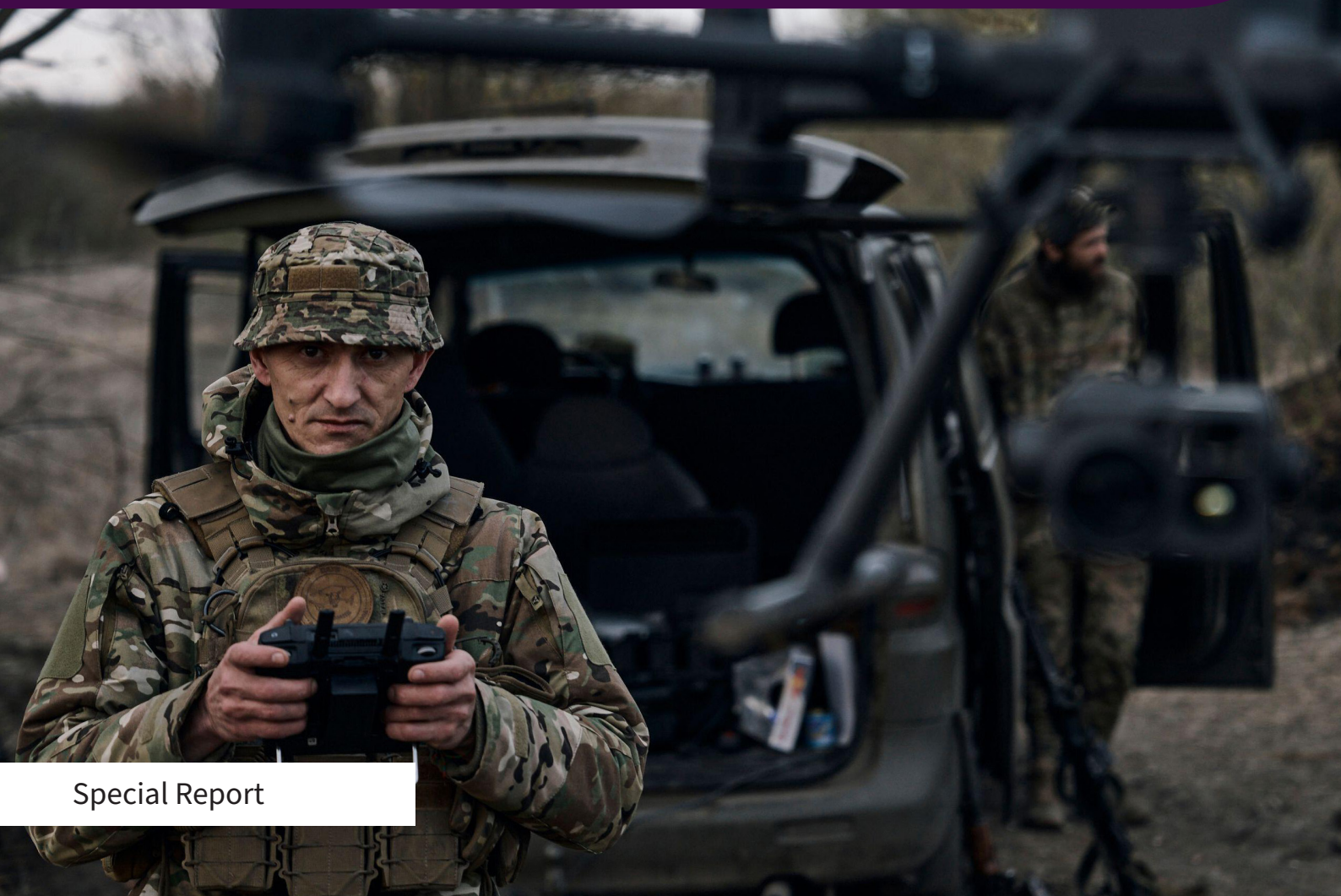


Special Report

Preliminary Lessons from Ukraine's Offensive Operations, 2022–23

Jack Watling, Oleksandr V Danylyuk
and Nick Reynolds



Special Report

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Contents

Executive Summary	1
Introduction	4
I. The Operational Context	7
II. The Ukrainian Offensive of 2023	19
III. Assessing the Causes of Failure	27
A Lack of Surprise	30
Inadequate Force Generation	31
Deficiencies in Planning	32
IV. Identifying Emerging Tactical Challenges	35
Pervasive Observation and Precision Fires	36
Electromagnetic Battlespace Management	37
Accelerated Capability Refresh Cycles	38
Diversification of Last-Mile Resupply	39
Vulnerability of Critical Enablers	41
Conclusion	43
About the Authors	45

Executive Summary

The purpose of this report is to examine the causes of the failure of the Ukrainian offensive in 2023 in order to avoid the repetition of such errors in the future and to inform the regeneration of offensive combat power in NATO militaries.

The original concept of operations for the Ukrainian offensive was sound. It required 12 armoured and mechanised brigades to achieve a breakthrough along 30 km of frontage, the isolation of Tokmak within seven days, and thereafter a breakout south towards Melitopol. Tempo was supposed to prevent Russia from bringing the majority of its forces to bear, so that the attacking force would need to overcome only six regiments in defence.

This concept of operation was not implemented. This arose from operational errors made by both Ukraine and its international partners. Ukraine's international partners missed two critical decision points prior to the offensive. First, whereas Russia began to transition to a war economy from May 2022 and began the mobilisation of troops from the autumn, Ukraine's international partners did not take significant steps to address their industrial limitations. In consequence, while many nations gifted Ukraine a significant proportion of their national stocks, this did not amount to a sufficient volume of equipment to provide the doctrinal minimum of critical enablers required for the concept of operation to be executed.

The second decision point missed was when that equipment needed to arrive in Ukraine. Ukraine's international partners wasted four months in deciding to act, so that only a part of the pledged equipment arrived in Ukraine prior to the offensive, and the Ukrainian brigades did not have enough time to train on the equipment that did arrive. The brigades were, therefore, undertrained at the start of the offensive, which accounts for a significant proportion of the tactical mistakes made during the execution of the operation.

Ukraine also made a series of errors. First, experienced troops were used to hold the line of contact and thereafter conduct fixing operations during the offensive, while the main force was for the most part newly raised. This left the lead elements with a dearth of combat experience, which led to tactical errors during the execution of the operation. Second, Ukrainian planners exacerbated their shortage of properly equipped forces by committing troops on multiple axes, which were then further resourced with ammunition and enablers, at the expense of the main effort. The combination of these two errors limited the ability of the force to operate at and maintain tempo.

The most serious error made in planning by Ukraine appears to have been the basis on which it was determined that the main effort could succeed under these circumstances. Rather than using tempo and concentration to defeat six Russian regiments, it was hoped that shock action would cause Russian troops to break, as had occurred around Kharkiv in 2022. Insufficient planning was done to assess how the critical conditions for such a collapse in morale could be achieved, so that this proved an overly optimistic planning assumption. In the event, the initial attacks failed, and tempo was lost, such that Russia could fight the battle with the full 105,000 troops it had in the target sector.

A lesson for both Ukraine and its international partners is that operational security was inadequate, such that Russia knew precisely where and approximately when the offensive was to take place. This problem was exacerbated by the fact that with only a couple of brigades properly equipped for offensive operations, Russia only had to track a small number of units to determine Ukrainian intent. Given that this lack of security partly stemmed from the multinational process of organising the offensive, this should be examined carefully by NATO, which relies on comparable processes.

There are a great many tactical lessons identified in this paper. Some, however, raise questions about necessary adaptations to prevailing doctrine. First, there is a need to have an effective counter-reconnaissance capability to reduce sustained enemy observation of the intended axes of advance. The inability to screen axes of advance from enemy ISR risks sustained exposure to precision fires, producing an unacceptable rate of equipment loss.

Second is the need for electronic protection, and a corresponding requirement for electromagnetic command and control. Fratricide in the electromagnetic spectrum (EMS) is a major problem for controlling large-scale operations under modern conditions. Given the density of systems dependent on the EMS and the actively contested condition of the spectrum, it is not viable to simply deconflict frequencies at the divisional level.

It was also evident during the offensive that while software-defined systems were critical to the competitiveness of the force, they were also susceptible to targeted electronic warfare interference. This was especially true in relation to precision strike. Over time, the enemy developed hard counters to a range of Ukrainian capabilities including Excalibur and GMLRS (guided multiple-launch rocket systems). It is therefore evident that retaining technological advantage requires the ability to rapidly update systems in the field.

The combination of sustained enemy observation and long-range fires meant that once troops were committed to offensive operations, their ground lines of communication became predictable and targetable, collapsing tempo. Where

operations required gap crossing, the issue of sustainment became insurmountable. The question of how enduring protection of crossing points to sustain a force across a wet gap can be established should be a critical area of capability focus for NATO forces.

Finally, the density of precision effects, even at tactical echelons, has left prestige enablers, such as offensive breaching vehicles, exceedingly vulnerable. Without such assets, there is no mobility, and thus no scope for manoeuvre. NATO militaries should therefore carefully examine how the density of enablers can be increased without overburdening the force, or how enabling capabilities can augment other platforms, such as to improve the organic mobility of units. Dependence on small fleets of specialist enablers is increasingly non-viable when the enemy can discern and engage specific targets within a formation and will do so throughout the depth of an operation.

For Ukraine, the lead times involved in regenerating offensive combat power mean that renewed offensive operations are not viable in the foreseeable future. To that end, Ukraine must now reprioritise inflicting as much damage as possible on the Armed Forces of the Russian Federation to buy the necessary time. At the same time, Ukraine is likely to pursue trying to constrain Russian revenue generation through strikes on Russian revenue-generating infrastructure. Time can be bought, albeit at a heavy price. The question for Ukraine and its international partners is what is done with it.

Introduction

In 2023, Ukraine launched an offensive operation in an attempt to break through Russian defence lines and sever the land corridor occupied by Russia at the neck of Crimea. The operation failed to achieve any of its objectives. Understanding why is vital to ensuring that future Ukrainian operations are properly planned and resourced, and to inform the way in which NATO land forces endeavour to rebuild their offensive combat power.

