

⁵⁴ Mikhailov, A. et al. (2024), 'Вмять штурмом: зачем в Сухопутных войсках воссоздают десантные бригады' [Stormed: Why Are Airborne Brigades being recreated in the Ground Forces], *Izvestia*, 9 April 2024, <https://iz.ru/1678690/aleksei-mikhailov-roman-kretcul-vladimir-matveev/vmiat-shturmom-zachem-v-sukhoputnykh-voiskakh-vossozdaiut-desantnye-brigady>.

Lessons and policy implications for Western military planners

For Western military planners and others seeking to anticipate potential future Russian threats, a key question regarding the likely trajectory of Russian ground-based capabilities is how the Russian leadership intends to identify and correct weaknesses. Russian ground units executed a poor strategy during the full-scale invasion of Ukraine. This was partly due to the fact that they were deployed with minimal warning. However, Russian forces were also generally slow to adapt to the realities of combat, and their decision-making remained excessively centralized. A culture of reinforcing failure and of lying is also pervasive. In many cases, Russian units adapted to local battlefield conditions at the tactical level, but those innovations were not institutionalized across the force.

The effectiveness of Russia's ground forces in the future will likely depend substantially on changes in leadership.

The effectiveness of Russia's ground forces in the future will likely depend substantially on changes in leadership. Valery Gerasimov, the current chief of the General Staff, and Oleg Salyukov, the commander-in-chief of the Russian Ground Forces, have been in their respective positions for more than a decade. In contrast, the commanders of the military districts have all changed multiple times during the war, and Colonel General Mikhail Teplinsky has commanded the VDV only since 2022. Moreover, Sergei Surovikin, arguably Russia's most effective senior commander in the war, was replaced as overall commander of Russian forces in Ukraine in early 2023 before being relieved of his position as commander of the Russian Aerospace Forces (VKS) after the Wagner Group mutiny. The Russian military now has many officers with substantial combat experience, but if promotions are determined by loyalty or political considerations rather than by merit, this may prevent institutionalization of lessons from the war. Further changes at the Ministry of Defence are also likely given the recent appointment of Andrei Belousov as minister of defence.

Over the medium term, Russia's ground forces will likely continue to increase in size, but their quality will vary and equipment shortages will persist. Russia may have to rethink its manpower policies in order to increase the size of these forces sufficiently, but high personnel costs resulting from labour shortages and from the use of greater financial incentives could become an issue in the long term as well. However, the Russian Ground Forces will likely continue to strengthen their reconnaissance fire and strike complexes by procuring larger quantities of improved UAVs and munitions. Russian EW counter-UAV and counter-precision-guided-munitions capabilities will likely continue to grow in quantity and quality as well; traditional capabilities such as artillery, armour and others will also remain a priority. But even with improved capabilities, much will depend on how well these capabilities are employed together on the battlefield, as Russian commanders are struggling to employ battalion and higher elements.

Lastly, a better understanding of Russian morale is necessary if Western policymakers and military planners are to anticipate Russian military strengths and weaknesses more accurately. Despite the chaotic mobilization in 2022 and numerous anecdotal accounts of poor leadership, Russian forces did not capitulate last summer, and they have continued to conduct assaults across the front. Many Russian servicemen appear to be content fighting in Ukraine if they receive a high enough salary. Russia's offensive capabilities may continue to deteriorate, but its forces can still make it difficult for Ukrainian units to advance from strong defensive positions. In other words, expecting that the Russian ground forces will simply collapse at some point due to heavy losses is not a safe assumption.

04

Air power and aerial platforms

Russian military regeneration will not dramatically alter the balance of air power. Likely priorities for Moscow will include producing enough of existing types of weaponry and aircraft to compensate for attrition, and investing in long-range bombers and stand-off missiles. However, the primary threat to NATO airpower in Europe will remain Russia's highly effective ground-based air defence systems.

Justin Bronk

Existing capabilities and gaps

The different combat arms of the Russian Armed Forces have been affected in very different ways by the demands that Russia's full-scale invasion of Ukraine has placed on them, with the rigours of conflict highlighting strengths in some areas but also in particular exposing systemic weaknesses. For Russia's Aerospace Forces – the VKS⁵⁵ – the verdict is largely negative. The VKS has seen its established doctrine, tactics and equipment perform even worse, relative to pre-war expectations, than has been the case for the Russian Ground Forces.

A comparison is telling. Despite repeated strategic failures in the first year of the war and devastating losses, the Russian Ground Forces and Airborne Forces (VDV)⁵⁶ have taken significant amounts of Ukrainian territory, inflicted serious casualties on Ukrainian forces, and successfully held the Surovikin Line against

⁵⁵ *Vozdushno-kosmicheskiye sily* (Воздушно-космические силы).

⁵⁶ *Vozdushno-desantnyye voyska Rossii* (Воздушно-десантные войска России).

the Ukrainian summer offensive in 2023.⁵⁷ In contrast, the VKS has failed to establish the capacity to operate fighters, ground attack aircraft or helicopters over Ukrainian-held territory.⁵⁸

Moreover, despite remaining on its own side of the front line since the first month or so of the full-scale invasion, the VKS has suffered significant attrition. Publicly verifiable losses at the time of writing (March 2024) included 82 fixed-wing combat aircraft and 131 helicopters; the real totals are likely to have been slightly higher, due both to losses that cannot be independently verified and to the unrecorded scrapping of aircraft damaged upon landing but considered uneconomical to repair.⁵⁹ The majority of the fixed-wing losses incurred in the air have been of Su-34(M) Fullback strike fighters and Su-25SM/SM3 Frogfoot ground attack aircraft, with 11 Su-30SM(2) and five Su-35S multi-role fighters also lost. The remainder were Su-24 maritime strike and reconnaissance bombers, which were predominantly destroyed on the ground in Ukrainian strikes on airbases.

Helicopter losses have been most severe in the Ka-52 Alligator fleet, with 59 of its gunships destroyed, seriously damaged or captured, and in the Mi-8/17 transport helicopter fleets, where at least 21 airframes have been lost. The Mi-24/35 Hind and Mi-28 Havoc gunship fleets have also taken significant losses, despite the fact that their operational use tempo has been less intensive than that of the Ka-52s.

Perhaps even more worryingly for the VKS in future, its fast jet and attack helicopter forces have achieved at best very modest results in exchange for these significant losses. A continuing inability to plan and fly complex composite air operations (COMAOs) means that Russia is still unable to plan and coordinate the sort of mutually supporting strike packages that a US-led air campaign would rely on to conduct suppression/destruction of enemy air defences (SEAD/DEAD) and offensive counter-air operations.⁶⁰ Instead, the VKS still operates relatively rigidly planned and tightly controlled sorties, with individual weapon release authorization required in real time from officers in ground-based or airborne command and control posts.

During the Russian offensives in 2024, Su-34, Su-30SM and Su-35 fighters and strike bombers have started to have more direct impact on the war by launching large numbers of stand-off glide-bomb attacks. The heavy 500-kg and 1,500-kg variants of the FAB series of bombs with glide-wing kits provide a relatively cheap means for the VKS to deliver concentrated explosive effect on fixed Ukrainian positions while remaining largely out of range. However, they are not able to hit mobile or dynamically located targets, so even this nominally 'new' capability effectively represents the use of Russia's most modern front-line jets as blunt heavy artillery.

⁵⁷ Watling, J. and Reynolds, N. (2023), *Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive*, Report, London: Royal United Services Institute, https://static.rusi.org/Stormbreak-Special-Report-web-final_0.pdf.

⁵⁸ Bronk, J. (2023), *Russian Combat Air Strengths and Limitations: Lessons from Ukraine*, CNA Occasional Papers, Arlington, VA: Center for Naval Analyses, April 2023, <https://www.cna.org/reports/2023/04/Russian-Combat-Air-Strengths-and-Limitations.pdf>.

⁵⁹ Janovsky, J. et al. (2022), 'List Of Aircraft Losses During The Russian Invasion Of Ukraine', Oryx, 20 March 2022, <https://www.oryxspioenkop.com/2022/03/list-of-aircraft-losses-during-2022.html>.

⁶⁰ Bagwell, G. (2019), 'Composite air operations With a little help from your friends', Summary of COMAOs, Key Military, 17 January 2019, <https://www.keymilitary.com/article/composite-air-operations-little-help-your-friends>.

In comparison to the marked failure of the fast jet and helicopter fleets to achieve significant effects against Ukraine, the Tu-95, Tu-160 and Tu-22M3 bomber fleets of the Long Range Aviation (LRA) force have consistently performed well in their assigned task of strategic bombardment from stand-off ranges.⁶¹ From the first missile barrages against air defence targets at the outset of the invasion, through successive strike campaigns against Ukrainian defence industry, fuel, rail and power infrastructure, the LRA has maintained a significant operational tempo for two years.

Ukrainian missile defence capabilities have progressively improved, so that as the war has continued, a far higher proportion of the Kh-101 missiles fired by the Tu-95 and Tu-160 bombers have been shot down before reaching their targets. However, Russian forces have demonstrated a continuing ability to adapt in response, with increasingly sophisticated coordinated waves that combine ground-launched Shahed-136/Geran-2 one-way attack unmanned aerial vehicles (UAVs), naval Kalibir cruise missiles, Iskander-M-launched ballistic and cruise missiles, and waves of cruise missiles from the LRA to continually strain Ukrainian defences. Alongside Kh-22 and Kh-32 anti-ship missiles fired by the Tu-22M3s in indiscriminate attacks on cities, and the quasi-hypersonic Kh-47M2 'Kinzhal' air-launched ballistic missile fired by the MiG-31K, the LRA has inflicted by far the most damage and had the greatest effect on the course of the conflict of any VKS area of capability.

Prospects for potential VKS re-equipment and recapitalization

The doctrinal and cultural legacy of the VKS's roots as primarily a ground-controlled interception fighter force, reliant on pre-planned strikes from attack aircraft and helicopters tasked by ground commanders, is difficult to overcome. The relatively rigid mindset that the VKS approach to air power produces in its pilots during initial flight training and through operational service permeates to the senior ranks. This makes it difficult for Russia to fundamentally change the way it approaches air power in response to shortcomings.

Within these limitations, however, the VKS has managed a steady pace of tactical-level innovation in response to Ukrainian ground-based air defence (GBAD) and air force evolution over time. Examples include: a shift to the large-scale use of glide-bombs to provide an affordable way to strike fixed targets near the front lines from stand-off distances; slowly improving long-range air-to-air tactics; and better coordination of electronic warfare (EW) effects with both fixed-wing and rotary sorties.⁶²

⁶¹ Bronk (2023), *Russian Combat Air Strengths and Limitations: Lessons from Ukraine*; and Butowski, P. (2022), 'Russia's Secretive Long-Range Bomber Operations Against Ukraine', *The Warzone*, 14 September 2022, <https://www.twz.com/russias-secretive-long-range-bomber-operations-against-ukraine>.

⁶² Author interviews with Ukrainian Air Force commanders and military scientists, Ukraine, October 2022 and July 2023. See also General James Hecker in Gordon, C. (2023), 'Russian Air Force Trades Efficacy for Survival Over Ukraine, USAFE Boss Says', *Air and Space Forces Magazine*, 14 September 2023, <https://www.airandspaceforces.com/tactics-russian-air-force-losses-ukraine>; and Newdick, T. (2022), 'A MiG-29 Pilot's Inside Account Of The Changing Air War Over Ukraine', *The Warzone*, 15 December 2022, <https://www.twz.com/a-mig-29-pilots-inside-account-of-the-changing-air-war-over-ukraine>.

In the coming years, there is little chance that the VKS will be able to overcome its core doctrinal and cultural limitations, since the rigid and piecemeal approach to air power employment is deeply ingrained in both the VKS itself and the wider military leadership – dominated by the Russian Ground Forces – within which the VKS operates. However, tactical adaptation will undoubtedly continue, and the VKS will attempt to develop weapons, EW techniques and possibly new platforms to compensate for its shortcomings in Ukraine.

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It remains to be seen whether such investment in the development of new weapons and aircraft to fill known gaps will receive significant funding, however, or whether the VKS will instead invest further in increasing the size of force elements that have already proven relatively effective.