Several reports on the Ukrainian offensive of 2023, including some contributions by the authors, emphasise tactical considerations in explaining its failure.¹ This report does address tactical lessons, but it is primarily concerned with the operational shortcomings of the offensive, relating to planning, operational decisions, the absolute shortage of critical means, and the challenges of mobilisation, force generation and logistics. The report seeks to shed light on how much decision space the Ukrainian military had, and where decision points actually lay. For example, problems with the concentration of a critical mass of Ukrainian troops on the main effort, and with Ukrainian force quality at the beginning of the offensive, have been widely reported.² This does explain why particular assaults failed. However, the factors leading to these limitations were the result of decisions made months earlier, and so correcting such vulnerabilities has a long lead time.

This report was written in collaboration with the Ukrainian General Staff. The report is based on interviews with Ukrainian military personnel and commanders at tactical, operational and strategic echelons throughout 2023. It also draws on the operational data accumulated by the Ukrainian General Staff on troop strengths, casualties and equipment levels in units. The authors also worked closely with the lessons learned department of the Ukrainian General Staff, responsible for identifying adaptations to training, tactics and organisation for the Armed Forces of Ukraine (AFU). In addition, the authors engaged extensively with Ukraine's international partners throughout the offensive. While

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1. Jack Watling and Nick Reynolds, 'Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive', RUSI, 4 September 2023; Michael Kofman and Rob Lee, 'Perseverance and Adaptation: Ukraine's Counteroffensive at Three Months', *War on the Rocks*, 4 September 2023, <<https://warontherocks.com/2023/09/perseverance-and-adaptation-ukraines-counteroffensive-at-three-months/>>, accessed 1 June 2024; Atlantic Council, 'What's Next for Ukraine's 2023 Counteroffensive?', panel discussion, 13 September 2023, <<https://www.atlanticcouncil.org/event/whats-next-for-ukraines-2023-counteroffensive/>>, accessed 1 June 2024.
 2. *War on the Rocks*, 'Fires and Observation: A Conversation with Jack Watling, Part 2', The Russia Contingency with Michael Kofman, podcast, 25 September 2023, <<https://warontherocks.com/episode/therussiacontingency/29535/fires-and-observation-a-conversation-with-jack-watling-part-2/>>, accessed 1 June 2024.

observations from those interviews shaped the thinking in this report, no data from Ukraine's international partners is used. The report builds on and extends a report written by the authors covering the first six months of the war, published in November 2022.³

This report has a range of methodological limitations that should be declared up front. This is not an impartial piece of analysis. Ukraine is fighting an ongoing war, meaning there are parts of the dataset examined that cannot be released. There are also topics – such as some of the details of the relationship between Ukraine and some of its international partners – that remain sensitive and cannot be addressed. This report also – while identifying a range of shortcomings in decision-making, planning and tactical execution – avoids allocating blame. The authors aim for lessons to be learned, rather than seeking to offer an exercise in accountability. It should also be noted that the data in this report is derived from figures declassified for release in Ukrainian General Staff assessments. Other assessments have been made at various times, which often cite different numbers. In some instances, these may be more precise; in others, they are less so. However, there are very few alternative open source datasets that are persistently available using a consistent methodology across the period under examination. Some of the more complete datasets in the public domain are either Ukrainian or Russian information operations. This report therefore generally uses the Ukrainian General Staff figures because the consistency in methodology allows for like-for-like comparisons over time.

Very briefly, it is worth noting one topic that is conspicuous by its absence: airpower. Much has been written about the importance of airpower in NATO offensive operations. The reality, however, is that while Ukraine's lack of airpower was undoubtedly a serious disadvantage, it would not have been possible to build Ukrainian airpower capabilities in a manner where Ukraine would have been capable of conducting effective close air support inside the threat envelope that prevailed and within the timeframe of the Ukrainian 2023 offensive being planned and executed. Airpower was used during the offensive, with the Russians launching dozens of glide bombs per day onto Ukrainian positions. But in this it was used more as an augmentation of artillery, rather than as a parallel campaign. It therefore affords limited data points to discuss the application of airpower. As such a discussion would be somewhat theoretical, it has been omitted from this report.

The report is divided into four chapters. Chapter I describes the command decisions that shaped Ukrainian operations from September 2022 to the commencement of the offensive in June 2023. It establishes a baseline context

3. Mykhaylo Zabrodskiy et al., 'Preliminary Lessons in Conventional Warfighting from Russia's Invasion of Ukraine: February–July 2022', RUSI, 30 November 2022.

and explains the correlation of forces. Chapter II describes the phases of the Ukrainian offensive, concluding in October 2023. Chapter III analyses the factors that contributed to Ukraine's failure during the summer offensive, which are specific to this conflict. Chapter IV examines tactical and operational challenges that were new and are not accounted for in existing doctrine among Ukraine's international partners, which are relevant for the regeneration of offensive combat power in NATO countries.

I. The Operational Context

In July 2022, the AFU halted the advance of the Armed Forces of the Russian Federation (AFRF) in Donbas. There were three factors that caused the Russian offensive to culminate. Russia had suffered heavy attrition among its best units during the early phase of the conflict – which were, in any case, inappropriately organised for large-scale offensive operations – and was thus finding it difficult to sustain offensive momentum.⁴ The AFRF had been compensating for this shortcoming through the application of an overwhelming fires advantage. Ukraine's use of long-range precision strikes destroying Russian logistical infrastructure in June and July 2022 denied Russian forces this advantage.⁵ After months of bruising defensive operations, this created the first opportunity for Ukraine to seize the initiative.

For Ukraine's political leadership, uncertainty as to the longevity of international support was the critical factor in planning. Ultimately, Ukraine could be defeated in two ways: the AFU could be broken on the battlefield, or the loss of international support could leave it without arms or ammunition. By summer 2022, Ukraine had exhausted its own stocks of most critical munition natures and therefore depended on the international community.⁶ It was also believed that the flurry of gifting of equipment would not last unless Ukraine's international partners perceived a viable path towards favourable war termination.⁷ Thus, the political direction to the AFU was twofold. First, the AFU had to generate a plan for offensive operations that could be sold to Ukraine's international partners, who would need to resource it. Second, successful offensive operations of symbolic significance had to take place imminently. A further drive towards an early offensive was the threat that Russia would annex, depopulate and thereafter entrench the boundaries of the occupied territories. Russian officials had openly

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4. Michael Kofman and Rob Lee, 'Not Built for Purpose: The Russian Military's Ill-Fated Force Design', *War on the Rocks*, 2 June 2022, <<https://warontherocks.com/2022/06/not-built-for-purpose-the-russian-militarys-ill-fated-force-design/>>, accessed 1 June 2024.
 5. Max Hunder and Tom Balmforth, 'Ukraine's Strikes Significantly Reducing Russia's Offensive Potential, Kyiv Says', *Reuters*, 15 July 2022.
 6. Author interviews with senior Ukrainian military and intelligence personnel, Ukraine, April, June and August 2022.
 7. Author interviews with senior Ukrainian officers, Ukraine, June and August 2022.

discussed annexation prior to the invasion,⁸ as well as during its early stages,⁹ and it would mirror the Russian playbook in 2014.¹⁰

The majority of the AFU's combat power in August 2022 was fixed defending the line of contact. Many units had been attrited, and so there was a relatively small number of brigades that had a sufficient level of readiness as a reserve to be used in offensive operations. With political direction to undertake offensive operations, the General Staff had to determine against which axes these forces would be committed. In terms of impact on the war if successful, the most attractive plan was to push south from Zaporizhzhia towards Melitopol and thereby sever the neck of Crimea, while simultaneously cutting the supply lines to Russian forces holding the right bank of the Dnipro River around Kherson. This axis was high risk. The consequence of the thrust would be a long and thin penetration with Russian forces on both sides. If the Russians responded aggressively this thrust could fail. The thrust would be close to the main concentrations of Russian forces in Ukraine at the time, who had been moved to the area to deny this very axis. Many of the Russian troops there had also not participated in the offensive in Donbas and had suffered fewer losses of equipment or personnel. The decision was therefore made to commit several brigades to attack the Russian forces on the right bank of the Dnipro to liberate Kherson, since the river would protect Ukrainian forces from any Russian attempt to counterattack.

The operation to liberate Kherson began on 29 August 2022. The fight would prove challenging.¹¹ The Russians had committed some of their best troops to the city. The fact that the Ukrainian political leadership needed to demonstrate a 'win' to Western partners meant that the objective of the operation had been heavily signalled.¹² The Russians knew what was coming and had prepared three defence lines around the city. Despite the rate of resupply for Russian forces being constrained by the need to move materiel across contested crossing points over the Dnipro, Ukrainian forces found themselves advancing into well-sited ATGM (anti-tank guided missile) ambushes and artillery killing areas. The

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8. *Kommersant*, «Нарышкин оговорился и заявил, что поддерживает присоединение ДНР и ЛНР к России» [‘Naryshkin Misspoke and Stated that he Supports the Accession of the DPR and LPR to Russia’], 21 February 2022, <<https://www.kommersant.ru/doc/5228476>>, accessed 1 June 2024.
 9. Alexander Ryumin, «Источники «Медузы» утверждают: в середине мая в ЛНР и ДНР собираются провести референдум о присоединении к России А в Херсонской области — о создании ХНР» [‘“Meduza’s” Sources Claim: In Mid-May, the LPR and DPR are Going to Hold a Referendum on Joining Russia, and in the Kherson Region – on the Creation of the KhNR’], *Meduza*, 27 April 2022, <<https://meduza.io/feature/2022/04/27/istochniki-meduzy-utverzhdayut-v-seredine-maya-v-lnr-i-dnr-sobirayutsya-provesti-referendum-o-prisoedinenii-k-rossii>>, accessed 1 June 2024.
 10. *BBC News*, ‘Ukraine: Putin Signs Crimea Annexation’, 21 March 2014.
 11. John Hudson, ‘Wounded Ukrainian Soldiers Reveal Steep Toll of Kherson Offensive’, *Washington Post*, 7 September 2022.
 12. Christopher Miller and Paul McLeary, ‘Ukraine has Telegraphed its Big Counteroffensive for Months: So Where is it?’, *Politico*, 16 August 2022, <<https://www.politico.com/news/2022/08/16/ukraine-russia-kherson-00052285>>, accessed 29 March 2024.