One route that the VKS leadership may decide to take is to push a greater share of overall sustainment, ammunition procurement and recapitalization funding into the LRA, which offers a well-understood return on that investment in terms of combat power. Work is already under way to modify Tu-22M3s to carry and launch the Kh-47M2, alongside the MiG-31K and Su-34, suggesting that Russia wishes to expand its salvo launch capacity for the weapon despite disappointing performance against the Patriot PAC-3 missile defence system.⁶³

Tu-160 modernization efforts continue. Existing airframes are being reconditioned to Tu-160M standard, and a contract is also in place for 10 new-build Tu-160M2 aircraft that will significantly increase the capacity of the Blackjack fleet by the end of the decade.⁶⁴ Russian production of long-range missiles has also increased significantly since the start of the invasion, with well over 100 missiles per month now being manufactured across the various cruise and ballistic types.⁶⁵

Equally, the VKS might try to increase the development priority allocated to the Su-57 Felon programme and other relatively novel weapons systems in order to try to close the obvious capability gaps revealed in its fast jet fleets, especially

⁶³ Author interviews with Ukrainian military scientists, Ukraine, July 2023.

⁶⁴ Scramble (2023), 'Two more Tu-160M/M2 strategic missile carriers', 4 January 2023, <https://www.scramble.nl/military-news/two-more-tu-160m-m2-strategic-missile-carriers>.

⁶⁵ Watling, J. (2023), 'Ukraine Must Prepare for a Hard Winter', RUSI Commentary, Royal United Services Institute, 19 October 2023, <https://www.rusi.org/explore-our-research/publications/commentary/ukraine-must-prepare-hard-winter>.

when facing hostile surface-to-air missile (SAM) systems. Here, Russian production and development capacity is likely to be limited by constraints on access to Western micro-electronic components and avionics.

In addition, the Su-57 Felon's stealth properties have been hampered by persistent manufacturing quality challenges and an airframe shape that prioritized manoeuvrability and lower development costs over minimizing radar cross section. Consequently, although Su-57s have flown regularly and have even reportedly used weapons against Ukrainian targets, the VKS has not been willing to risk its small existing fleet of Su-57s inside Ukrainian-controlled airspace.⁶⁶

Policy implications for the US and NATO, and for future wars

Given that the VKS leadership appears to lack faith in the Su-57's survivability against Ukrainian air defence systems, it seems unlikely in the foreseeable future that the aircraft could dramatically improve the VKS's ability to operate in contested airspace against NATO forces that operate far more capable sensors than Ukraine.

Russia's long-range precision-strike arsenal has long been one of the more concerning aspects for Western military planners.

Therefore, even if the VKS chooses to prioritize the more rapid development and production of the supposedly improved Su-57M version from 2027 onwards, such a move would probably have limited implications for the air-to-air overmatch that the US and NATO have long enjoyed relative to Russia.

On the other hand, Russia's long-range precision-strike arsenal has long been one of the more concerning aspects for Western military planners. During the post-Cold War era, most European air forces have closed many of their airbases and have concentrated their aircraft and maintenance organizations on a relatively small number of 'superbases'. These superbases are more cost-efficient, but are also much easier targets.

Therefore, a Russian decision to prioritize LRA development and missile production would make current NATO efforts to reinforce NATO deterrence capacity in Europe more challenging from a dispersal and missile defence requirements perspective.

In any case, Russia's available resources for recapitalization and regeneration of VKS aircraft and weapons will be constrained by the urgent demands for large-scale production of key capabilities in other domains to support the ongoing

⁶⁶ Author interviews with Ukrainian military scientists, Ukraine, July 2023. See also UK Ministry of Defence (@DefenceHq) via X (formerly Twitter) (2023), 'Intelligence Update on the situation in Ukraine', 9 January 2023, <https://twitter.com/DefenceHQ/status/1612337912091217920/photo/1>.

war against Ukraine. Russia has poured resources into increasing production and reconditioning of artillery shells, howitzers, tanks, infantry fighting vehicles (IFVs) and armoured personnel carriers (APCs) since October 2022.⁶⁷ It is also investing heavily in the production of UAVs such as the Orlan-10, loitering munitions such as the Lancet-3, and first-person-view one-way attack drones.

Therefore, whatever the VKS prioritizes in the medium term to try to enhance its capabilities, it may find that it struggles to compete with the ground forces for the necessary resources. It may also find that it is further constrained in its more ambitious technical projects by sanctions enforcement against potential suppliers of key components.

Consequently, for the foreseeable future the biggest threats to NATO from Russia in the air domain are likely to remain – as now – its numerous, lethal and layered SAM systems and a growing long-range strike arsenal.

⁶⁷ Watling, J. and Reynolds, N. (2024), 'Russian Military Objectives and Capacity in Ukraine Through 2024', RUSI Commentary, Royal United Services Institute, 13 February 2024, <https://www.rusi.org/explore-our-research/publications/commentary/russian-military-objectives-and-capacity-ukraine-through-2024>.

05

Russia's navy and naval platforms

Even though Russia's navy has been embarrassed by Ukrainian attacks in the Black Sea, and has suffered heavy and much-publicized losses, it remains more potent than is commonly assumed. Maintaining a global naval capability will continue to be a strategic priority for the Russian leadership.

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Note: The opinions here are the author's alone and do not reflect those of the U.S. Navy, Department of Defense, or any other part of the U.S. Government.

Ukraine's successes against the Black Sea Fleet since 2022 should not obscure the important reality that the Russian Federation Navy (RFN) is no less dangerous to NATO than it was prior to the Ukraine war. Without question, Russia has experienced significant setbacks at sea. But the navy's force of modern vessels capable of global power projection has grown, and the experience of war has provided critical combat lessons for the larger fleet. While the navy faces rougher waters ahead when Moscow begins recapitalizing its armed forces over the next decade, the RFN will remain a critical component of Russia's nuclear and conventional strategic deterrence force.

State of play

In 2023, Ukraine inflicted a series of cascading tactical defeats on the RFN that resulted in the loss of Russian initiative, the breaking of the RFN's *de facto* naval blockade against Ukraine, and the ejection of the Black Sea Fleet's surface warships from the western Black Sea. Daring Ukrainian commando raids, well-planned long-range precision strikes, and much-vaunted attacks by unmanned surface vessels (USVs) ensured that Ukraine's lifeline to the sea remained open. The result was an important strategic victory for Kyiv.

An oft-misunderstood aspect of the naval war in the Black Sea is Russia's attempt at maritime economic coercion of Ukraine. While Russia's actions never strictly amounted to a declared blockade – Russia never actually declared war – they

functioned as such. However, the Black Sea Fleet's restriction of Ukrainian maritime trade is better described as a 'blockade-in-being' because it relied almost entirely on the *threat* of interdiction rather than on actual blockade operations. Such a threat, which Russia is certainly capable of enforcing, was adequate to restrict anything other than bulk dry cargo ships allowed under the Black Sea Grain Initiative (BSGI). After the BSGI collapsed, Russian threats were made hollow by the threat of war with NATO when cargo ships were re-routed through Romanian and Bulgarian territorial waters. Today, Ukrainian grain transits meet or exceed pre-war totals. Taken together, these events and responses provide important insights into Russian risk calculus *vis-à-vis* NATO.

Ukrainian forces were particularly effective against Russian amphibious capabilities, severely damaging or destroying five of the 11 medium-sized Russian amphibious ships (landing ship–tanks, or LSTs) in the Black Sea. Russian naval infantry, though much better trained and equipped than many army formations, have also taken savage losses in the ground campaign. It is likely to be a decade before the RFN is able to recoup these catastrophic losses to its expeditionary amphibious forces.⁶⁸

With two important exceptions, most of Ukraine's accomplishments have come against naval vessels that were either very old or very limited in capability.

But with two important exceptions, most of Ukraine's accomplishments have come against naval vessels that were either very old or very limited in capability.⁶⁹ Indeed, despite Ukraine's laudable success, the RFN has lost none of its blue-water combat capability. Of the 21 corvette-sized or larger combat vessels damaged or destroyed in the war, only one, the aged cruiser *Moskva*, could be considered capable of distant overseas power projection. In short, Ukrainian success at sea has been impressive, but this should not obscure the fact that Russia's global power projection capabilities are undiminished.

The Russian surface fleet, often mocked as aged and underperforming, is in fact still capable of sustained global operations.⁷⁰ Moscow considers its navy to be a global force; that thinking shows no signs of shifting. At the start of the full-scale war against Ukraine in 2022, the RFN had 19 warships, from four

⁶⁸ Shoaib, A. (2023), 'Ukraine has 'completely defeated' a Russian naval infantry brigade of the Black Sea Fleet — for a second time, says think tank', *Business Insider*, 24 September 2023, <https://www.businessinsider.com/ukraine-completely-defeated-russian-brigade-second-time-2023-9>; *Moscow Times* (2023), 'Elite Russian marine unit 'nearly destroyed' near Ukraine's Vuhledar', 14 February 2023, <https://www.themoscowtimes.com/2023/02/14/elite-russian-marine-unit-nearly-destroyed-near-ukraines-vuhledar-a80220>.

⁶⁹ Those two exceptions are Ukraine's successful strikes against the submarine *Rostov-na-Donu* and the yet-to-be-finished missile corvette *Askold*, both of which were in dry dock when they were attacked. Three other modern ships, all Project 22160 Bykov-class patrol vessels, were successfully attacked, but none of these was capable of mounting long-range precision strikes or providing area air defence.

⁷⁰ Mahadzir, D. (2023), 'Russian Pacific Fleet Hold Exercises Off Siberia, Near Alaska', USNI News, 22 September 2023, <https://news.usni.org/2023/09/22/russian-pacific-fleet-holds-exercises-off-siberia-near-alaska>; Reuters (2023), 'Russia's warship with hypersonic missiles arrives for drills with S. Africa, China', 22 February 2023, <https://www.reuters.com/world/russias-warship-with-hypersonic-missiles-arrives-drills-with-safrica-china-2023-02-22>; Bhatt, P. (2023), 'The Indian Ocean is witnessing a surge in Russian military exercises', *The Diplomat*, 13 December 2023, <https://thediplomat.com/2023/12/the-indian-ocean-is-witnessing-a-surge-in-russian-military-exercises>.

different fleets, in the Mediterranean.⁷¹ Since then, the Northern and Pacific fleets in particular have been busy conducting global deployments, exercises and presence operations.⁷² Many ships that patrolled the Mediterranean in 2021–22 have been deployed repeatedly in 2023–24. While the effect on these ships' material condition is currently unknown, Russia's navy has been using them extensively around the world. Their combat readiness is almost certainly diminished, but their ability to conduct presence operations is not.⁷³

Prospects for Russian naval development

Because of extremely long build times for naval vessels, the war has not yet had a noticeable structural effect on Russian naval shipbuilding. In 2023, deliveries to the RFN actually increased over the previous year, with highlights including the commissioning of Russia's newest Borey-A ballistic missile submarine, a Yasen-M nuclear-powered multi-purpose submarine, a third Gorshkov-class frigate, and two Steregushchiy-class frigates. Further additions have included several smaller corvettes, a Kilo-class diesel submarine and fast-attack boats, all of which are suited for near-sea operations closer to Russian shores.

Nonetheless, Russian naval shipbuilding faces a complex future. Competition between the different armed services over spending may negatively affect plans for naval development as the army recapitalizes its forces and will probably drive hard choices over service prioritization. At the moment, Russia's defence ministry is either ignoring those difficult trade-offs or believes it can overcome them with larger budgets.

Making matters worse, United Shipbuilding Company (USC), the state-owned umbrella enterprise for naval construction, has endured years of catastrophic losses. In 2023, President Vladimir Putin finally ordered that all of USC's shares be put into trust management via a major national bank.⁷⁴ Indeed, Moscow's 2023 announcement of a significant boost in general military spending over the next several years may in fact be for the purpose of servicing the Russian defence industry's massive debt rather than expanding its capacity.⁷⁵ And given the long build times and enormous resource investment needed for capital ships, a short-term injection of funding is unlikely to make a significant difference in the number of major combatant vessels available to the RFN.