Russians used the limited artillery support they had in the region effectively. The AFU made some initial gains,¹³ only for their tempo to diminish as equipment and personnel losses mounted. Nevertheless, Russian troops were in a vulnerable position and, given Ukrainian fire control over their supply lines, risked slowly losing many competent troops.¹⁴ This pressure on Russian supply lines eventually saw Moscow withdraw its forces from Kherson in an orderly manner in October and November 2022.¹⁵

The broader operational challenge faced by Russian forces in summer 2022 was that the initial invasion force was too small to maintain a sufficient concentration of troops across the breadth of the front. As the Kherson operation drew in Russian reserves, the question therefore arose as to whether the AFU could apply pressure elsewhere on the line.

The best place to attack was assessed to be in Kharkiv Oblast, which had several attractions. First, the Russian army lacked forces there, with units having suffered heavily during Russia's offensive in Donbas. Second, as things stood, Iziium remained a launching point for further attacks on Donbas, while the Russians were in artillery range of Kharkiv's suburbs. This latter point, given Kharkiv's significance as a major population centre, made Kharkiv a priority axis. While Russian forces observed Ukraine's build-up of troops on the Kharkiv axis, they lacked forces to respond, having committed them to the south. It is also reasonable to conclude that while Ukraine did not achieve surprise as regards their intentions, they did achieve surprise with the timing of the attack.¹⁶ The gains exceeded Ukrainian expectations, as the Russian Western Group of Forces collapsed.¹⁷ Ironically, although the liberation of Kherson had been prioritised because it was a notable objective, the unexpected speed and scale of the gains in Kharkiv had an outsized effect in convincing Ukraine's international partners that resourcing offensive operations could bring about results, thereby achieving the political goals of the operations.

Autumn 2022 was marked by notable successes on the part of the AFU. Nevertheless, the AFU entered 2023 facing several significant challenges. Over the course of 2022, the AFU had taken approximately 30,000 killed and missing,

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13. Jim Sciutto and Tim Lister, 'Ukrainian Forces Aim to Take Kherson by Year's End as Gains Made in South, US and Ukrainian Officials Say', *CNN*, 7 September 2022.
 14. Sergio Miller, 'A River Too Far: Bridges in Kherson Oblast', *Wavell Room*, 12 October 2022, <<https://wavellroom.com/2022/10/12/a-river-too-far-control-of-bridges-in-kherson-oblast/>>, accessed 29 March 2024.
 15. Sergio Miller, 'Russia's Withdrawal from Kherson', *Wavell Room*, 6 January 2023, <<https://wavellroom.com/2023/01/06/russias-withdrawal-from-kherson/>>, accessed 24 March 2024.
 16. Max Hunder and Vitalii Hnidy, 'Russia Gives up Key Northeast Towns as Ukrainian Forces Advance', *Reuters*, 11 September 2022.
 17. Tim Lister and Darya Tarasova, 'Russia's Collapse in Northeast Ukraine Ignites Fury from Putin Loyalists', *CNN*, 12 September 2022.

and a significant number of wounded.¹⁸ Most losses took place during the Russian offensive on Donbas in May and June 2022, and during the offensive to liberate Kherson. Many of these losses were concentrated among Ukraine's professional military brigades, which had been on the frontline continuously since the beginning of the full-scale invasion. Besides killed and wounded, the AFU had also lost a large quantity of materiel. New units could be mobilised, but without equipment for them they could not be made suitable for offensive operations. The Territorial Defence Forces were left largely unmechanised.

Another challenge was available commands. Although the AFU had capable brigade staffs, these were largely committed to managing defensive sectors. The expansion of the AFU after the invasion increased the number of troops, but there was not a proportional number of experienced brigade staffs so that brigades tended to be given more battalions under command. The limited number of brigade enablers made it difficult to rotate full brigades off the line of contact so that they could conduct exercises to prepare for brigade operations. The challenge of rotation was exacerbated by the risks involved, due to the congestion it caused on the roads.¹⁹ Given the persistent threat to Ukraine's training areas from Russian long-range strikes,²⁰ and the lack of ammunition, spares or platforms to equip new units, Ukraine could raise new units, but training and equipping them depended on support from the country's partners. If the AFU was to conduct further successful offensive operations, it needed to build new brigades, appropriately equipped for the task.

The main outlines of a plan for a major offensive were in place by September 2022. The successes of the Kherson and Kharkiv offensives created the political belief that liberating further territories held by Russia could be possible. This spurred the Ramstein process – in which Ukraine's international partners pledged the provision of materiel and other support – to begin cohering donations of equipment from Ukraine's allies. Unfortunately, the process of agreeing what equipment could be gifted took almost three months,²¹ with pledges only made in January 2023.²² This wasted time would come at a terrible price later in the year. The process also established a clear tension between the need to sell the plan and the requirements of operational security. Regrettably, both Ukrainian

18. Data from Ukrainian General Staff.

19. Author observation of a brigade rotation on roads in Kharkiv Oblast, October 2022.

20. One training area visited by the authors prior to the Ukrainian summer offensive had recently been struck by 18 Russian long-range fires systems.

21. Katrin Bennhold, 'Germany's Chancellor has "A Lot" for Ukraine. But No Battle Tanks', *New York Times*, 25 September 2022; John Lough, 'Scholz Will Bow to Pressure to Send Tanks to Ukraine', Chatham House, 23 January 2023, <<https://www.chathamhouse.org/2023/01/scholz-will-bow-pressure-send-tanks-ukraine>>, 1 June 2024.

22. Tim Martin, 'Ukraine Contact Group Meeting Caps off Deluge of New Arms Pledges, But No German Leopards', *Breaking Defense*, 20 January 2023, <<https://breakingdefense.com/2023/01/ukraine-contact-group-meeting-caps-off-deluge-of-new-arms-pledges-but-no-german-leopards/>>, accessed 29 March 2024.

messaging and speculation by Western officials were already setting clear expectations of a Ukrainian spring offensive and its potential objectives as early as December 2022. These discussions were noted in Moscow.

In response to Ukraine's offensive operations, the AFRF adopted several measures to stabilise their front that would fundamentally alter the context for the future Ukrainian offensive. First, the AFRF had declared mobilisation to raise troop levels after the Ukrainian breakthrough in Kharkiv exposed how Russian forces were stretched.²³ Second, the AFRF withdrew from the right bank of the Dnipro through Kherson, turning the river into a natural defensive barrier and securing their flank. Third, the Russians set about building deliberate defences across the approaches to the neck of Crimea in Zaporizhzhia Oblast.²⁴ Mobilisation did not rapidly produce well-trained soldiers. The defence lines would also take time to erect. Russia therefore embarked on an offensive in late January 2023, beginning in Vuhledar²⁵ but rapidly spreading to most of the eastern front, with a particular emphasis on the city of Bakhmut.²⁶ This ill-prepared offensive using under-trained troops was extremely costly for the Russians, but the command appears to have judged that it could trade lives for time.

Russian mobilisation placed the AFU in a challenging position, where tactical successes could increasingly expose Ukraine to operational vulnerability over time. There has been a protracted debate about the efforts expended by the AFU in the defence of Bakhmut.²⁷ Once depopulated by shelling, the city itself was of little value. However, the concern within the Ukrainian General Staff was that if Bakhmut fell without the AFRF culminating there, their next objective would be Chasiv Yar. Chasiv Yar not only straddles a ridge that would have facilitated further offensive operations, but if captured would also bring the rail and ground lines of communication from Kostyantynivka under Russian fire control and could bring Kramatorsk within range of Russian artillery, risking its depopulation.²⁸ Furthermore, if the Russians did not culminate in Bakhmut

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23. Pjotr Sauer, 'Putin Announces Partial Mobilisation and Threatens Nuclear Retaliation in Escalation of Ukraine War', *The Guardian*, 21 September 2022.
 24. On the evolution of the Surovikin Line, see Brady Africk, 'Ukraine Maps Show the Price of Allies' Hesitation', *Washington Post*, 1 August 2023.
 25. *Reuters*, 'Russia Likely Lost Dozens of Armoured Vehicles Near Ukraine's Vuhledar', 10 February 2023.
 26. Josh Holder and Marco Hernandez, 'How Russia's Offensive Ran Aground', *New York Times*, 6 April 2023.
 27. Jamie Dettmer and Veronika Melkozerova, 'Zelenskyy Digs in Against Calls to Quit Bakhmut', *Politico*, 17 March 2023, <<https://www.politico.eu/article/zelenskyy-digs-in-against-calls-to-quit-bakhmut-us-western-allies-eu-russia-frontlines-valeriy-zaluzhnyy-kyiv-soledar-kupol/>>, accessed 29 March 2024; Isabella Kurshudyan, Paul Sonne and Karen DeYoung, 'Ukraine Short of Skilled Troops and Munitions as Losses, Pessimism Grow', *Washington Post*, 13 March 2023; Phillips Payson O'Brien and Mykola Bielieskov, 'What the Battle in Bakhmut has Done for Ukraine', *The Atlantic*, 22 April 2023.
 28. Because the AFRF culminated in Bakhmut in 2023, they were unable to pursue this objective until 2024, but the risk remains extant. See Warren Murray, 'Ukraine War Briefing: Chasiv Yar is Russians' Next Big Objective, Says Oleksandr Syrskyi', *The Guardian*, 15 April 2024.

they would force the AFU to fight for vital ground at a time when the intent was to be committing resources to offensive operations elsewhere.

Given that Russia's assault on the city offered the prospect of an urban defence where the AFU could inflict disproportionate losses, the decision was made to mount a determined defence of the city. Initially, this decision was vindicated by high Russian losses. However, Bakhmut was a highly unfavourable position to defend, situated in low ground. Russian gains around Bakhmut meant that by February the AFRF had established artillery control over the main ground lines of communication into the city along which Ukrainian troops were rotated. At this point, the disparity in losses became unfavourable for Ukraine. Overall, approximately 10,000 Ukrainian troops were killed or severely wounded during the fight for and around Bakhmut.²⁹ Russian forces attacking the city were largely composed of Wagner Group troops and mobilised convicts, with support from the VDV (Russian Airborne Forces). In total, 19,547 Wagner fighters were killed in Bakhmut, with a similar number seriously wounded.³⁰ In theory, this produced a 4:1 exchange ratio in favour of Ukraine. However, 88% of Wagner losses were of mobilised convicts, with the number of trained Wagner troops killed averaging between 40 and 60 per week.³¹ Thus, while Ukraine was losing experienced personnel, Russia was expending what it considered disposable untrained troops to fix the AFU, while inflicting heavy losses with its 5:1 advantage in artillery.³² Militarily, it is evident that the optimal tactical course of action would have been to withdraw to a new defence line once the AFRF had artillery control of the ground lines of communication into the city.

Politically, however, the Ukrainian government believed that withdrawing from Bakhmut came with considerable risk. The decision point for the withdrawal coincided with several key decisions on the release of critical equipment, including tanks, munitions and enablers to Ukraine, mainly from Germany, for the planned offensive. The idea of the news from the front being Russia's success against its main objective was, therefore, judged to endanger the speed with which Ukraine's international partners would push materiel forward. Thus, the city was allowed to acquire a strategic symbolic significance that defied operational military logic.³³

By February 2023, the scale of a Ukrainian offensive had been determined, based on the volume of equipment being supplied by Ukraine's partners and the troops

29. Author interviews with senior Ukrainian officers responsible for the operation, Ukraine, February 2024.

30. Olga Ivshina and Olga Prosvirova, "Immoral but Effective." How the "Wagner" Private Military Company Lost 17,000 Prisoners in the Assault on Bakhmut', *BBC News Russian*, <<https://bbcrussian.substack.com/p/how-wagner-lost-17000-fighters-in-bakhmut>>, accessed 24 June 2024.

31. *Ibid.*

32. *Ibid.*

33. Gaelan Hanlon, 'How Long Should Ukrainian Forces Defend Bakhmut? Lessons from Stalingrad', Modern War Institute at West Point, 18 April 2023, <<https://mwi.westpoint.edu/how-long-should-ukrainian-forces-defend-bakhmut-lessons-from-stalingrad/>>, accessed 1 June 2024.

that had been raised to conduct it. Ukraine and its partners thereafter set about apportioning equipment and training to these units. The challenge that emerged from the fight for Bakhmut was that many of those lost were experienced troops who could have been seeded throughout new units to raise their tactical proficiency. Instead, while experienced forces held the Russians back, new units were prepared for the offensive.

By March 2023, equipment deliveries were starting to arrive in Ukraine.³⁴ Given the limitations of available equipment in NATO countries that had run down their own militaries for three decades, the donations of equipment represented a large proportion of national stocks. It is important here to reflect on the scale of the conflict, as it highlights the extent to which many of Ukraine's international partners have come to depend on fleets of military equipment that are manifestly too small for the purpose for which the equipment was procured. Relative to Russian forces, the quantity of equipment provided to Ukraine has been small. The total number of tanks given to Ukraine as aid over the course of the war is 671. Only 150 of these are Western models, with the majority Soviet models. At the same time, Ukraine has captured 495 Russian tanks over the course of the war, which makes Russia its largest single supplier of tanks. Ukraine received 480 infantry fighting vehicles from its international partners, more than 300 of which were BMP-1s. Ukraine has also captured 424 Russian BMPs.³⁵ And yet, Russian equipment levels in theatre have expanded over the course of the fighting, with Russia producing and refurbishing approximately 1,500 tanks per year.³⁶

It could be argued that there was and to some extent is a significant cognitive dissonance between what Ukraine's international partners gave to Ukraine and what they thought could be achieved. In essence, while what was gifted was a significant proportion of the national stocks of Ukraine's partners, that did not make the volume of equipment commensurate with the task. The inability of Western officials to grasp the scale of the fighting sat behind a persistent misalignment of expectations and outcome that haunted the 2023 Ukrainian offensive.³⁷ This hype was exacerbated by Ukrainian information operations.

The commitment of experienced troops to blunt the Russian winter–spring offensive meant that the new units raised for the Ukrainian offensive were predominantly made up of fresh recruits. This was identified by commanders of these units in after-action reviews as a mistake, as it left an insufficient

34. *France24*, 'Britain's Challenger Tanks Have Arrived in Ukraine: Kyiv', 27 March 2023.

35. Data from Ukrainian General Staff.

36. Ukrainian assessment of Russian tank production, the basis for which was reviewed by the authors in February 2024.

37. Siobhan O'Grady et al., 'Senior Ukrainian Officials Fear Counterattack May Not Live Up to Hype', *Washington Post*, 6 May 2023.

proportion of the force with combat experience during early engagements.³⁸ These troops received basic training in the UK³⁹ and Europe, and some subsequently received collective training.⁴⁰ Other personnel received specialist training in operating donated equipment.⁴¹ This proved problematic. First, Ukraine received a vast range of equipment, and even within the same platform type it received multiple varieties.⁴² The result was that each formed Ukrainian brigade was fielding up to five different armoured vehicles. Moreover, while equipment that was to be donated had to be brought out of storage and either repaired or demodernised to remove sensitive systems, the equipment that many Ukrainian specialists trained on came from active military units in the donor nation. This meant that the vehicles on which Ukrainian troops trained differed in the workflow, capabilities and maintenance requirements from those that arrived in Ukraine, usually without manuals or spares.⁴³ The result was that the units prepared for the offensive lacked combat experience among their junior leaders, had received accelerated tactical training on equipment that differed from the weapons with which they were to fight, and had a limited ability to maintain and operate the few platforms they received.

More time was needed to build up the readiness of the brigades created for Ukraine's offensive. However, time was also unavailable, as it would give Russia the opportunity to extend and deepen its defence lines and to raise and train more forces. With Russia's force expansion proceeding faster than Ukraine's, there was a point after which no offensive could have been possible.⁴⁴ The key lesson for NATO leaders is that the preference of politicians to defer decisions is extremely costly in war. Just as Russia paid a heavy price for not mobilising in April 2022, Ukraine suffered for not expanding mobilisation, backed by an earlier commitment from its partners to train and equip its forces at scale, made in September 2022.

In planning for the offensive, the Ukrainian General Staff had assessed five options for the axes of advance. First, there was the eastern direction around Bakhmut. This axis offered the greatest freedom of manoeuvre, but there were

38. Author interviews with officers from Ukrainian brigade staffs, July and November 2023 and February 2024.

39. Sam Read and Helen Burchell, 'Ukraine Soldiers in Combat-Training at Secret Camp in East Anglia', *BBC News*, 24 February 2024.

40. Peter Wilke, 'Inside the EU's Military Crash Course for Ukrainian Troops', *Politico*, 22 August 2023, <<https://www.politico.eu/article/eu-military-course-germany-ukraine-russia-war-soldiers-training/>>, accessed 1 June 2024.

41. Here too, technical proficiency was often hyped to suggest tactical proficiency. See Lara Seligman, '“Absolutely a Quick Study”: Ukrainians Master Patriot System Faster than Expected', *Politico*, 21 March 2023, <<https://www.politico.com/news/2023/03/21/ukrainian-soldiers-patriot-missile-training-oklahoma-00088166>>, accessed 1 June 2024.

42. Author observations of brigade equipment sets, 2023.

43. Author interviews with Ukrainian battalion staffs and vehicle crews, 2023.

44. *Wall Street Journal*, 'WSJ Exclusive: An Interview with Ukraine's Volodymyr Zelensky', 3 June 2023.

no objectives in this direction that would alter the logic of the conflict, unless Ukraine could surround or isolate a large body of Russian troops. This was deemed unlikely. All other options would aim to bring the neck of Crimea under physical control or fire control, complementing the roll back of the Black Sea Fleet to bring about the isolation of Crimea, thereby altering the dynamics of the war. The second axis would see amphibious operations across the Dnipro River. This would bypass much of the Russian defence line, but Ukrainian troops would face the same challenge of contested supply lines as had undermined the Russian defence of Kherson. There were three axes heading south. The westernmost axis would strike along a ridge line, parallel to the Dnipro, through Vasilyivka. This had some attractions. It would bypass the densest parts of Russia's defence line, while a large stretch of the axis had been the basis for exercises in Ukrainian professional military education, such that many officers were familiar with the ground. There were drawbacks. First, it would involve two river crossings in the initial phases. Second, it would leave Ukrainian forces advancing on a narrow front, with the risk of being pinned against the Dnipro. Third, this axis would have brought fighting close to the Zaporizhzhia Nuclear Power Plant at Energodar, with the risk that it could be damaged or sabotaged.⁴⁵

The final two axes ran from Orikhiv via Tokmak towards Melitopol, and through Velika Novosilka towards Berdyansk. The density of Russian defences was comparable on these axes, with a slightly greater concentration on the former. The latter, however, required much more ground to be covered to be successful. Considering all these factors, the Orikhiv–Tokmak axis was identified as the direction of the Ukrainian main effort. Fixing actions, meanwhile, would be undertaken towards Bakhmut and threatened across the Dnipro to reduce Russia's lateral redeployment of forces to defend Tokmak. The subsequent blowing of the Nova Kakhovka dam by the AFRF during the first week of the offensive removed the possibility of a fixing operation being executed across the Dnipro.⁴⁶

The AFRF was aware of the Ukrainian plan in detail. Between Ukrainian messaging,⁴⁷ the leaking of highly classified information from the US,⁴⁸ and terrain analysis, the Russians had concentrated their defences on the Orikhiv–Tokmak axis. Thus, by the time the offensive was to be executed, the correlation of forces was unfavourable to Ukraine.

45. Darya Dolzikova and Jack Watling, 'Dangerous Targets: Civilian Nuclear Infrastructure and the War in Ukraine', RUSI, 28 April 2023.

46. *BBC News*, 'Ukraine Dam: What We Know About the Nova Kakhovka Incident', 8 June 2023; James Glanz et al., 'Why the Evidence Suggests Russia Blew up the Kakhovka Dam', *New York Times*, 16 June 2023.

47. Julian E Barnes et al., 'Ukraine's Spring Offensive Comes with Immense Stakes for Future of the War', *New York Times*, 24 April 2023.

48. Aric Toler, Malachy Browne and Julian E Barnes, 'Airman Shared Sensitive Intelligence More Widely and for Longer Than Previously Known', *New York Times*, 21 April 2023.