⁷¹ *Black Sea News* (2023), 'Deployment of Russian warships in the Mediterranean as of November 1, 2023', 4 November 2023, <https://www.blackseanews.net/en/read/210586>.

⁷² Reuters (2023), 'Russia's warship with hypersonic missiles arrives for drills with S. Africa, China'.

⁷³ Russian Embassy in India (@RusEmbIndia) via X (formerly Twitter) (2024), 'On February 19, 2024, a detachment of the warships of #Russia's Pacific Fleet, consisting of the missile cruiser Varyag and the frigate Marshal Shaposhnikov, arrived in the #Indian port of #Visakhapatnam to participate in the Multilateral Naval Exercise #MILAN2024.', 20 February 2024, <https://twitter.com/RusEmbIndia/status/1759896496332509245>.

⁷⁴ Office of the President of the Russian Federation (2023), 'Об управлении находящимися в федеральной собственности акциями акционерного общества "Объединенная судостроительная корпорация"' [On the management of federally owned shares of the joint-stock company 'United Shipbuilding Corporation'], press release, 9 October 2023, <http://publication.pravo.gov.ru/document/0001202310090012>.

⁷⁵ Cooper, J. (2023), 'Another Budget for a Country at War: Military Expenditure in Russia's Federal Budget for 2024 and Beyond', *SIPRI Insights on Peace and Security*, December 2023, <https://www.sipri.org/publications/2023/sipri-insights-peace-and-security/another-budget-country-war-military-expenditure-russias-federal-budget-2024-and-beyond>.

The effects of sanctions will likely become more noticeable in the near term as the shipbuilding industry continues to adjust to the loss of access to Western technologies. The industry is either attempting domestic development of technologies or seeking international replacements for everything from machine tools to ship engines, electronics and specialized ship lighting. Russia's largest supplier, especially for machine tools and marine diesel engines, is China.⁷⁶ But even if the Russian shipbuilding industry is able to procure the proper machine tools, it will be years before it can develop and produce properly machined parts at scale. Worse, Chinese diesel engines aboard Russian ships have proven to be unreliable.⁷⁷ Finally, the Russian ship construction industry looks set to be caught between multiple constraints: a debt-ridden USC, the need for increased civilian and military ship construction at too few shipyards, a lack of shipyard capacity for new construction, and a shortage of trained shipyard employees.

Even if the Russian shipbuilding industry is able to procure the proper machine tools, it will be years before it can develop and produce properly machined parts at scale.

The navy leadership has made it clear that, within these constraints, it will continue to prioritize its nuclear-powered submarine fleet. At the end of 2023, the RFN's then commander-in-chief, Nikolai Yevmenov, announced that 'the High Command of the Russian Navy will continue to pay priority attention to the development of the nuclear submarine component of the Submarine Forces, which are the basis for guaranteed state security in maritime and ocean areas'.⁷⁸

Despite massive cost overruns and delayed completion, the Borey-A and Yasen-M programmes are extremely capable and satisfy Russia's commitment to maintaining a seaborne nuclear and non-nuclear strategic deterrent. They will continue to represent the most significant undersea challenge that Russia poses to Western navies in the Atlantic and Pacific oceans.

The RFN also plans to maintain a busy surface ship production schedule through 2035. But it is in this area that the navy will probably face its most difficult choices over the next decade, as the bills for the war on Ukraine come due and as the effects of decades of inefficiency are felt financially. Shipyards across Russia

⁷⁶ Leahy, J., Cook, C., Seddon, M. and Harlow, M. (2024), 'China's advanced machine tool exports to Russia soar after Ukraine invasion', *Financial Times*, 2 January 2024, <https://www.ft.com/content/d16c688d-9579-4f1d-a84f-ca29ca2f0bc0>.

⁷⁷ *Marine News Russia* (2018), 'ВМФ России отказался от ремоторизации «Каракуртов»' [The Russian Navy refused the re-motorization of the Karakurts], 10 October 2018, <https://morvesti.ru/news/1679/74686>.

⁷⁸ RIA Novosti (2023), 'Главком ВМФ назвал атомные субмарины приоритетом для флота' [The Commander-in-Chief of the Navy called atomic submarines a priority for the fleet], 29 November 2023, <https://ria.ru/20231129/vmf-1912583964.html?in=t>.

have orders on their books for new frigates, corvettes, small missile and patrol ships, minesweepers and large amphibious ships.⁷⁹ But the industry is struggling to deliver on these commitments.⁸⁰

The next decade of surface ship construction may be even worse than the two previous ones. Naval shipbuilders will have to navigate the aforementioned USC-related debt crisis while simultaneously managing the results of sanctions, fundamental structural neglect, a lack of parts and sub-assemblies, and continued high demand for new and modernized vessels.

Despite potential challenges with its future fleet, Moscow will likely continue to exploit overseas naval basing opportunities. While Russia reportedly has 'indefinitely suspended' its on-again, off-again plans for a naval base in Sudan, more promising from Moscow's perspective is the prospect of a naval base in Tobruk, Libya.⁸¹ Such a base would strengthen Russia's connections with emerging dictatorships in Libya and West Africa while providing for greater situational awareness of NATO naval forces in the Mediterranean. Tobruk has seen hundreds of tons of military equipment shipped from the Russian naval base at Tartus, Syria, which has proven to be of enormous strategic value to Russia since the Ukraine war began.⁸² Elsewhere, in the South Caucasus, the separatist government in Abkhazia has also reportedly agreed to begin working to host the Russian navy at Ochamchire.⁸³ Looming economic challenges for the RFN are currently having a negligible effect on these plans.

Lessons and policy implications for NATO military planners

The naval dimensions to date of Russia's war on Ukraine have important implications for NATO military planners and for others seeking to anticipate the trajectory of Russian naval force regeneration and to prepare accordingly. First of all, the conflict has validated important Russian assumptions about modern naval warfare. In 2017, Russia's naval warfighting doctrine first recognized what it called 'a qualitatively new objective: destruction of the enemy's military and economic potential by striking its vital facilities from the sea'.⁸⁴ First demonstrated in Syria and then to even more devastating effect against Ukraine, naval precision-strike

⁷⁹ RIA Novosti (2023), 'Путин: на "Северной верфи" будут строить корветы и большие десантные корабли' [Putin: Severnaya Verf will build corvettes and large landing ships], 25 December 2023, <https://ria.ru/20231225/korabli-1917997660.html>.

⁸⁰ Afonina, S. (2023), "'Пелла" хочет через суд продлить сроки сдачи трёх кораблей "Каракурт"' [Pella wants to extend the deadline for delivery of three 'Karakurt' ships through court], *Business Petersburg*, 14 December 2023, <https://www.dp.ru/a/2023/12/14/pella-hochet-cherез-sud-prodlit>.

⁸¹ *Militarnyi* (2024), 'Russian navy base in Sudan postponed indefinitely', 13 February 2024, <https://mil.in.ua/en/news/russian-navy-base-in-sudan-postponed-indefinitely>.

⁸² Kington, T. (2024), 'Russia funneling weapons through Libyan port, eyeing gateway to Africa', *Defense News*, 19 April 2024, <https://www.defensenews.com/global/europe/2024/04/19/russia-funneling-weapons-through-libyan-port-eying-gateway-to-africa>.

⁸³ Radio Free Europe/Radio Liberty (2024), 'Abkhaz separatists say work set to begin on Russian naval base in Georgian region', 13 January 2024, <https://www.rferl.org/a/abkhazia-russia-naval-base-georgia/32772824.html>.

⁸⁴ Russia Maritime Studies Institute (transl. by Davis, A.) (2017), 'Fundamentals of the State Policy of the Russian Federation in the Field of Naval Operations for the Period Until 2030', RMSI Research2, p. 12, https://dnnlwick.blob.core.windows.net/portals/0/NWCDepartments/Russia%20Maritime%20Studies%20Institute/2017_RMSI_ENG_RUS_RFNavyFundamentals_FINAL.pdf?sv=2017-04-17&sr=b&si=DNNFileManagerPolicy&sig=DvTVL%2BX7s7gA1K2Oam92QrVC%2FtStqTWHw81%2F61E%2Bybg%3D.

capabilities have been at the centre of Russia's strategic campaign in the current war. While Russia's ability to fire large salvos of land attack cruise missiles is constrained by the small number of vertical-launch cells on each ship, the RFN's ability to conduct precision land attack from the sea will continue to be an area of acute focus for Russian military planners in the future.⁸⁵

Beyond the obvious infrastructure challenges this presents to NATO nations, the conflict has proven that transatlantic force flows in wartime are at extreme risk when they arrive in port. Attacking moving objects over the horizon at sea is complex and difficult. Attacking fixed objects at a pier is comparatively less difficult. Russian ships in particular have suffered a string of catastrophic attacks while in port or dry dock, ironically underlining the point made in 2017 about the relative vulnerability of fixed objects.⁸⁶ For NATO, in any conflict involving seaborne resupply, this means that ensuring rapid onload and offload capabilities at multiple, resilient ports will be crucial for mitigating Russian attacks.

The odd case of the Ukrainian LST *Yuriy Olefirenko* proves the point. Early in the war, this lumbering Cold War-era ship bombarded Russian positions in Kherson from within sight of the coastline, then escaped without facing any counterattack. Later, a Russian aerial drone located the vessel, but with neither ships nor aircraft available to attack it, the Russian military resorted to an artillery bombardment, from which the vessel escaped unscathed.⁸⁷ A land attack cruise missile finally destroyed it in port a year later.⁸⁸

A possible explanation for this failure on Russia's part is that for all of the analysis in the last decade about Russian advancements in long-range strike capabilities, technological modernization in this area has not been matched by development of concepts of employment and training for integrating the reconnaissance-strike complex against mobile targets.⁸⁹ This is a crucial area for future research, but the probable lesson here is that any adversary with a mobile naval force capable of rapid, disaggregated, coordinated manoeuvre and strike operations would present Russia with significant challenges, at least in the short term.

⁸⁵ Kozak, Y. (2024), Interview with Nikolai Yevmenov, 'На защите национальных интересов страны в Мировом океане' [Protecting the country's national interests in the ocean], Morspolit.ru, 10 January 2024, <https://morspolit.ru/na-zashhite-nacionalnyx-interesov-strany-v-mirovom-okeane>.

⁸⁶ Sutton, H. (2022), 'Satellite images confirm Russian Navy landing ship was sunk at Berdyansk', USNI News, 25 March 2022, <https://news.usni.org/2022/03/25/satellite-images-confirm-russian-navy-landing-ship-was-sunk-at-berdyansk>.

⁸⁷ Sutton, H. (2022), 'Ukrainian Navy ship in dramatic escape, survives Russian artillery attack', Naval News, 10 June 2022, <https://www.navalnews.com/naval-news/2022/06/ukrainian-navy-ship-in-dramatic-escape-survives-russian-artillery-attack/#prettyPhoto>.

⁸⁸ *Moscow Times* (2023), 'Russia Says Destroyed Ukraine's 'Last Warship'', 31 May 2023,

<https://www.themoscowtimes.com/2023/05/31/russia-says-destroyed-ukraines-last-warship-a81344>.

⁸⁹ Shevtsov, N. T. and Moor, A. N. (2021), 'Способ доразведки объектов противника при ведении боевых действий смешанной авиационной дивизией' [Method of additional reconnaissance of enemy targets during mixed aviation division combat operations], *Vozdushno-kosmicheskiye sily, teoriya i praktika*, 19, pp. 57–73, <https://cyberleninka.ru/article/n/sposob-dorazvedki-obektov-protivnika-pri-vedenii-boevyh-deystviy-smeshannoy-aviatsionnoy-diviziyey>; and Vasiliev, V. A. (2021), 'Анализ возможностей космической разведки по информационному обеспечению управления авиацией при выполнении огневых задач' [Analysis of space reconnaissance capabilities for information support of aviation control when performing fire missions], *Vozdushno-kosmicheskiye sily, teoriya i praktika*, pp. 47–56, <https://cyberleninka.ru/article/n/analiz-vozmozhnostey-kosmicheskoy-razvedki-po-informatsionnomu-obespecheniyu-upravleniya-aviatsiyey-pri-vypolnenii-ogneyh-zadachr>.

Finally, Ukraine's USV campaign is an unquestionable success that has rescued Kyiv's previously perilous position at sea and turned the western Black Sea into a denied area for Russian ships. At the same time, this campaign's outsized impact on public narratives about the war threatens to skew analysis in unhelpful ways for Western naval planners. The episodic nature of successful attacks begs the question of how high Ukraine's true failure rate has been. Unfortunately, no such data is publicly available.

It would be unwise for Western military planners to dismiss the capabilities of the entire Russian navy just because of recent experience.

Ukraine appears to be innovating faster than Russia, but observers should be cautious about coming to any firm conclusions about USV warfare. Too little is known publicly about Russian adaptation in response to Ukrainian innovation in this case. Nonetheless, the war has made it clear that USVs will be a fixture of naval combat perhaps for decades to come. Understanding the personnel, logistics, concept development, command and control, training and countermeasures requirements must be a priority for navies in the future.

The Black Sea Fleet has undeniably been embarrassed by Ukraine. The RFN's amphibious capability is shattered. The limitations of its much-vaunted long-range precision-strike regime are exposed. The effects of sanctions will almost certainly constrict an already inefficient and corrupt production pipeline even further. Russia's navy faces a painful decade as it becomes further disconnected from Western supply chains, is more reliant on domestic production of tools and parts, and seeks improved partnership with China.

Yet despite these problems, it would be unwise for Western military planners to dismiss the capabilities of the entire Russian navy just because of recent experience. Russian warship construction has not met its goals for decades, and almost certainly will continue to suffer the same fate over the next 10 years. Nonetheless, Moscow's intention to shift the focus of Russian trade to the Indo-Pacific will require Russia to maintain a global naval presence. The Russian leadership will thus expect the RFN to defend the nation's strategic economic interests, which are increasingly found offshore in Arctic fossil fuel fields and along Indo-Pacific trade routes.

If Moscow wants to project power around the world, it will have to rely in large part on the RFN to do so. The path to success is not clear, but the Russian navy will almost certainly muddle through – much as it has done previously – with a patchwork of ad hoc bureaucratic measures, service life extensions and short-term repairs accompanying a trickle of new ships and submarines. Western planners would be wise to keep this in mind.

06

Russia's asymmetric enablers

Russian uses of asymmetric tools – from information warfare to counterspace – have been tested by the war in Ukraine, demonstrating innovation but also vulnerabilities. In ongoing competition with Russia, the West must work to further degrade Russian technological and informational capabilities.

Jaclyn Kerr

Note: The views expressed in this chapter are those of the author and do not reflect the official policy or position of the National Defense University, the U.S. Department of Defense or the US government.

Russian military strategy involves significant use of asymmetric tactics and capabilities. Since the beginning of Russia's full-scale war with Ukraine in early 2022, the utility of these asymmetric approaches in above-threshold conflict has been tested – revealing areas of ongoing strength, but also of weakness, degradation and future uncertainty. In its prolonged competition with Russia, the West must pursue policies and strategy to further weaken the Kremlin's asymmetric capabilities, raise the costs associated with their maintenance and use, and undermine Moscow's ability to regenerate and adapt these capabilities for future conflict and competition.

State of play of Russian asymmetric enablers

Asymmetric approaches have long been a core element of Russian military strategy, utilized both in full-scale warfare and in ambiguous or sub-threshold forms of 'hybrid' or 'grey zone' conflict and competition. Moscow seeks to exploit under-recognized vulnerabilities of stronger adversaries, including through

leveraging novel techniques or weapons, and employing surprise, deception, covert action and innovation to disrupt adversaries' decision-making and resolve, and to achieve desired strategic outcomes while minimizing the costs to Russian forces.

Moscow's asymmetric techniques and enablers – often thought of in relation to confrontation with the US and NATO – seek to offset conventional superiority or areas of greater technical sophistication on the part of an adversary by exploiting vulnerabilities in its society, government, military strategy and capabilities. The Kremlin's broad array of asymmetric tools includes, for example, its information and influence, cyberwarfare, electronic warfare (EW), and unmanned and autonomous and counterspace capabilities, as well as advanced data analytics and artificial intelligence (AI) algorithms to support these.⁹⁰

For years, the Russian armed forces have pursued research and development, prototyping and testing in these areas critical to their vision for modern asymmetric and information-centric warfare. These programmes have been applied, tested and adapted during the full-scale war in Ukraine since February 2022. Moscow has leveraged asymmetric enablers to facilitate its military effort, though these uses and their effects have not always been as visible or dramatic as some observers expected. As in the conventional domains, observations of Russian uses of asymmetric capabilities in Ukraine suggest that Moscow began its invasion prepared for and expecting a short, intense war and rapid victory, but that the Russian military adapted as the war continued. Two recurrent themes across multiple areas have been the failure of Russia's early attempts to use surprise and domain dominance to shatter Ukraine's defences, and the ongoing cycles of reciprocal Russian and Ukrainian innovation and adaptation that have characterized later attritional stages of the conflict.

Russia's use of its cyber and information warfare capabilities in the context of the war offers an illustrative example. The first wave of cyberattacks – which occurred shortly prior to and alongside the opening barrage of precision-strike firepower – involved sophisticated operations. These attacks targeted critical capabilities and supported an early-war effort to overwhelm and paralyse Ukraine's defences. Despite this, some analysts in the early stage of the war pointed to the lack of obvious 'cyber shock and awe' and scrutinized the supposed absence of Russia's formidable cyber and information warfare capabilities.⁹¹

As the war has progressed and observations based on richer data have come to the fore, it has become clear that Russian cyber-aggression has been significant, but that Ukraine has also been well defended. The years of prior cyber and information attacks had given Ukraine significant lead time in which to improve its cyber defences. Western partners also heightened their efforts to provide Ukraine

⁹⁰ Bendett, S. et al. (2021), *Advanced military technology in Russia: Capabilities and implications*, Research Paper, London: Royal Institute of International Affairs, pp. 6–10, <https://chathamhouse.soutron.net/Portal/Public/en-GB/RecordView/Index/203568>; and Boulègue, M. et al. (2023), *Understanding Russia's military vulnerabilities*, Project summary, London: Royal Institute of International Affairs, pp.17, 38, <https://chathamhouse.soutron.net/Portal/Public/en-GB/DownloadImageFile.ashx?objectId=7398&ownerType=0&ownerId=203677>.

⁹¹ For a discussion, see Kerr, J. (2023), *Assessing Russian Cyber and Information Warfare in Ukraine: Expectations, Realities, and Lessons*, Arlington, VA: Center for Naval Analyses (CNA), <https://www.cna.org/reports/2023/11/assessing-russian-cyber-and-information-warfare-in-ukraine>.

with assistance in the forms of intelligence sharing, 'pre-bunking' of false Russian narratives, 'hunt forward' efforts to assist in identification of threats, and private sector support for protection of critical data, online services and communications.⁹²

But Russia has continued to innovate and adapt. As the conflict has continued, Russia's ongoing cyber offensives have often been characterized as operating at a high tempo and continuing to evolve.⁹³ Moscow has also continued to mount large-scale information and influence campaigns aiming to undermine support for Ukraine and exacerbate potential tensions within Ukrainian society. While early analyses of the information contest suggested that Ukraine was largely prevailing with Western audiences, the picture may be changing: two years into the war, Russia's successes in leveraging war fatigue, anti-immigrant sentiment, and domestic and transatlantic tensions among Kyiv's key supporters warrant critical attention.⁹⁴

Russia's ongoing cyber offensives have often been characterized as operating at a high tempo and continuing to evolve. Moscow has also continued to mount large-scale information and influence campaigns aiming to undermine support for Ukraine and exacerbate potential tensions within Ukrainian society.

Russia's use of EW and unmanned system capabilities during the war has shown a similar dynamic of surprising early lack of relative advantage followed by rapid and ongoing adaptation. In the first months of the war, commentary in the West often focused on Ukraine's remarkable relative success – compared to Russia – in the use of drones. Ukraine's surprising degree of EW success in jamming Russian drone systems was also noted. These were unexpected outcomes given Russia's reputation for strong EW capabilities, its recent focus on both EW and unmanned aerial vehicle (UAV) technologies, and the broader expectation of Russian air power dominance.⁹⁵

As in other areas, some Western analysts have suggested that these early weak showings might have been a result of expectations of rapid success – that Moscow might have initially viewed full EW deployment as unnecessary. But initial setbacks also pointed to gaps in Russian capabilities and the evolving nature of modern drone and EW warfare. The vehicle-mounted EW systems that Russia did deploy were relatively large and slow, and unable to keep up with more mobile units.⁹⁶ Russia also appeared to lack several key categories of drones, and suffered from long lag times when using drones for artillery firing, making UAVs less useful

⁹² Ibid.

⁹³ Ibid.

⁹⁴ Digital Forensic Research Lab (2023), *Undermining Ukraine: How the Kremlin Employs Information Operations to Erode Global Confidence in Ukraine*, Washington, DC: Atlantic Council, <https://www.atlanticcouncil.org/in-depth-research-reports/report/undermining-ukraine>.

⁹⁵ *The Economist* (2022), 'How Ukraine is winning the drone-jamming war', 18 May 2022, <https://www.economist.com/the-economist-explains/2022/05/18/how-ukraine-is-winning-the-drone-jamming-war>.

⁹⁶ Abdurasulov, A. (2023), 'Ukraine's invisible battle to jam Russian weapons', BBC News, 4 August 2023, <https://www.bbc.com/news/world-europe-66279650>.

in targeting mobile Ukrainian units. To fill some gaps, Russian volunteers bought cheap Chinese-made commercial drones and the Russian government purchased Iranian drones and loitering munitions.⁹⁷

By 2023, the battlefield dynamics had changed considerably. Russia was using hundreds of smaller and more mobile EW units at its front line to interfere with Ukrainian radar, GPS and other satellite connections, and to support target identification during Ukraine's counteroffensive. Similarly, while at first making less effective use of drones, Russia has used UAVs extensively as the war has continued, including for intelligence, surveillance and reconnaissance (ISR), targeting and direct attacks. Russia has targeted both Ukrainian military units and critical infrastructure with attack drones, apparently seeking to create dilemmas for and deplete Ukrainian air defences.⁹⁸ The relative advantage in both EW and unmanned systems has shifted repeatedly between Ukraine and Russia during the conflict, as each side goes through cycles of innovation and adaptation. These developments have contributed to intense dynamics of both aerial and maritime contestation, have increased the challenge of massing forces, and have ratcheted up attention to the potential role of greater automation.

Russian counterspace capabilities have also been demonstrated to an extent in Ukraine, though it is not clear if these have been as effective as desired by Moscow in all areas of battlefield significance. Starting well before the war, Russian 'inspector satellites' have made repeated close approach manoeuvres and have loitered in proximity of other geostationary satellites. This suggests they have been used for signals intelligence collection. Russia has also used jamming and cyberattacks to interfere with satellite-enabled systems used by Ukraine, including GPS, command and control, and communications systems. While Russian officials have threatened that foreign commercial satellites involved in armed conflicts will be treated as legitimate military targets, repeated Russian attempts to jam SpaceX's Starlink terminals have met with limited success.⁹⁹

But Russia continues to develop and to wield the threat of new systems. Before the war, Moscow successfully tested a direct-ascent anti-satellite (ASAT) weapon against one of its own low-earth orbit (LEO) satellites. Russia has also touted its development of laser weapons that can dazzle, blind or destroy satellites, though it is less clear to what effect these capabilities have been used in the conflict. In February 2024, reports suggested Russia was developing a space-based nuclear capability – a nuclear weapon rather than a nuclear propulsion system. Such a weapon could aim to scale up ASAT capabilities to attack (or hold at risk) more resilient large constellation systems of hundreds or thousands of satellites (such as those of Starlink).¹⁰⁰

⁹⁷ Luzin, P. (2022), 'Russian UAVs: What Has Gone Wrong?', *Eurasia Daily Monitor*, 11 November 2022, <https://jamestown.org/program/russian-uavs-what-has-gone-wrong>.