The offensive plan envisaged Ukraine fielding 12 brigades. As originally conceived, three brigades were to support a fixing operation against Russian forces in the east. Three armoured brigades would then be committed to breach the Russian defence line, with another three mechanised brigades echeloning through to defeat Russian forces defending Tokmak. The final three brigades were to function as an exploitation force. In principle, the breach was to be accomplished within seven days. Such a tempo would mean that the Ukrainian forces would need to defeat six AFRF regiments, producing a favourable local force ratio. In practice, the original plan could not be executed at the time when the offensive was launched because of the equipment and readiness of the brigades.

The brigades for the offensive comprised three brigades of the National Guard of Ukraine (the 3rd, 14th and 15th Brigades) and three tactical groups of the AFU. The latter were called corps (the 9th Corps, the 10th Corps and the 'Maroon' Corps), even though they were definitely not corps, by neither NATO nor Ukrainian standards, lacking corps echelon troops or the cohesion to function as formations. At best, they were division-sized units without divisional or adequate numbers of brigade enablers. Rather than being full armoured and mechanised brigades, the tactical groups consisted of two to three mechanised battalions each, with additional unmechanised units. The subordinate brigades fielded few critical enablers. The original scheme of manoeuvre had been for 9th Corps to be responsible for the initial break-in through the Russian disruption belt, for 10th Corps to penetrate to Tokmak, and for the Maroon Corps to then exploit towards Melitopol. Because these brigades lacked the equipment or readiness to execute a plan at the requisite tempo, the Russians would have time to bring to bear their forces throughout the area of the operation, which shifted the correlation of forces to unfavourable.

In front of the Ukrainian forces were arrayed three defence lines comprising a disruption belt and forward defence line, a main defence line, and a reserve defence line, collectively straddling about 30 km of depth.⁴⁹ These were defended by the 7th Airborne Division and the 42nd Motorised Rifle Division of the AFRF. For every 10 km of defence, the Russians thus had one motorised rifle regiment (70, 71 and 291 Regiments across the frontage of the axis) and one airborne regiment. In the second line were the 56th, 108th and 247th Regiments. The 810th Naval Infantry Brigade of the Russian Federation and one of the battalions of the 177th Naval Infantry Regiment were also deployed.

49. Seth G Jones, Alexander Palmer and Joseph S Bermudez Jr, 'Ukraine's Offensive Operations: Shifting the Offense-Defense Balance', Center for Strategic and International Studies, 9 June 2023, <<https://www.csis.org/analysis/ukraines-offensive-operations-shifting-offense-defense-balance>>, accessed 1 June 2024.

In total, two motorised rifle divisions (19 and 42) and two airborne divisions (7 and 76, consisting of the 104, 234 and 347 Regiments) were available to be brought to the defence lines, under command of the 58th Combined Arms Army. Additional artillery units were also assigned, including the 439th Artillery Brigade, equipped with Tornado-S MLRS (multiple-launch rocket systems). At the beginning of the Ukrainian offensive, the Russians had cached 35 days' worth of supplies of ammunition around their gun lines, amounting to three replenishments of a standard load per day.⁵⁰ In addition, the Russians fielded about 60 combat helicopters.

It should be noted that while the AFRF had reverted back to the divisional and regimental force structure from the battalion tactical group in 2022, the composition of its units at this time was somewhat irregular. Many battalions included Storm-Z companies, territorial units and other attachments, while also lacking some of the conventional elements of their order of battle. The unit designations above should not, therefore, be taken as proxies for the order of battle, but rather as the command and control (C2) elements of the Russian defensive echelons.⁵¹ In total, if the Ukrainian offensive had prosecuted its three phases, there were 105,000 Russian troops that were available to defend the Orikhiv–Tokmak–Melitopol axis. These troops fielded approximately 470 tanks, up to 1,410 armoured fighting vehicles, over 720 artillery systems, up to 230 MLRS, and 12 operational–tactical missile complexes.⁵² However, if the tempo envisaged in the original plan had been achieved, Ukrainian forces would only have had to contend with 30% of these forces.

Lacking the units of action to execute the plan as originally intended, Ukrainian planners nevertheless felt that an offensive had to be attempted, and so began to hypothesise that if the initial attack applied enough pressure, they could advance into a numerically superior enemy by breaking its morale. The defeat mechanism of the Russian defence lines was premised on deep strike and shock action causing localised collapse. It was hoped that this would thereafter lead to a manoeuvre defence that would see Russian troops lose cohesion. These were very optimistic assumptions.

Given that Ukraine fielded approximately 400,000 combat troops including the Territorial Defence Forces, the National Guard and State Border Guards at this time, there has been much discussion as to why more troops were not concentrated for the attack. First, many of these troops were not equipped or trained for breaching operations. But it is also important to note the broader context of the

50. Assessment of Russian forces by GUR (Ukraine Defence Intelligence).

51. For a discussion of the unevenness of Russian force quality and composition, see Kofman and Lee, 'Perseverance and Adaptation'.

52. Data from Ukrainian General Staff.

conflict to appreciate the risks that further concentration would have created elsewhere. Unlike in September 2022, when the Russian concentration in the south came at the expense of other parts of the line, mobilisation had allowed the AFRF to maintain significant forces across the front and to replenish losses. Thus, despite the losses suffered by Russia in early 2023, in July the number of Russian troops fielded in the Operational Group of Forces attacking Ukraine increased to about 450,000 personnel, fielding 2,200 tanks and 5,150 armoured combat vehicles.⁵³

53. *Ibid.*

II. The Ukrainian Offensive of 2023

In mid-May, Ukraine initiated operations on the Bakhmut axis, intended to fix Russian forces ahead of the main effort in the south.⁵⁴ The attack on the Orikhiv–Tokmak axis was opened on 3 June, with operations by supporting brigades to secure the flanks of the main axis. The intent was for artillery preparation and an assault to take place during the night of 3–4 June. During these opening phases, however, several tactical errors were made. First, deconfliction between the troops assigned to the main effort and those that had been holding the front prior to the offensive was inadequate. This led to several incidents of friendly fire and disruption caused by Ukrainian defensive obstacles, prior to the initiation of attacks.⁵⁵ Second, this disruption led to a time lag between the initial fire preparation missions and the assault of approximately three hours, leading to the opening of the main effort commencing after dawn. These errors reflected the limited cohesion carried out at brigade level during training.

Battalions of the 47th, 65th, and 33rd Brigades from 9th Corps opened the offensive with a series of attempted breaches by mechanised companies. MICLIC and UR-77 Meteorit explosive breaching lines were used to create lanes in the minefields, but these were often of insufficient depth to deliver a complete breach, while inexperienced vehicle crews deviated from the cleared path. A lack of demining equipment then became a problem. The corps had 10 demining vehicles, mainly Vincent-1s. These could clear ground but would overheat and shut down after ploughing for a sustained period. Russian units concentrated ATGMs, fired from infantry positions and from tanks stationed on high ground, against the demining equipment. Furthermore, a shortage of mine ploughs meant that usually only the leading vehicle had clearing equipment in each breach. The Ukrainian artillery also lacked smoke rounds to obscure their lines of advance.

The result was that multiple company attacks suffered the same fate. They entered the narrow breaching lanes, only for the lead vehicle to be knocked out or immobilised.⁵⁶ At this point, the cleared lane was too narrow for vehicles to turn, so that, when following vehicles, if either tried to turn around or to move around the destroyed leading vehicle, they would become immobilised by mines.

54. *Reuters*, 'Russia's War on Ukraine Latest: Russia Retakes Land Around Bakhmut', 12 May 2023.

55. Author interviews with Ukrainian brigade and battalion staffs, Orikhiv axis.

56. Author review of footage of multiple breaching attempts accumulated by the Ukrainian General Staff J7. Consistent with author interviews with AFU battalion commanders.

This led to large concentrated groupings of immobilised Ukrainian armour, which would then be targeted by Russian artillery.

Despite the blunting of initial armoured advances,⁵⁷ the first Russian defensive positions were lightly held. Following the initial failed assaults, Ukrainian forces made a series of dismounted attacks drawing on troops from more experienced units, which managed to enter the first series of Russian fighting positions. Consistent with Russian doctrine, the first belt of defensive positions was a disruption zone, and thus Russian forces withdrew from some of their positions before Ukrainian troops entered them during the first two weeks of the offensive, only to counterattack before the enemy could consolidate.⁵⁸ This was not conducted in an orderly manner, and so Russian forces took losses to Ukrainian artillery. There were two drivers of this disorder. First, Russian guns lacked the range to conduct effective counterbattery fire. Second, weeks of Ukrainian propaganda had convinced some Russian soldiers that they were about to face the brunt of NATO's heavy equipment, and morale among some troops was low, although this phenomenon was uneven. Nevertheless, as the mechanised Ukrainian units began to accumulate losses and videos of these engagements spread among Russian troops, their confidence started to recover.⁵⁹

Losses during the initial assaults had an impact on the morale of as yet uncommitted Ukrainian units.⁶⁰ The Ukrainian troops' confidence in both their equipment and training diminished, especially since the second echelon was largely mounted in BMPs that lacked the crew survivability offered by Western infantry fighting vehicles.⁶¹ As a result, Ukrainian commanders moved experienced troops from a range of unmechanised supporting brigades into the line to conduct assaults using dismounted assault group tactics.⁶² Because these units had not been prioritised for the provision of Western equipment, many of them lacked means to support their assaults. This led to the blending of units, with tanks or breaching equipment borrowed from one brigade to support the assault groups of another.⁶³ The result was that in some instances a company attack might have supporting components from up to three brigades enabling the effort. This proved highly problematic. The Ukrainian brigades that were prepared for the

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57. Peter Beaumont and Patrick Wintour, 'Ukraine's Failed Mala Tokmachka Assault Lays Bare Counteroffensive Challenges', *The Guardian*, 14 June.
 58. Michael Kofman et al., 'Russian Military Strategy: Core Tenets and Operational Concepts', CNA, August 2021, <https://www.cna.org/archive/CNA_Files/pdf/russian-military-strategy-core-tenets-and-operational-concepts.pdf>, accessed 1 June 2024.
 59. *Reuters*, 'Russia Says it Hits Leopard Tanks, U.S. Bradley Vehicles in Ukraine', 11 June 2023.
 60. Howard Altman, 'Ukraine's Big Offensive Kicks Off to Tough Resistance', *The Warzone*, 8 June 2023, <<https://www.twz.com/ukraines-big-offensive-kicks-off-to-tough-resistance>>, accessed 1 June 2024.
 61. Author interviews with AFU battalion, Zaporizhzhia, July 2023 and February 2024.
 62. This approach was consistent with how many Ukrainian units outside the three corps were trained; author observation of assault group training, Ukraine, April 2023.
 63. Author review of combat footage of assaults conducted during this period, Zaporizhzhia Oblast, July 2023.

offensive also had not previously practised working with the brigades protecting their flanks. For those troops lacking combat experience, with very short training courses in the West, control of direct fire was a serious problem, such that there were many cases of friendly fire between intermingled sub-units from different brigades. Despite these complications, the assault units did make some progress into the Russian defence lines.