⁹⁸ Edmonds, J. and Bendett, S. (2023), *Russia's Use of Uncrewed Systems in Ukraine*, Report, Arlington, VA: Center for Naval Analyses (CNA), <https://www.cna.org/reports/2023/05/russias-use-of-drones-in-ukraine>.

⁹⁹ Bingen, K., Johnson, K., Young, M. and Raymond, J. (2023), *Space Threat Assessment 2023*, Washington, DC: Center for Strategic and International Studies, pp.12–20, <https://www.csis.org/analysis/space-threat-assessment-2023>; Weeden, B. and Samson, V. (eds) (2024), *Global Counterspace Capabilities Report: An Open Source Assessment*, Washington, DC: Secure World Foundation, https://swfound.org/media/207826/swf_global_counterspace_capabilities_2024.pdf.

¹⁰⁰ Panda, A. and Samson, V. (2024), 'Russia's Reported Pursuit of a Nuclear-Armed Anti-Satellite Weapon', *Thinking the Unthinkable with Ankit Panda*, Podcast, 8 March 2024, <https://warontherocks.com/episode/thinkingtheunthinkable/30642/russias-reported-pursuit-of-a-nuclear-armed-anti-satellite-weapon>.

Prospects for asymmetric enabler adaptation and evolution

The Kremlin's future ability to effectively leverage asymmetric enablers faces several important challenges. Not least among these will be the country's diminished technological capacity. While Russia's high-technology sector once showed promise as a source of 'economic modernization' benefiting from Russia's notable technical talent, growing international collaboration and homegrown entrepreneurship, the state's policies have repeatedly undercut this potential. Steadily increasing political repression throughout the 2010s, and the effects of economic sanctions imposed as a consequence of Russia's 2014 annexation of Crimea, have led to losses in investment and human capital.

Since 2022, the already high emigration rate among Russia's tech workers has turned into a mass exodus, driven by surging repression, military mobilization and economic precarity. Multinational IT companies have also left Russia, while US and EU export restrictions have limited Russia's access to critical technologies. Despite government attempts to address these challenges through initiatives that include import substitution, compulsory licensing and IT workforce retention incentives, Russia's tech sector is unlikely to develop indigenous capacities overnight in areas where it has long depended on Western imports. This lack of self-sufficiency might prompt Russia to rely on China for microchips, machine tools and other critical components – but this supply is itself potentially vulnerable to international pressure and secondary sanctions.¹⁰¹

All that said, imminent degradation in Russia's capacity to leverage asymmetric enablers to significant effect is by no means a foregone conclusion. So far, Russia has been able to circumvent the worst effects of Western economic measures, relying on illicit imports, domestic war production, and closer trade ties with China, Iran and North Korea.

What is more, Russia's asymmetric techniques are not all dependent on cutting-edge technologies. Extensive information and influence operations conducted by Russia against Ukraine's Western partners may already be contributing to heightened perceptions of escalation risk and flagging support for the war effort in these countries. Russian sub-threshold activities outside Ukraine may become more brazen as the war continues or after. These methods may serve as an offset during a period of reduced conventional capability in which Russia focuses on force regeneration, or they might be leveraged more aggressively by a Kremlin emboldened by battlefield success.

¹⁰¹ Kendall-Taylor, A. et al. (2023), *Identifying Russian Vulnerabilities and How to Leverage Them*, Washington, DC: Center for a New American Security, pp. 11–14, <https://www.cnas.org/publications/reports/identifying-russian-vulnerabilities-and-how-to-leverage-them>; De Chant, T. (2022), 'Russia mulls legalizing software piracy as it's cut off from Western tech', *Ars Technica*, 7 March 2022, <https://arstechnica.com/tech-policy/2022/03/russia-mulls-legalizing-software-piracy-as-its-cut-off-from-western-tech>; *Kommersant* (2022), 'В России легализуют пиратов' [In Russia, pirates are being legalized], 4 March 2022, <https://www.kommersant.ru/doc/5240942>; Luzin, P. (2024), 'Chinese Machine Tools Serve as Russia's Safety Net', *Eurasia Daily Monitor*, 22 January 2024, <https://jamestown.org/program/chinese-machine-tools-serve-as-russias-safety-net/>; Kofman, M. et al. (2022), *Assessing Russian State Capacity to Develop and Deploy Advanced Military Technology*, Washington, DC: Center for a New American Security, <https://www.cnas.org/publications/reports/assessing-russian-state-capacity-to-develop-and-deploy-advanced-military-technology>.

Russia also has its own vulnerabilities on the information front, however. Despite its increasingly tight control over the domestic information environment, and despite new extremes of repression since the start of the war, the Kremlin is performing a careful balancing act between mobilization and demobilization to maintain both domestic regime stability and adequate public support for the war effort. The 2023 Wagner Group mutiny (and subsequent apparent assassination of Yevgeny Prigozhin) and the imprisonment of (but relatively short sentence received by) ultranationalist Igor Girkin (aka Strelkov) are symptomatic of the balancing act and attendant risks. So, too, are the groundswells of citizens who participated in the funeral of opposition leader Alexei Navalny and in the 'Noon Against Putin' voting action on the last day of the March 2024 presidential election.¹⁰²

Despite its increasingly tight control over the domestic information environment, and despite new extremes of repression since the start of the war, the Kremlin is performing a careful balancing act between mobilization and demobilization to maintain both domestic regime stability and adequate public support for the war effort.

While opinion polling shows mass public support for the war as 'relatively weak and unenthusiastic', the regime relies heavily on Russia's heterogeneous nationalist community as a base of support.¹⁰³ Thus, even while clamping down ferociously on other forms of independent or oppositional discourse, the Kremlin has taken a more tepid approach to critical pro-war commentary, allowing the flourishing of the 'Z-universe' of extreme military bloggers and nationalist Telegram channels.¹⁰⁴ The Kremlin's lack of hermetic control over the information environment means it must constantly manage the tension 'between framing and reality'. The regime faces challenges when this dissonance grows suddenly, such as through embarrassing battlefield setbacks or intelligence failures.¹⁰⁵

While the war's consequences have exacerbated Moscow's existing challenges and created new ones, the course of the conflict has also raised important strategic considerations regarding the role of asymmetry in the changing environment

¹⁰² Ваупов, А. (2023), 'Путин начал репрессии против «своих». Какой будет Россия, в которой больше нет Пригожина, Стрелков сидит в тюрьме, а Суровикин непонятно где?' [Putin began repression against 'his own'. What will Russia be like with Prigozhin no longer there, Strelkov in prison and Surovikin who knows where?], *Meduza*, 24 August 2023, <https://meduza.io/feature/2023/08/24/putin-nachal-repressii-protiv-svoih-kakoy-budet-rossiya-v-kotoroy-bolshe-net-prigozhina-strelkov-sidit-v-tyurme-a-surovikin-neponyatno-gde>; Spicer, N. (2024), 'Supporters chant 'We are not afraid' as Russia's Navalny is laid to rest', NPR, 1 March 2024, <https://www.npr.org/2024/03/01/1235121398/kremlin-russia-navalny-funeral>; Kurmanaev, A. and Heitmann, N. (2024), 'Long Lines of Russian Voters Signal Discontent With Putin's Tenure', *New York Times*, 17 March 2024, <https://www.nytimes.com/2024/03/17/world/europe/russia-vote-noon-protests-navalny.html>.

¹⁰³ Mankoff, J. (ed.) (2024), 'Lessons and Legacies of the War in Ukraine: Conference Report', *INSS Strategic Perspectives* 43, p. 44, <https://inss.ndu.edu/Media/News/Article/3693718/lessons-and-legacies-of-the-war-in-ukraine-conference-report>.

¹⁰⁴ Davidoff, V. (2022), 'Reading the Tea Leaves of Russia's Pro-War "Z-Universe"', *Moscow Times*, 14 October 2022, <https://www.themoscowtimes.com/2022/10/13/reading-the-tea-leaves-of-russias-pro-war-z-universe-a79078>.

¹⁰⁵ Boulègue et al. (2023), *Understanding Russia's military vulnerabilities*, pp. 31.

of modern warfare. It raises doubts, for example, about the viability of strategies focused on achieving rapid 'fait accompli' victories through sudden and overwhelming first waves of attack. It also challenges some prior understandings of domain offence–defence balances, indicating areas in which strategies of denial and persistence might be viable against or even favourable over those of superiority. The war likewise raises questions about strategies designed primarily around reliance on exquisite high-end weaponry, often appearing to favour rapid iterations of innovation and adaptation involving the fielding of larger quantities of cheap but expendable 'mass'.¹⁰⁶

The high-tempo cycles of innovation and adaptation and the critical support provided by private companies during the conflict further underscore the importance of rapid acquisition cycles and of public–private partnerships. Russia, while proving itself to be adaptable, has not always shown the same degree of flexibility and innovation as Ukraine has. Russia appears to face more challenges around bureaucratic rigidity, organization and speed of response. Likewise, the country's top-down defence innovation ecosystem and its undernourished private sector pose challenges for future adaptation.

Lessons and policy implications for Western planners

However the war in Ukraine progresses, Russia is likely to continue to leverage its asymmetric capabilities – both below and above threshold – in what it regards as an ongoing and protracted competition with the West. This poses significant risks. But its capacity to do so effectively is also not guaranteed. Western policymakers must take steps to limit this viability. These measures should include the following:

Take steps to intensify the degradation of Russian technological capacity, without becoming narrowly fixated on technological advantage as a solution to every problem. The US and its allies and partners must work together to tighten enforcement of sanctions and export controls, denying Russia access to critical components, supply chains and revenue. These efforts should address sanctions evasion, money laundering, and Russia's still lucrative exports of natural resources and weapons. The US and allies should also further encourage brain drain from Russia's technology sector, using 'loosen[ed] visa regimes' and messaging campaigns to 'welcome and incentivize' the long-term movement of tech talent out of Russia and the resettlement of such talent in Western countries.¹⁰⁷ Given understandable concerns and animosities in a time of war, these efforts to enable some forms of emigration from Russia have not been universal or well synchronized, but they

¹⁰⁶ Mankoff (ed.) (2024), 'Lessons and Legacies of the War in Ukraine', pp. 21–42.

¹⁰⁷ Kendall-Taylor et al. (2023), *Identifying Russian Vulnerabilities and How to Leverage Them*, p. 14.

are nonetheless crucial and should be accompanied by efforts to provide critical support to Russian oppositional civil society, including actors working within Russia and from exile.¹⁰⁸

Take steps to mitigate known and likely vectors of Russian cyber and informational aggression, while working to exacerbate Russia's own informational vulnerabilities. Western countries must prioritize the detection and mitigation of Russian efforts to use sub-threshold means to undermine alliance cohesion and stymie effective Western collaboration and coordination on matters of strategic importance – such as on aid and continuing support to Ukraine. As part of this effort, Western countries should increase relevant intelligence sharing and cyber cooperation. They should leverage these capacities to degrade Russian cyber options, 'pre-bunk' disinformation narratives, and diminish Russian effectiveness in sub-threshold power projection. Efforts should also be taken to magnify the challenges the Kremlin faces in managing Russia's own domestic information space, where possible using intelligence revelations to force the Russian leadership to account for errors and failures. While the regime's current brutal authoritarianism leaves little room for overt domestic dissent, the war is far from universally popular in Russia. Major setbacks for Russia in the conflict will create dilemmas for a regime that is likely uncomfortably aware that with growing repression comes risk of greater authoritarian regime brittleness.

Most critically, continue support for Ukraine. The single most significant factor in contributing to Russia's inability to reconstitute and leverage its asymmetric capabilities effectively in coming years will be ongoing Western support for Ukraine. Western countries must continue to collaborate to provide arms, ammunition, financial support, assistance to refugees and moral solidarity for the Ukrainian war effort. Denying Russia an easy, cheap victory and forcing it to continue in a long attritional struggle will further degrade all elements of its war-making capacity, including its ability to invest in and produce cutting-edge technological enablers. Critically, these efforts will also further undermine the viability of the Kremlin's informational strategy both at home and abroad. They will diminish its ability to effectively introduce turbulence within Western democratic systems. Ultimately, they may also weaken the Putin regime's long-term hold on power.