As Ukrainian forces got deeper into the defences, new challenges started to emerge. First, by late June, Russian troops started to counterattack. At first, this involved the use of their artillery, held out of range of the front, to destroy abandoned fighting positions once they were occupied by Ukrainian troops. Second, Russian troops began to use dismounted infantry supported by armour to attack the positions at night.⁶⁴ Given that each Ukrainian battalion produces at best two platoons of fully capable assault troops, it was vital that Ukrainian forces replaced assault troops with line infantry on positions they occupied. In general, there were insufficient troops to conduct rotations. The tempo of Russian counterattacks also meant that troops would then need to be resupplied. Resupply at night through the narrow breaches in the minefields was extremely dangerous, especially given the limited availability of night vision equipment, and Russia's use of artillery-deployed scatterable mines. Thus, Ukrainian units often had to resupply during the day, when Russian troops would begin to attack the resupply routes using FPV loitering munitions and barrel-launched ATGMs fired by tanks from hilltops, and attack aviation firing ATAKA and Vikhr ATGMs.⁶⁵ Given the absolute shortage of demining equipment, this often had to be accomplished by hand, which was slow and dangerous. The overall effect was to prevent any build-up of tempo, such that Ukrainian units had to continually attack prepared positions.⁶⁶

The loss of enablers in 9th Corps meant that this equipment had to be committed from 10th Corps to continue the attacks. Without these enablers, and without the C2 to conduct a large-scale forward passage of lines in a convoluted battlespace, 10th Corps began to be committed piecemeal, not only on the main axis, but also on the eastern axis around Bakhmut, and on the supporting Velika Novosilka axis.

Eventually, Ukrainian troops managed to gain sufficient lodgements to push further into the defences in some sectors. These were, however, highly predictable

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64. Author interviews with personnel involved in these attacks, Ukraine, July and November 2023 and February 2024.
65. Thomas Newdick and Tyler Rogoway, 'Ukraine's Armor Appears to Have a Russian Attack Helicopter Problem', *The Warzone*, 15 June 2023, <<https://www.twz.com/ukraines-armor-appears-to-have-a-russian-attack-helicopter-problem>>, accessed 1 June 2024.
66. Mariano Zafra and Jon McClure, 'Four Factors that Stalled Ukraine's Counteroffensive', *Reuters*, 21 December 2023.

for the Russians, so defensive means could be concentrated at these points. Moreover, because of the narrow width of the proposed axis of advance and the persistent threat from Lancet-3Ms hunting Ukrainian artillery, the guns could not be brought forwards. This meant that proportionally more Russian artillery could cover Ukrainian lines of advance without Ukrainian counterbattery fire being able to reach the Russian guns. Thus, for the second round of assaults, the resistance became harder. With most of the available demining equipment already lost, the proportion of breaching that needed to be conducted by hand increased. The units conducting it largely lacked dismounted breaching equipment. This time, Russian troops consistently held their positions, having often set up flanking ambushes from the tree lines while counterattacking aggressively with armour. During this phase, Ukrainian troops often took positions, only to lose them to counterattacks, such that assaults would need to be repeated several times. As a result, by late June, Ukrainian officers feared that the counteroffensive would not achieve its aims and paused while they debated where and how to commit additional units.⁶⁷

The original plan had seen the 9th, 10th and Maroon Corps as distinct units of action. In practice, units of the 9th Corps had been expended in the first assaults, while 10th Corps had been committed piecemeal, exacerbated by the need to amalgamate breaching equipment. By July, Ukrainian commanders had to judge whether to commit units from the Maroon Corps to continuing the southern axis, or to call off the offensive.⁶⁸ Politically, halting the offensive seemed unacceptable. Fears that there would not be another chance and hopes that the Russian resistance would falter if the attack were sustained led to the decision to continue pushing south, but with the revised objective of capturing Tokmak. The AFU, recognising that to use its exploitation force for the assault would prevent an exploitation after the breakthrough, also switched its prioritisation of fires towards a damage-centric strategy.

Ukraine's long-range strike campaign during the offensive deserves some discussion. More than 300 Storm Shadow and SCALP cruise missiles were delivered to Ukraine over the course of the offensive,⁶⁹ although only small numbers could be launched at any given time. Despite some strikes on Russian C2 and logistics during the offensive, long-range fires had little impact on the fighting. Given the extent to which NATO militaries hope that precision and deep strike can offset volume of unguided artillery, it is worth examining the reason for these results. First, the priority of the precision strike campaign was to destroy the Russian Black Sea Fleet and to degrade defences on the Crimean

67. *Al-Jazeera*, 'Ukraine Says "Biggest Blow" Yet to Come in Counteroffensive Push', 20 June 2023.

68. Lara Jakes, Andrew E Kramer and Eric Schmitt, 'After Suffering Heavy Losses, Ukrainians Pause to Rethink Strategy', *New York Times*, 15 July 2023.

69. Data from Ukrainian General Staff.

Peninsula. Combined with the use of uncrewed surface vessels,⁷⁰ long-range precision strikes degraded Russian sea control.⁷¹ This had the strategic effect of allowing Ukraine to resume exports from its ports. It also set the conditions for the isolation of Crimea from the sea,⁷² although this effect would only be felt if the neck of Crimea could be threatened. The long-range strike campaign was therefore successful against its primary objective, but the failure of the ground operation meant the success was not fully exploited.

Strikes using Storm Shadow in support of the ground operation proved less successful. Several headquarters were destroyed, including the reserve command post of the 58th Combined Arms Army in Berdyansk,⁷³ along with strikes on bridges at the neck of Crimea.⁷⁴ Collectively, however, these strikes never reached the critical level of damage that would disorder the C2 or logistics system. Nor were the strikes themselves effectively synchronised with ground operations that would have caused pressure in tempo with disruption in the deep. This was partly because having effect in the land domain requires the simultaneous servicing of more targets than operations targeting naval forces. The damage to the Black Sea Fleet was absolute. Damaged command posts and bridges, by contrast, could be replaced and repaired.

At the beginning of the offensive, GMLRS strikes had been prioritised in maximum depth, to disrupt Russian C2 and logistics and also to target air defence systems and other targets that could have improved the efficiency of loitering munitions raids on Crimea. Once the objective became more limited to Tokmak, the depth of the fires campaign also came back, with an emphasis on fires in shallow depth to assist with the attack. Thus, GMLRS in particular started to be reprioritised, from targeting high-value targets to striking Russian artillery. This was also driven by the inability to push Ukrainian guns forwards, as the breach was insufficiently wide, and scoured by Lancets. While many Russian guns were destroyed, with only approximately seven GMLRs (munitions, not launchers) per day to service the whole theatre,⁷⁵ the rate of destruction was something Russian troops could absorb during the critical period when Ukraine had remaining offensive combat power.

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70. Sidharth Kaushal, 'Ukraine's Uncrewed Raid on Sevastopol and the Future of War at Sea', *RUSI Commentary*, 2 February 2023.
 71. Megan Fisher and Vitaly Shevchenko, 'Ukraine Hits HQ of Russia's Symbolic Black Sea Navy', *BBC News*, 22 September 2023.
 72. James Marson and Oksana Pyrozhok, 'Ukraine's Victories over Russia's Black Sea Fleet Reopen Vital Grain Corridor', *Wall Street Journal*, updated 16 March 2024.
 73. Tim Lister, Uliana Pavlova and Anna Chernova, 'Russian General in Ukraine Says he was Fired After Accusing Defence Ministry of Betraying Troops', *CNN*, 13 July 2023.
 74. *ABC News*, 'Russia Says Ukraine Blew Up Two Crimea Bridges with Storm Shadow Missile', *YouTube*, 7 August 2023, <https://www.youtube.com/watch?v=zF24f4i_0MU>, accessed 1 June 2024.
 75. Data from Ukrainian General Staff.

The impact of precision strike was further mitigated by Russian countermeasures. The munitions that were to deliver these precision effects had been employed for almost a year by the time the offensive began. Whereas Excalibur, for example, was achieving around 70% effectiveness at the beginning of the conflict, by August 2023, it was hitting the designated point only 6% of the time, a rate lower than non-precision munitions.⁷⁶ This was because of exquisite electronic warfare (EW) countermeasures fielded by the AFRF. The impact on GMLRS was slightly different. The first challenge was that electronic protection systems were able to redirect entire salvos of GMLRS targeting specific areas. The second issue was that Russian air defences had been calibrated to be able to shoot down GMLRS. These problems could be overcome by layering effects. The use of other munition types such as HARMs, EW or decoys, or selecting the right time to engage, made GMLRS strikes highly effective. But these shaping requirements significantly reduced the tempo and scale at which strikes could be directed against operationally significant targets.⁷⁷

The commitment of Maroon Corps units in July began to exert significant pressure on the 58th Combined Arms Army. Along with small numbers of strikes in depth using Storm Shadow, the attrition of artillery systems with GMLRS, and the fact that Russian troops had been in the line for two months of heavy fighting, Ukrainian units began to achieve results in small tactical actions, largely by narrowing the axis on which they were working from a 30 km frontage to a 10 km frontage. In one incident, for example, a Ukrainian assault group of 15 personnel managed to dislodge 88 Russian troops from a position. Despite these kinds of incidents, the pace of advance was extremely slow and always gave the Russians time to reset their defences, such that every attack had to be a deliberate assault action. The need to secure the flanks of any gains further slowed progress. Furthermore, Ukrainian advances began to be canalised between two pieces of high ground across an area 7 km wide. This left troops vulnerable to plunging fire from the flanks, further constraining the rate of advance. The commitment of the Maroon Corps, as the exploitation force, also removed any risk for the Russians that further Ukrainian axes could be prioritised. This freed up Russian troops to rotate the more damaged units of the 58th Combined Arms Army, such that Ukrainian forces found themselves fighting fresh troops.

There has been persistent discussion about the Ukrainian decision to commit some of the troops prepared for the offensive towards the Bakhmut axis, rather than concentrating forces in the south.⁷⁸ This is, to some extent, the wrong framing of the choice facing the AFU. The allocation of ammunition to the

76. *Ibid.*

77. Author interviews with senior Ukrainian officers responsible for fires, Ukraine, July and November 2023 and February 2024.

78. *Washington Post*, 'Miscalculations, Divisions Marked Offensive Planning by U.S., Ukraine', 4 December 2023.

eastern axis certainly contributed to Ukraine having insufficient fires on the southern axis. Nevertheless, since Ukrainian artillery was being held back from advancing by Russian mines and Lancets, adding more artillery pieces to the southern axis would not have axiomatically increased Ukraine's firepower where it mattered. The same can be said of committing more troops. Given the frontages involved, pushing more companies of assault troops southwards would not have vastly increased the scale of operations that could be carried out and thus the combat power applied. As it became clear, however, that the southern axis might at best reach Tokmak – and even this objective appeared in doubt – there was a strong political direction to demonstrate progress, so that more troops were committed to the Bakhmut axis. Without sufficient mechanised forces, however, these attacks could not achieve sufficient tempo to produce encirclements of Russian troops. The eastern direction therefore devolved into fights for treelines.⁷⁹ The real trade-off decision, therefore, was not between the commitment of units between two axes or one, but rather whether these reserves should have been committed at all, or else preserved. In hindsight, the commitment of these forces appears to have been a mistake, as Ukraine is now short of cohered units.⁸⁰

Russian attrition during the offensive arguably reached its height in early August. The use of counterattacks, and the provision of dual-purpose improved conventional munitions (DPICM) to Ukraine, which increased both the number of rounds that could be fired per day and the lethality of these fire missions, all drove up Russian casualties. Nevertheless, Russia continued to rotate its regiments under its divisions to ensure that there were fresh troops holding the defences. If a breakthrough to Tokmak was going to happen, this was most likely in early August. After that, the likelihood began to diminish. Ukrainian ammunition stocks meant that the rate of fire to support offensive operations could be continued until October at the latest. By mid-September, offensive actions were largely aimed at improving tactical positions, as commanders recognised that a breakthrough – even to Tokmak – was not going to occur.

The offensive may have culminated, but one last operation was attempted, to cross the Dnipro and attack through Krynky. For this purpose, some 55 GMLRS were stockpiled, along with a large volume of other fires.⁸¹ The Ukrainian marines conducting the operation were attacking into their old training grounds and knew the terrain well. It was hoped that a surge of force across the river might turn the flank. When the crossing was made, Ukrainian forces managed to secure a lodgement on the eastern bank, and for approximately three days there

79. Jan Kallberg, 'Ukraine's War of the Treelines', CEPA, 2 October 2023, <<https://cepa.org/article/ukraines-war-of-the-treelines/>>, accessed 1 June 2024.

80. Isabelle Khurshudyan and Anastacia Galouchka, 'Front-Line Ukrainian Infantry Units Report Acute Shortage of Soldiers', *Washington Post*, 8 February 2024.

81. Data from Ukrainian General Staff.

was an opportunity to move a significant number of troops across. This was not attempted. The reason was simple. While a large body of troops might have been projected over the river, they could not be sustained, and the larger the force the less viable their sustainment would be.⁸² The Krynky operation does not need to be covered in detail as it was never fully carried out, but it does offer one salutary lesson to which observers should pay attention. Under modern battlefield conditions, the establishment and protection of a crossing on a wide wet gap against sustained observation and the indefinite threat of fires is a problem to which there is not yet a doctrinal answer. Given the number of these gaps in Eastern Europe, it is a problem set that deserves study.

82. Author observation of the operational commander, Ukraine, December 2023.

III. Assessing the Causes of Failure

Most analyses gravitate towards the conclusion that the reasons for the difference between the failure of Russian operations in 2022 and their comparative success in 2023 is that the Russians are learning and adapting, and are becoming more tactically proficient.⁸³ Although Russia has adapted its tactics, the main reason for the striking difference in the effectiveness of Russian operations is that in the preparation of the invasion of Ukraine, the Kremlin's main effort was that of its Special Services, which were supposed to destabilise Ukraine and disorganise its system of state and military administration. The military invasion was not supposed to meet serious organised resistance, other than in Donbas.⁸⁴ The defeats suffered by the AFRF in the battles of Kyiv, Kharkiv and Kherson were primarily the consequences of an initial miscalculation in the planning of the invasion, and the employment of forces improperly structured and commanded for conventional warfighting. After the failure of the initial coup de main, attempts were made to rectify the structural shortcomings, but without an uplift in mass, and because of the losses during the opening phase of the war, the Russian military failed to achieve its objectives. In 2023, Ukraine was dealing with an enemy that had completely changed its strategy. Russia began to take seriously the planning and conduct of military operations, moving from a blitzkrieg strategy to a protracted war, with the mobilisation necessary for this through its human and industrial resources. It placed its main bet on the fact that Western partners will tire of supporting Ukraine, allowing Russia to eventually gain the necessary advantage on the battlefield.

The main reason for the AFRF's operational failures in 2022 was the insufficient number of ground troops to conduct effective combat operations along multiple independent axes. In fact, the lack of the necessary forces and means for a successful full-scale invasion was one of the foremost reasons why many analysts, including in Ukrainian intelligence agencies, were sceptical about the probability of a Russian invasion in February 2022, predicting such an invasion later, in June or even September 2022, and only in the limited theatre of the south and east. Such sceptical assessments of the probability of a successful invasion

83. The authors have tracked this process. See Jack Watling and Nick Reynolds, 'Meatgrinder: Russian Tactics in the Second Year of its Invasion of Ukraine', RUSI, 19 May 2023.

84. The authors published an analysis of these operations in 2023. See Jack Watling, Oleksandr V Danylyuk and Nick Reynolds, 'Preliminary Lessons from Russia's Unconventional Operations During the Russo-Ukrainian War, February 2022–February 2023', RUSI, 29 March 2023.

allowed the Russians to achieve operational surprise, which explains the success in capturing the south of Ukraine, as well as the deep advance in the north, where the AFU did not have significant forces. The Russian plan came much closer to succeeding than is often acknowledged, but when the bet on speed failed, the plan was invalidated.

Failure to defeat the AFU during its initial blitzkrieg and heavy losses in people and military equipment meant that Russia faced the problem of an acute lack of the troops necessary not only to continue the offensive, but also to hold territories in the east and especially in the south. It was the lack of adequate personnel that forced the Russians to withdraw from Kyiv, Chernihiv and Sumy, and prevented them from organising the proper density of defences near Kharkiv, enabling the AFU to carry out a successful breakthrough there and a further offensive almost to the borders of the Luhansk region. Although Ukrainian fire control of Russian lines of supply explains the tactical decision to withdraw from Kherson, the unwillingness of the AFRF to lose the quality troops deployed there reflected the shortages in personnel elsewhere on the front.

As in many military conflicts before, including the First and Second World Wars, after the end of the first phase of the war, which was characterised by rapid manoeuvre by the first echelon, the second phase began, during which the skirmish line stabilised, the fighting became positional, and the parties concentrated on generating the reserves to win the war. As a result of the mobilisation that began in October 2022, Russia managed by May 2023 not only to replenish its losses, but also to increase the size of the group of forces in Ukraine to approximately 420,000 personnel (not counting the units of the Russian Guard and the police involved in running an occupation regime),⁸⁵ as well as to establish the production of weapons and military equipment in the volumes necessary to support their operations. As a result, the Ukrainian offensive, which began in June 2023, was conducted in conditions that differed significantly from those that prevailed when the plan for the offensive was developed.

In autumn 2022, the AFRF in Ukraine consisted of 130 battalion-tactical groups and separate units of the 1st and 2nd Army Corps with a total number of about 200,000 servicemen, about 930 tanks, more than 2,500 armoured combat vehicles, 1,350 artillery systems, 660 MLRS and 40 operational-tactical missile systems (OTMS).⁸⁶ By the beginning of June 2023, Russian ground forces in Ukraine comprised about 420,000 personnel, 1,980 tanks, 4,450 armoured combat vehicles, 2,750 artillery systems, 860 MLRS and 46 OTMS.⁸⁷ During this time, the AFRF abandoned the use of battalion-tactical groups and switched to the army

85. Data from Ukrainian General Staff.

86. *Ibid.*

87. *Ibid.*

management system, cohering 50 brigades, 128 regiments, 102 separate battalions and about 50 combined units.

It is important to note that Russia's group of forces in Ukraine, outlined above, constitutes its combat troops. These troops were not responsible for guarding the Russian border, a task undertaken by other parts of the AFRF. Nor were they primarily concerned with supporting the administration of the occupied territories. For this, the Russian Federation had deployed in Ukraine 25,000 servicemen of the Russian Guard, fielding their own 520 armoured combat vehicles, about 140 artillery systems and 22 helicopters.⁸⁸ By contrast, the AFU's combat power had to hold the entire Ukrainian border, stretching out AFU resources while the AFRF maintained freedom to commit resources on particular axes. The presence of AFRF units on the Russian–Ukrainian border, their constant shelling of Ukrainian territory with MLRS, artillery and mortars, airstrikes and the use of sabotage groups forced Ukraine to keep part of its troops in the north, making it impossible to transfer them to other directions.⁸⁹ A further 50,000 troops of the AFU were committed to generating mobile air defence groups with their necessary support echelon to defeat a sustained Russian long-range strike campaign throughout Ukraine.