¹⁰⁸ Kerr, J. (2022), 'Runet's Critical Juncture: The Ukraine War and the Battle for the Soul of the Web', *SAIS Review of International Affairs*, 42(2), pp. 63–84, <https://doi.org/10.1353/sais.2022.0011>; Meduza (2022), 'Стартап для релокации айтишников в Великобританию Immigram выиграл миллион евро инвестиций на Западе' [Startup for IT relocation to the UK, Immigram, won a million euros of investments in the West], 21 November 2022, <https://meduza.io/feature/2022/11/21/startap-dlya-relokatsii-aytishnikov-v-velikobritaniyu-vyigral-million-evro-investitsiy-na-zapade>; Soldatov, A. and Borogan, I. (2024), 'Seeds of Hope Despite Russia's Return to Autocracy', *Europe's Edge*, Center for European Policy Analysis, 21 February 2024, <https://cepa.org/article/seeds-of-hope-despite-russias-return-to-autocracy>.

07 Russia's military-industrial complex and military innovation

Several compound factors – including the impact of sanctions and pre-existing, systemic issues in the defence industry – undermine Russia's ability to procure, develop and make military materiel. At the same time, Russia's military-industrial complex remains surprisingly resilient. For the West, a key lesson is the need to close sanctions loopholes.

Mathieu Boulègue

The Russian military-industrial complex (hereafter OPK)¹⁰⁹ has been severely affected by almost a decade of international targeted sanctions and by the demands of the full-scale invasion of Ukraine. The current situation is untenable for Russia, and is leading the OPK into a period of deterioration and decline. Yet despite its problems, the Russian military industry remains a formidable and resilient force, able to adapt under very challenging conditions. Future Western policy pathways must therefore find innovative solutions to accelerate the OPK's decline, and must limit Moscow's ability to recapitalize its military capabilities and compete with the West and NATO.

¹⁰⁹ Оборонно-промышленный комплекс – *oborónno-promýšlennyj kómpleks*.

State of play of the Russian military-industrial complex

In the context of the war against Ukraine, the state of the Russian military industry is a compound problem affected by several key factors.

Russian defence spending has been increasing since the 2022 full-scale invasion, and is projected to reach a post-Soviet-era high of over 6 per cent of GDP (over \$112 billion) in 2024.¹¹⁰ This means that about every third rouble from the Russian budget will be allocated to supporting the war effort and the military industry.¹¹¹ The rise in defence spending is compounded by the presence of 'unspecified' expenditure probably linked to the war effort, as well as by increased output of civilian industrial goods (metalworking products, consumer electronics, agrochemicals, etc.) that support military activity.¹¹²

Since 2014, international sanctions have impaired the ability of the OPK to regenerate and keep stocks of critical components. The situation is mostly explained by Russia's legacy dependence on imported Western components and industrial equipment for the OPK.¹¹³ The impacts of sanctions and the current war (i.e. since 2022) have shed new light on Russia's critical dependencies on Western components, especially on the 'silicon lifeline'¹¹⁴ provided by dual-use computer chips, semiconductors, and other electronics needed for advanced military systems.¹¹⁵ The equation is fairly simple: the more advanced a Russian weapons system becomes, the greater its dependence on foreign imports.¹¹⁶

Initial Russian responses to pressures on production have mostly consisted of drawing down existing stocks of materials, components¹¹⁷ and ammunition.¹¹⁸ This approach is unsustainable, however, and has failed to prevent shortages of critical military supplies. From 2015 onwards, after Russia's first invasion

¹¹⁰ Bloomberg News (2023), 'Russia Plans Huge Defense Spending Hike in 2024 as War Drags', 22 September 2023, <https://www.bloomberg.com/news/articles/2023-09-22/russia-plans-huge-defense-spending-hike-in-2024-as-war-drag-on>; Kantchev, G., Malenko, A. and Galkina, E. (2024), 'Here's How the Russian and Ukrainian War Efforts Compare, in 10 Charts', *Wall Street Journal*, 6 January 2024, <https://www.wsj.com/world/russia/heres-how-the-russian-and-ukrainian-war-efforts-compare-in-10-charts-1cf9a74f>.

¹¹¹ Miroshnychenko, B. (2023), 'Russia's military-industrial complex is gaining momentum. Where does the money come from, and who helps Russia produce missiles?', *Ukrainska Pravda*, 29 May 2023, <https://www.pravda.com.ua/eng/articles/2023/05/29/7404294>.

¹¹² Bloomberg News (2023), 'Russia's Industry Surges as Putin Seeks to Feed War Machine', 27 September 2023, <https://www.bloomberg.com/news/articles/2023-09-27/russia-s-breakneck-military-buildup-bolsters-sanctioned-economy>.

¹¹³ Luzin, P. (2023), *Russian Military Drones: Past, Present, and Future of the UAV Industry*, Philadelphia: Foreign Policy Research Institute, <https://www.fpri.org/article/2023/11/russian-military-drones-past-present-and-future-of-the-uav-industry>.

¹¹⁴ Byrne, J. et al. (2022), *Silicon Lifeline: Western Electronics at the Heart of Russia's War Machine*, Report, London: Royal United Services Institute, <https://rusi.org/explore-our-research/publications/special-resources/silicon-lifeline-western-electronics-heart-russias-war-machine>.

¹¹⁵ Rácz, A., Spillner, O. and Wolff, G. (2023), *Russia's War Economy: How Sanctions Reduce Military Capacity*, Policy Brief, Berlin: Deutschen Gesellschaft für Auswärtige Politik, https://www.ssoar.info/ssoar/bitstream/handle/document/86644/ssoar-2023-racz_et_al-Russias_War_Economy_How_Sanctions.pdf?sequence=1&isAllowed=y&lnkname=ssoar-2023-racz_et_al-Russias_War_Economy_How_Sanctions.pdf; and Bilousova, O. et al. (2023), *Russia's Military Capacity And The Role Of Imported Components*, Research Paper, Kyiv: KSE Institute, <https://kse.ua/wp-content/uploads/2023/06/Russian-import-of-critical-components.pdf>.

¹¹⁶ Luzin, P. (2023), 'Lagging Production of Machine Tools and Parts Plagues Russian Military-Industrial Complex', *Eurasia Daily Monitor*, 4 December 2023, <https://jamestown.org/program/lagging-production-of-machine-tools-and-parts-plagues-russian-military-industrial-complex>.

¹¹⁷ Luzin, P. (2023), *Russia's Military Industry Forecast 2023–2025*, Report, Philadelphia: Foreign Policy Research Institute, <https://www.fpri.org/article/2023/04/russias-military-industry-forecast-2023-2025>.

¹¹⁸ Malmlöf, T. (2023), *Russia's defense industry at war: Can it live up to expectations?*, Report, Stockholm: Swedish Defence Research Agency, <https://www.foi.se/rest-api/report/FOI%20Memo%208231>.

of Ukraine in 2014, the OPK quickly ran out of higher-end components. This forced Moscow to seek lower-end imported substitutes and to retrofit military platforms with lower-quality systems.¹¹⁹

Furthermore, a combination of import substitution programmes and off-the-shelf procurement from third parties¹²⁰ failed to meet expectations, leaving the OPK with entire production gaps – especially in engines, turbines and microelectronics.

Years of sanctions, increased defence spending and limited procurement alternatives have further exposed the 'Achilles heels' in Russia's defence industry. The list of goods and materials that the OPK struggles to obtain keeps growing by the year.

An additional problem, from Russia's point of view, was that the OPK entered the 2022 war in poor financial shape. The industry was already struggling with crippling financial issues dating from the impact of the first invasion of Ukraine – these included, among other things, profitability problems at the main OPK state corporations,¹²¹ weak debt management, and an inability to diversify production into dual-use and civilian goods.¹²² The OPK is plagued by what has been described as 'military industry overheating':¹²³ an unsustainable model in which a military-industrial complex subject to ever-rising costs accounts for a significant share of Russian economic output that is then immediately consumed in Ukraine.¹²⁴

Years of sanctions, increased defence spending and limited procurement alternatives have further exposed the 'Achilles heels'¹²⁵ in Russia's defence industry. The list of goods and materials that the OPK struggles to obtain keeps growing by the year, and includes: microelectronic components (especially optical systems and microchips), machine-building tools,¹²⁶ special steels and metallurgical products, space-grade materials and components, engines and turbines, and bearings for military vehicles.¹²⁷

¹¹⁹ Bergmann, M. et al. (2023), *Out of Stock? Assessing the Impact of Sanctions on Russia's Defense Industry*, Report, Washington, DC: Center for Strategic and International Studies, <https://www.csis.org/analysis/out-stock-assessing-impact-sanctions-russias-defense-industry>.

¹²⁰ Boulègue, M. (2018), 'Here Is How Russia's Military Industry Is Responding to Sanctions', *The National Interest*, 14 February 2018, <https://nationalinterest.org/feature/here-how-russias-military-industry-responding-sanctions-24505>.

¹²¹ Luzin, P. (2023), 'The Russian army in 2023: military districts, money and the military-industrial complex', Riddle, 17 February 2023, <https://ridl.io/the-russian-army-in-2023-military-districts-money-and-the-military-industrial-complex>.

¹²² Ivanov, V. (2020), 'Оздоровление предприятий ОПК – приоритет власти' [The improvement of defence industry-priority for the authorities], *Novosti VPK*, 17 February 2020, https://vpk.name/news/375160_ozdorovlenie_predpriyatii_opk_prioritet_vlasti.html; and Bolshakova, E. (2020), 'Рынок с ароматом ГОЗ' [Market with the aroma of GOZ], *Kommersant*, 18 March 2020, <https://www.kommersant.ru/doc/4290231>.

¹²³ Sapozhkov, O. (2023), 'Военно-промышленный перегрев' [Military-industrial overheating], *Kommersant*, 15 December 2023, <https://www.kommersant.ru/doc/6397842>.

¹²⁴ Luzin (2023), 'The Russian army in 2023: military districts, money and the military-industrial complex'.

¹²⁵ Connolly, R. and Boulègue, M. (2018), *Russia's New State Armament Programme: Implications for the Russian Armed Forces and Military Capabilities to 2027*, Research Paper, London: Royal Institute of International Affairs, <https://chathamhouse.soutron.net/Portal/Public/en-GB/RecordView/Index/180296>.

¹²⁶ Luzin (2023), 'Lagging Production of Machine Tools and Parts Plagues Russian Military-Industrial Complex'.

¹²⁷ Bergmann et al. (2023), *Out of Stock? Assessing the Impact of Sanctions on Russia's Defense Industry*.

The state of the OPK is worsened by wider socio-economic issues linked to low workforce productivity and a continuing brain drain. Overall productivity in the OPK was never impressive, but the impacts of the initial 2014 invasion, the COVID-19 pandemic¹²⁸ and international sanctions have only made things worse. To sustain the war effort, the Russian government has made repeated calls to increase military-industrial output,¹²⁹ notably by extending the number and length of work shifts, cancelling holidays and days off, or keeping production chains open for longer periods.¹³⁰

Wartime solutions for mitigating shortages of materiel, however, are facing an insurmountable problem: the limited life cycle of machine-building tools and industrial machines used for military production. Moscow is seeking to achieve an impossible balance between increasing output and preserving Western-imported tools that cannot be replaced because of sanctions. The OPK might be tempted to cannibalize machine tools from the civilian world – for instance, from the automotive industry – in response, but this will not solve the issue in the long term.

Furthermore, the OPK is crippled with systemic workforce issues in terms of quality (a decline in technical education, ineffective recruitment, and a continuing gap between personnel needs and applicant capabilities)¹³¹ and quantity (the brain drain,¹³² problems retaining staff, poor working conditions, etc.).

In February 2024 Russia's president, Vladimir Putin, boasted that the OPK had created 520,000 new jobs since the start of the full-scale invasion and was currently employing 3.5 million workers.¹³³ Regardless of the veracity of such statements, they hint at the implicit 'responsibility' of the OPK for maintaining employment – and thus social stability – across Russian regions.

Many of the above problems negatively affected OPK production capabilities at the start of the full-scale invasion of Ukraine, preventing the industry from reaching surge production capacity in 2022 – the shortfall was also due, not least, to the fact that the industry had not been informed of the looming invasion.¹³⁴ Rather, surge production had been requested in the current State Armament Programme (GPV), running until 2027, with the aim of building peacetime stockpiles through 'serial and uninterrupted' production of military equipment.

¹²⁸ Boulègue, M. (2020), 'How Is The Russian Military Responding To Covid-19?', War on the Rocks, 4 May 2020, <https://warontherocks.com/2020/05/how-is-the-russian-military-responding-to-covid-19>.

¹²⁹ President of Russia, Vladimir Putin (2022), 'Meeting with members of the Coordination Council under the Government to meet the needs of the RF Armed Forces', press release, 24 November 2022, <http://www.kremlin.ru/events/president/news/69932>.

¹³⁰ *Moscow Times* (2023), 'Russian Defense Chief Says Military Factories Working 'Around the Clock'', 2 January 2023, <https://www.themoscowtimes.com/2023/01/02/russian-defense-chief-says-military-factories-working-around-the-clock-a79864>.

¹³¹ Luzin, P. (2022), 'Russia's Defense Industry Growing Increasingly Turbulent', *Eurasia Daily Monitor*, 17 November 2022, <https://jamestown.org/program/russias-defense-industry-growing-increasingly-turbulent>.

¹³² Zysk, K. (2023), 'Struggling, Not Crumbling: Russian Defense AI in a Time of War', RUSI Commentary, Royal United Services Institute, 20 November 2023, <https://rusi.org/explore-our-research/publications/commentary/struggling-not-crumbling-russian-defence-ai-time-war>.

¹³³ President of Russia, Vladimir Putin (2024), 'Meeting with activists participating in the Everything for Victory! forum', press release, 2 February 2024, <http://en.kremlin.ru/events/president/news/73368>.

¹³⁴ Massicot, D. (2023), 'What Russia Got Wrong. Can Moscow Learn From Its Failures in Ukraine?', *Foreign Affairs*, 8 February 2023, <https://www.foreignaffairs.com/ukraine/what-russia-got-wrong-moscow-failures-in-ukraine-dara-massicot>.

Prospects for military-industrial adaptations and evolution

The OPK has demonstrated resilience since the start of the full-scale invasion, as the events of the war have forced it to adapt and recover from shocks. Military-industrial output has not collapsed: the OPK can still produce sufficient amounts of hardware and ammunition to sustain the war effort for the time being. However, the industry must perform a constant balancing act between managing existing stocks,¹³⁵ procuring and modernizing existing platforms, taking legacy platforms out of storage¹³⁶ and increasing production in other sectors.¹³⁷

Despite sanctions, Russia has demonstrated a continued ability to access sufficient amounts of Western military-grade components.¹³⁸ Adaptation to the current sanctions regime has been one of the strong suits of Russia's military industry: Moscow benefits from insufficient external enforcement of sanctions, loose secondary sanctions regimes, and gaps in export controls on third-party countries.¹³⁹

Several mechanisms to circumvent sanctions are in place. Moscow is evading sanctions primarily by importing from third-party countries that have not sanctioned Russia in the first place – countries like China, Iran, North Korea (via the infamous 'Orient Express' ammunition supply routes),¹⁴⁰ Türkiye, Kazakhstan, Belarus and so on. This allows the OPK to directly import a mix of off-the-shelf systems (for instance, Iranian attack drones) and critical military components. The defence industry also uses well-established networks of non-sanctioned intermediaries,¹⁴¹ shell companies, concealed entities and 'neutral' countries to import products semi-legally into Russia.¹⁴²

¹³⁵ Stewart, P. and Ali, I. (2022), 'Burning through ammo, Russia using 40-year-old rounds, U.S. official says', Reuters, 12 December 2022, <https://www.reuters.com/world/europe/burning-through-ammo-russia-using-40-year-old-rounds-us-official-says-2022-12-12>.

¹³⁶ Cotovio, V. et al. (2023), 'Russia is sending museum pieces into war, but experts say they may still be effective', CNN World, 8 May 2023, <https://www.cnn.com/2023/05/08/europe/russia-t-55-tanks-ukraine-intl-cmd/index.html>; and *Moscow Times* (2023), 'Russia Pulls Thousands of Soviet-Era Military Vehicles From Major Storage Facility', 8 August 2023, <https://www.themoscowtimes.com/2023/08/08/russia-pulls-thousands-of-soviet-era-military-vehicles-from-major-storage-facility-a82088>.

¹³⁷ Ovsyaniy, K. et al. (2023), 'Satellite Images Suggest Russia Is Ramping Up Production Capacity For Its War Against Ukraine', Radio Free Europe/Radio Liberty, 1 November 2023, <https://www.rferl.org/a/russia-ramping-up-war-production/32658857.html>.

¹³⁸ Bilousova, O. et al. (2024), *Challenges of Export Controls Enforcement: How Russia Continues to Import Components for Its Military Production*, Research Paper, Kyiv: KSE Institute, <https://kse.ua/wp-content/uploads/2024/01/Challenges-of-Export-Controls-Enforcement.pdf>.

¹³⁹ Bilousova et al. (2023), *Russia's Military Capacity And The Role Of Imported Components*.

¹⁴⁰ Byrne, J., Byrne, J. and Somerville, G. (2023), *The Orient Express: North Korea's Clandestine Supply Route to Russia*, Report, London: Royal United Services Institute, <https://rusi.org/explore-our-research/publications/commentary/report-orient-express-north-koreas-clandestine-supply-route-russia>; and Bermudez, J. S., Cha, V. and Jun, J. (2023), 'Dramatic Increase in DPRK-Russia Border Rail Traffic After Kim-Putin Summit', *Beyond Parallel*, 6 October 2023, <https://beyondparallel.csis.org/dramatic-increase-in-dprk-russia-border-rail-traffic-after-kim-putin-summit>.

¹⁴¹ Ezhov, S. (2024), 'Our man in Brussels: The Insider has unmasked GRU officer helping the Kremlin evade sanctions from his base in the heart of Europe', *The Insider*, 27 January 2024, <https://theinsider.ru/en/politics/268669>.

¹⁴² Miroshnychenko, B. (2023), 'Russia's military-industrial complex is gaining momentum. Where does the money come from, and who helps Russia produce missiles?', *Ukrainska Pravda*, 29 May 2023, <https://www.pravda.com.ua/eng/articles/2023/05/29/7404294>; and Bilousova et al. (2023), *Russia's Military Capacity And The Role Of Imported Components*.

Russia also smuggles components through illicit networks and along grey-market supply chains,¹⁴³ mainly through the Russia-led Eurasian Economic Union (EAEU), the Balkans, China, Türkiye and Iran.¹⁴⁴ This situation is creating a form of parallel black-market economy for the supply of certain components, a market that helps sustain Russia's official war economy.

Despite established sanctions evasion mechanisms, the OPK's current adaptations are not fully sustainable for Russia over the long term.

Yet despite established sanctions evasion mechanisms, the OPK's current adaptations are not fully sustainable for Russia over the long term. Russian efforts to evade sanctions involve additional cost, and can result in problems such as the procurement of lower-quality components, unpredictable delivery quantities, and delays in supply.¹⁴⁵ Imported components tend to be lower-quality substitutes,¹⁴⁶ and reliance on off-the-shelf foreign systems disincentivizes innovation in Russia's own military industry, thereby jeopardizing potential future technological developments. Third-party imports are only a stopgap measure for the OPK, not a long-term solution:¹⁴⁷ the Russian military industry will ultimately have to address its own challenges in domestic production if it wants to survive.

Due to structural limitations, the OPK is thus ill adapted to deal with the effects of a prolonged war against Ukraine or to achieve a sustainable future in terms of production, innovation and development. Indeed, Russia's highly centralized, state-based approach to military research and development (R&D) is contrary to current worldwide trends, most notably seen elsewhere in private sector-led and venture capitalism approaches to innovation. Existing Russian innovation structures such as the Advanced Research Foundation and the Era technopolis simply cannot compete with their Western equivalents.

Russian efforts to support military innovation and breakthrough technologies display various degrees of inadequacy – key problem areas include microchip production (where Russia critically lags),¹⁴⁸ military artificial intelligence (AI),¹⁴⁹

¹⁴³ Miroshnychenko, B. (2022), 'Контрабандна пухлина. Як Росія краде військові технології та що з цим робити' [Contraband tumor. How Russia steals military technology and what to do about it], *Ekonomichna Pravda*, 17 May 2022, <https://www.epravda.com.ua/publications/2022/05/17/687111>; and Barnes, J. E., Schmitt, E. and Gibbons-Neff, T. (2023), 'Russia Overcomes Sanctions to Expand Missile Production, Officials Say', *New York Times*, 13 September 2023, <https://www.nytimes.com/2023/09/13/us/politics/russia-sanctions-missile-production.html>.

¹⁴⁴ Bergmann et al. (2023), *Out of Stock? Assessing the Impact of Sanctions on Russia's Defense Industry*.

¹⁴⁵ Rącz, Spillner and Wolff (2023), *Russia's War Economy: How Sanctions Reduce Military Capacity*.

¹⁴⁶ Bergmann et al. (2023), *Out of Stock? Assessing the Impact of Sanctions on Russia's Defense Industry*.

¹⁴⁷ Popova, A. (2023), 'How to exploit Russia's addiction to Western technology', *Foreign Affairs*, 3 November 2023, <https://www.foreignaffairs.com/china/how-exploit-russias-addiction-western-technology>.

¹⁴⁸ Niskanen, J. (2023), *Russia's ICT infrastructure and its development prospects in the near future*, Research Publication, Finnish Defence Research Agency, https://puolustusvoimat.fi/documents/1951253/2815786/15_Niskanen.pdf/cbaf50be-e7b8-6802-7c57-495c52943a9c/15_Niskanen.pdf?t=1696849366521.

¹⁴⁹ Zysk, K. (2023), 'Struggling, Not Crumbling: Russian Defense AI in a Time of War', RUSI Commentary, Royal United Services Institute, 20 November 2023, <https://rusi.org/explore-our-research/publications/commentary/struggling-not-crumbling-russian-defence-ai-time-war>; and Nadibaidze, A. (2023), *Russian Perceptions Of Military AI, Automation, And Autonomy*, Report, Philadelphia: Foreign Policy Research Institute, <https://www.fpri.org/wp-content/uploads/2022/01/012622-russia-ai-.pdf>.

robotization of the armed forces,¹⁵⁰ and other advanced technologies.¹⁵¹ The situation is exacerbated by the mass exodus of scientific and intellectual capital from Russia. Prospects for military R&D are also limited by well-known structural factors such as corruption, bureaucracy, insufficient funding and so on.¹⁵²

Although the Kremlin and Putin himself are betting on technology to propel Russia into the future,¹⁵³ Moscow will probably limit the number of high-tech and R&D programmes in its next GPV cycle after 2027. Pathways to military innovation are still available in Russia, although genuine advances in capabilities are likely to be incremental and limited to very specific segments.¹⁵⁴ The OPK is not yet facing an existential crisis in terms of innovation models and advanced military technology, but the feasibility of it developing 'next-generation' weapons¹⁵⁵ can certainly be called into question. Increased reliance on foreign partners such as China, Iran or North Korea for technological and knowledge exchanges will not solve the aforementioned problems. These are but a few of the many outstanding challenges with the OPK that the new defence minister, Andrei Belousov, will have to take on.

Lessons learned and policy implications for Western military planners

After a decade of international targeted sanctions and an attempt at an impossible full-scale invasion of Ukraine, the Russian military industry is struggling. In 2023, Putin was confident that Russia's military-industrial strength would make victory in Ukraine 'inevitable'.¹⁵⁶ Instead, the Russian OPK is now going through decline and deterioration: the production of military hardware and components has had to be simplified, productivity rates are falling, production chains are stretched, the quality and sophistication of weapon systems are deteriorating, and prospects for improvement in R&D and innovation are slim.

Even though the entirety of the OPK is not turned towards supporting the war effort, the ongoing degradation of the military industry will undoubtedly impair Russia's ability to prosecute the war, particularly when it comes to continuing the

¹⁵⁰ Marcinek, K. and Han, E. (2023), *Russia's Asymmetric Response to 21st Century Strategic Competition: Robotization of the Armed Forces*, Report, Santa Monica, California: RAND, https://www.rand.org/pubs/research_reports/RRA1233-5.html.

¹⁵¹ Lehtinen, S. et al. (2022), *Russia's technological policy and knowhow in a competitive global context*, Report, Helsinki: Government Administration Department, <https://www.fia.fi/wp-content/uploads/2022/06/russias-technological-policy-and-knowhow-in-a-competitive-global-context.pdf>.

¹⁵² Connolly and Boulègue (2018), *Russia's New State Armament Programme*.

¹⁵³ President of Russia, Vladimir Putin (2024), 'Meeting with activists participating in the Everything for Victory! forum', press release, 2 February 2024, <http://en.kremlin.ru/events/president/news/73368>; President of Russia, Vladimir Putin (2018), 'Послание Президента Федеральному Собранию' [President's message to the Federal Assembly], 1 March 2018, <http://kremlin.ru/events/president/news/56957>.

¹⁵⁴ Zysk, K. (2021), 'Defense innovation and the 4th industrial revolution in Russia', *Journal of Strategic Studies*, 44(4), pp. 543–71, <https://www.tandfonline.com/doi/full/10.1080/01402390.2020.1856090>.

¹⁵⁵ Bendett et al. (2021), *Advanced military technology in Russia: Capabilities and implications*; and Zysk (2021), 'Defense innovation and the 4th industrial revolution in Russia'.

¹⁵⁶ Reuters (2023), 'Putin: Russian military-industrial might makes victory in Ukraine "inevitable"', 18 January 2023, <https://www.reuters.com/world/europe/putin-russian-military-industrial-might-makes-ukraine-victory-inevitable-2023-01-18>.

tempo of high-intensity offensive operations. The OPK's problems will also affect the ability of the armed forces to quickly re-equip, recapitalize military hardware and modernize.¹⁵⁷

However, the Russian military industry remains a formidable machine. It is likely to continue to be able to muddle along, producing 'good enough' systems¹⁵⁸ that will still represent a significant threat to Ukraine, NATO and their allies. This is especially true for stand-off and asymmetric capabilities that have not yet been engaged in the war against Ukraine.¹⁵⁹

Even so, there are segments of military technology where 'good enough' is simply not good enough, especially against the technology of a peer competitor – these sectors include space-grade technology, AI and automation, electronic warfare and hypersonic systems. In this respect, the decline of the military industry will increasingly affect Russia's ability to confront Western countries and NATO symmetrically in conventional and strategic competition, especially as technology becomes an even more significant element of national power.

This imbalance may lead to greater Russian emphasis on low-tech warfare, especially for sub-threshold and grey-zone operations as part of Russia's enduring low-intensity attacks on NATO and Western interests.

Western policymakers should focus on finding innovative ways to accelerate the decline of the Russian military industry. The aim should be to outsmart and 'out-tech' Moscow in order to blunt Russia's ability to compete with NATO symmetrically and asymmetrically, as well as to limit Moscow's ability to regenerate its armed forces.

As Russia itself is planning on the basis of a war economy, international sanctions against the OPK must equally be on a war footing. There remain many areas in which there is room for sanctions pressure to increase, which would enable the West to squeeze the Russian military industry further.

First, primary and secondary sanctions must be strengthened in sectors supporting those in which the OPK operates. Targets should include dual-use segments such as consumer electronics, heavy industry, metallurgy, heavy chemistry, agrochemicals, nuclear, etc. The aim should be to challenge Russia's technological self-sufficiency in specific weapons systems and platforms (especially the nuclear industry).¹⁶⁰ Ultimately, a shortage of military-related components will create a shortage of weapons systems.

Western policies must identify critical interdependencies along OPK production chains to multiply effects, exploit known vulnerabilities, and seek cascading impacts. In other words, policies should force Russia to 'go cheap' in sectors where quality cannot be compromised, such as in the space industry, electronic warfare, hypersonic systems and the nuclear industry.

¹⁵⁷ Dalsjö, R., Jonsson, M. and Norberg, J. (2022), 'A Brutal Examination: Russian Military Capability in Light of the Ukraine War', *Survival*, 64(3), pp. 7–28, <https://www.tandfonline.com/doi/full/10.1080/00396338.2022.2078044>.

¹⁵⁸ Connolly and Boulègue (2018), *Russia's New State Armament Programme*.

¹⁵⁹ Kofman, M. et al. (2022), *Assessing Russian State Capacity to Develop and Deploy Advanced Military Technology*, Report: Washington DC, Center for a New American Security, <https://s3.us-east-1.amazonaws.com/files.cnas.org/documents/CNAS-Report-RussianTechnology-Oct22-TSP.pdf>.

¹⁶⁰ Rącz, Spillner and Wolff (2023), *Russia's War Economy: How Sanctions Reduce Military Capacity*.

Second, stronger export controls on dual-use and military goods must be applied to actual or potential Russian trade partners to block Russia's ability to use direct and indirect imports. The objective should be to close export control gaps, loopholes and inconsistencies that currently allow Moscow to circumvent sanctions regimes.¹⁶¹ Of special relevance is the need for new secondary sanctions on countries that have not yet officially sanctioned Russia, and for controls on third-party intermediaries that are engaging in semi-legal trade or black-market trade with Russian entities.

Finally, individual countries and coalitions must develop adapted offensive economic statecraft practices to exploit Russian vulnerabilities, especially with regard to dual-use technology and goods. This could take the form of incentivizing a further exodus of scientific expertise from Russia, strengthening economic levers against countries known for enabling OPK-related Russian imports, improving institutional and inter-agency cooperation, increasing oversight of the private sector, and increasing corporate responsibility.¹⁶² Measures could and should also entail delegitimizing Russian arms exports, especially in what the Kremlin considers its 'near abroad'.

¹⁶¹ Bilousova et al. (2023), *Russia's Military Capacity and the Role of Imported Components*; and Bilousova et al. (2024), *Challenges of Export Controls Enforcement*.

¹⁶² Bilousova et al. (2024), *Challenges of Export Controls Enforcement*.

08 Conclusion

Just as the war in Ukraine has highlighted both weaknesses and resilience in the Russian military, the lessons for the West are equally mixed. Signs of Russian vulnerability offer no grounds for Western complacency – but point to the importance of reducing Russia’s war-making capacity by attrition. Above all, continued Western support for Ukraine will remain crucial.

Mathieu Boulègue

More than two years into the full-scale invasion of Ukraine, Russia remains able simultaneously to continue to prosecute the war and to effect wartime adaptations to its command structure. With varying degrees of success, the Kremlin has been able to rapidly mobilize reservists, employ private military companies, sustain military-industrial production for basic systems, and heavily militarize the public information space in support of the war.

In terms of command structure, the separation of the Western Military District into Moscow and Leningrad districts in March 2024 is also telling.¹⁶³ Moscow is now reverting to its ‘comfort zone’, namely Soviet-era command structures in the European theatre. The new Moscow Military District will concern itself exclusively with Ukraine, Belarus and Kaliningrad, which will inevitably be of direct concern to the US and NATO in the Baltic theatre as well as on the eastern flank of the Alliance.

The pace of implementation and the efficiency of continued reforms in the command structure, however, remain to be seen. They will partly depend on the effectiveness or otherwise of the new minister of defence, Andrei Belousov,

¹⁶³ Указ Президента Российской Федерации от 26.02.2024 № 141 “О военно-административном делении Российской Федерации” [Decree of the President of the Russian Federation dated February 26, 2024 No. 141 “On the military-administrative division of the Russian Federation”], 26 February 2024, <http://publication.pravo.gov.ru/document/0001202402260031>, <http://publication.pravo.gov.ru/document/0001202402260031>.

appointed in May 2024. Similarly, it is unknown if the Russian Armed Forces can be a 'learning organization' able to implement genuine changes, whether structural or cultural.¹⁶⁴

On top of wartime adaptations in the command structure, the military industry has displayed resilience in its ability to deliver military equipment and hardware in the war against Ukraine. The ongoing reconstitution of military equipment and hardware will inevitably inform the next cycle of the State Armament Programme (GPV) after 2027, as well as future plans regarding modern military technology and military innovation.

The Russian Armed Forces remain a credible threat to NATO and its allies. In Ukraine, the Russian military has shown it can absorb losses and maintain tactical-operational credibility despite strategic failures. Russian forces can count on improved reconnaissance fire and strike complexes equipped with a vast arsenal of long-range precision munitions, as well as larger quantities of improved uncrewed aerial vehicles (UAVs). Russian long-range strike and stand-off munitions, coupled with multi-layered air defence systems, represent the biggest conventional threat to NATO.

The Aerospace Forces (VKS) and the Russian Federation Navy (RFN) remain critical parts of the nuclear and conventional strategic deterrence force, potentially holding NATO assets at risk of destruction. Finally, asymmetric capabilities – especially the use of cyber and information warfare; electronic warfare for counter-UAV and counter-precision-guided-munitions operations; and space-based assets – are still able to offset NATO and US conventional superiority.

Russia's prospects for regenerating its military machine remain mixed, both in terms of speed and effectiveness. Yet as the war against Ukraine continues, and regardless of the depth of the reconstitution of Russia's military power, the current Kremlin leadership will remain a threat to European and transatlantic security as well as a strategic competitor to NATO and its allies.

Analysis of Moscow's nuclear declaratory policy suggests that if Russia were to suffer sufficiently severe degradation of its conventional military power, such that the leadership deemed the existence of the Russian state to be under threat, this would create conditions under which Russia might consider the use of nuclear weapons.¹⁶⁵ However, this possibility remains remote, especially while Russia's air arms, and its naval forces beyond the Black Sea, remain relatively intact.

Furthermore, Russia will continue to exploit its toolkit of asymmetric capabilities and ambiguous sub-threshold tactics. These tools must no longer be analysed as part of a 'grey zone' or 'hybrid' range of measures aimed at blurring the line between war and peace. They are fundamentally part of Russia's continued low-intensity warfare against Western interests.

¹⁶⁴ Boulègue et al. (2023), *Understanding Russia's military vulnerabilities*.

¹⁶⁵ Fink, A. (2023), *The Wind Rose's Directions: Russia's Strategic Deterrence during the First Year of the War in Ukraine*, Proliferation Papers, No. 65, French Institute of International Relations (Ifri), August 2023, https://www.ifri.org/sites/default/files/atoms/files/ifri_fink_russian_strategic_deterrence_aout2023.pdf.

Continued assessments of Russia's military reform and of its ongoing reconstitution of equipment are vital to understanding in which sectors Moscow still represents a threat to Western interests. Such assessments will be essential for the US and NATO in terms of retaining both a technological and overall deterrence advantage against the Kremlin.

The single most significant factor that can impair Russia's ability to reconstitute its overall military power and leverage asymmetric capabilities in coming years will be ongoing Western support for Ukraine.

Finally, the single most significant factor that can impair Russia's ability to reconstitute its overall military power and leverage asymmetric capabilities in coming years will be ongoing Western support for Ukraine. Western countries must continue to work together to provide Ukraine with arms, ammunition, financial support and refugee assistance, and to show moral solidarity with the Ukrainian war effort.

Denying Russia victory and forcing it to continue in a long attritional struggle will further degrade all elements of its war-making capacity, including its ability to invest in and produce cutting-edge technological enablers. Critically, these efforts will also further undermine the Kremlin's informational strategy both at home and abroad, diminishing its ability to destabilize Western democratic systems and, ultimately, weakening its long-term hold on power.

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Cover image: A destroyed Russian tank in Svitohirsk, Donetsk Oblast, Ukraine, April 2024.

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