The need to use artillery to compensate for the limited force density along much of the front limited the concentration of firepower on the main effort. The largest number of 155-calibre guns simultaneously operating on the Orikhiv–Tokmak axis was 55 units. Ammunition levels for Ukrainian artillery varied throughout the offensive. At its peak, these reached approximately 70 rounds per gun per day for those guns on the main effort.⁹⁰ However, ammunition supplies were uneven and would peak and trough, so that for periods of the offensive, Ukrainian guns had as little as 10 rounds per day.⁹¹

Both at the beginning and during the conduct of the Ukrainian offensive operation, the AFU did not have a numerical advantage over the enemy in the number of personnel, combat systems and ammunition, or enablers necessary for successful offensive operations, especially against a well-organised and echeloned line of defence. At times, the AFU did establish localised superiority, but this could rarely be maintained as forces advanced. The balance of forces in many cases was not in favour of Ukraine, which forced Ukrainian units to storm the positions of a more numerous enemy. Conditions were especially unfavourable given the lack of air support. Against this, Ukraine had some qualitative advantages in both troops and equipment, but this did not provide a sufficient offset.

88. *Ibid.*

89. Author observations of the northern Ukraine border, April 2024.

90. Author observations of Ukrainian artillery personnel, Ukraine, June 2023.

91. Author observations of Ukrainian brigade staff in Zaporizhzhia, Ukraine, July 2023.

Despite the lack of numerical advantage, the AFU counted on a moral advantage due to both the high level of motivation of the Ukrainian troops and the low morale of Russian troops observed during their winter offensive. To some extent, Ukraine repeated the mistake that Russia had made during the first stage of the war, counting on shock induced by offensive operations preventing the enemy from putting up an adequate resistance. This theory of success was a poor planning assumption.

At the operational level, therefore, the Ukrainian offensive failed because the plan was not properly calibrated to the available resources. Nor were appropriate troops assigned to the tasks for which they were suited. Undertrained personnel spearheaded the main effort, while experienced troops were committed to diversionary or fixing axes. Ukraine's international partners failed to mobilise industry early in the conflict, while over-optimistic planning assumptions by Ukrainian planners based on the conditions prevailing before Russian mobilisation had grave consequences. The reason to place such emphasis on this point is that Ukraine's international partners missed their decision points for industrial mobilisation, while Ukraine missed its decision points for the mobilisation and adequate training of personnel. It is thus vital that for future operations Ukraine and its partners do not lull themselves into believing that an under-resourced operation has a strong likelihood of succeeding.

Beyond this foremost operational point, numerous shortcomings of the preparation of the Ukrainian offensive can be identified.

A Lack of Surprise

One of the anticipated mechanisms enabling success during the Ukrainian offensive was the shock to Russian troops. In the initial plan, this was hoped to enable the 12 brigades to break six enemy regiments across 30 km of front. When planners realised that this was not possible, it was hoped that the violence of the initial attack would dislodge the defenders. Where tactical surprise was achieved during the war, as in the Kharkiv offensive in 2022, Ukrainian forces effectively dislocated Russian troops. Conversely, in both Kherson and on the Orikhiv–Tokmak axis, surprise was not achieved, and operational security failed. In the Kherson direction, the Ukrainian government signalled the intention to attack on this axis.⁹² The subsequent decision to attack Kherson was therefore made against a prepared defence and was neither particularly successful in terms of the ground assaults nor did it cause shock among Russian forces.

92. *The Economist*, 'A Ukrainian Counter-Offensive in Kherson Faces Steep Odds', 14 August 2022.

On the Orikhiv–Tokmak axis, the failure of operational security occurred at multiple levels. At the strategic level, leaks of top secret information from Ukraine's international partners (including terrain analysis and other materials) gave the Russians a precise picture of the Ukrainian assault force's structure, anticipated capabilities, limitations and options for axes of advance.⁹³ Furthermore, the public messaging from the Ukrainian government, and public discourse from partners, gave Russia a clear understanding of the timing of a likely assault and informed AFRF planning.⁹⁴ Finally, Russian penetration of Ukrainian communications systems enabled capture of a range of materials. The result was that when the offensive started, Ukrainian efforts to compartmentalise planning often left friendly forces with less understanding of the wider plan than Russian commanders.⁹⁵

The lesson is clear: future operations must be accompanied by appropriate deception and more effective operational security. For Ukraine, this means less public telegraphing of intentions. However, there are also lessons for Ukraine's partners about the transparency of its political discourse on collective planning.

Inadequate Force Generation

Considering the greater human reserves of the Russian Federation, Ukraine must seek qualitative superiority among its forces. For situations in which the AFU are on the defensive, this has largely been achieved. For offensive operations, 2023 demonstrated that the system of training and force generation is not producing sufficient force quality to execute a high tempo of operations. There are several reasons for this. At the most basic level, the training is appropriate neither in duration nor content. There are differences of approach between AFU and NATO members on how battle inoculation should be carried out. Nevertheless, restrained use of BATSIM (battlefield simulation) and other techniques to habituate trainees to the felt effect of artillery manifested in a proportion of units performing poorly early in the offensive. A lack of familiarity and training with artillery for example saw troops unwilling to keep pace with close support fires.

The other fundamental problem related to drill proficiency. With five weeks training at Operation *Interflex*,⁹⁶ and perhaps a month of collective training before being committed, troops did not have a well-rehearsed repertoire of

93. Toler, Browne and Barnes, 'Airman Shared Sensitive Intelligence More Widely and for Longer than Previously Known'.

94. Rob Picheta et al., 'Ukraine Eyes an Offensive Around Bakhmut as Russian Momentum Stalls', CNN, updated 24 March 2023.

95. *Kyiv Post*, 'Budanov Says Kyiv "Taking Action" After Ukraine's Secret Counteroffensive Plans Leaked to Kremlin', 29 February 2024, <<https://www.kyivpost.com/post/28831>>, accessed 29 March 2024.

96. Read and Burchell, 'Ukraine Soldiers in Combat-Training at Secret Camp in East Anglia'.

battlefield movements they could execute at pace. Tactical control of direct fires was also very limited, partly because safety constraints on training without sufficient time to lay strong foundations prevented fire and movement at platoon and company level from being adequately drilled. In consequence, fire discipline was largely poor.

The method adopted by the Ukrainian military to make up for this force quality problem was to select a cadre of assault troops from within its units, such that a battalion might generate two platoons of assault troops, while the remainder of the battalion formed conventional companies. In practice, this meant that rather than being able to echelon through one another to maintain offensive momentum, each attack had to be deliberately planned and would culminate on completion. Furthermore, the loss of these assault troops would remove the offensive combat power of the battalion. This made commanders cautious, further impeding tempo. Although the approach adopted by the AFU made sense in the limited time available, the time for training was inadequate.

Another problem was the training of brigades as a cohered formation. With most brigade staffs fixed on the front to manage defensive sectors, Ukraine has struggled to train brigades, or to exercise battalions beneath a brigade headquarters. The result was that when Ukrainian units reached the battle area, they tended to plan and execute separate company actions, managed by the brigade headquarters and supported by brigade fires, rather than conforming to a brigade scheme of manoeuvre.⁹⁷

The need to raise force quality for offensive operations through a deliberate process taking approximately eight months, with up to 18 weeks of individual training and collective training thereafter, must be factored in to war planning. Planning by Ukraine or its international partners has rarely been conducted over such horizons, especially among the political echelon. But failure to plan in this way means that the available force will not be suited to the envisaged task. The largest attacks during the offensive were battalion attacks. This reflected the small cadre of trained staff officers able to synchronise larger operations. To overmatch Russian units, it is necessary to increase the scale at which Ukrainian units can operate.

Deficiencies in Planning

The original concept of operations, as previously described, envisaged a 12-brigade operation taking seven days to breach the defence lines along a 30 km frontage and isolate Tokmak. The evidence suggests that had this concentration of forces

97. Author interviews with brigade staff, Ukraine, July 2023.

and tempo been achieved, a breakthrough to Tokmak was possible. However, this concept defining requirements was unburdened by the limitations of the actual force employed. The original concept was reasonable. But when the concept was turned into a plan, reflecting the limitations of the forces that had been generated, the time that had elapsed, and thus the disposition of the enemy, errors in planning emerged.

First and foremost, the theory of success for the operation as executed depended on a collapse in Russian forces, but the forces and means were not concentrated sufficiently to achieve this effect. It is not evident on what basis planners thought this would be achieved. Instead, planning appears to have proceeded on the basis of significant optimism bias. This appears to have stemmed partly from a belief that Russia's collapse around Kharkiv arose from a lack of morale, when in reality it arose from Russia's lack of sufficient troops. This is not a new problem, but given the extent to which NATO members hope to offset the enemy's numerical superiority, methodologies for more accurate assessments of the morale of an enemy seem worth developing. The UK, in particular, has for some time emphasised the importance of information manoeuvre and the cognitive dimension of war.⁹⁸ It is evident, however, that planners did not correctly evaluate Russia's mindset or vulnerabilities in this regard. Thus, it appears there are insufficient means for staffs to sense or conduct battle damage assessment on morale, to enable accurate planning for how a collapse might be induced.

It is also evident that planners failed to properly apportion the right forces for the operation. Rather than being recovered from the front to form the core of new units, experienced troops were instead left with diminishing levels of mechanised equipment and were committed on various diversionary axes, such as Bakhmut, or in fixing actions on either side of the main effort. When troops from these units were thereafter pushed into the offensive force, the units lacked critical means, including demining equipment, to be able to succeed. The decline in equipment quality in follow-on forces was also pronounced, such that Ukrainian units began to have to attempt offensive breaching operations with MaxxPros and other vehicles unsuited to the task.

Certain planning failures were made jointly between Ukraine and its international partners, for example, the weight given to effects of deep strikes, which were intended to disrupt the Russian defences. While the campaign targeting Crimea was well planned, the deep battle in support of the main effort employed too few munitions against too diverse an array of targets to ever deliver a critical scale of effect. Nor were the application of long-range precision fires synchronised

98. See, for example, Ministry of Defence, Land Warfare Development Centre, 'Land Operations', Army Doctrine Publication AC 71940, 2010, p. 5-1.

with tactical actions that would best exploit the pressure placed on the Russian defensive system.

Another curious element of the planning is the lack of mitigations in place to overcome identified Russian strengths. During wargames carried out with Ukraine's international partners prior to the offensive, a number of Russian capabilities were identified as especially problematic.⁹⁹ Russian aviation was one such capability. Yet the operation was launched without any means to counter the threat from Russian attack aviation. The US eventually approved the use of ATACMs in October to strike Russian helicopters at their airfields.¹⁰⁰ This was all very well, but by October Russian attack aviation had already played its part in blunting Ukraine's offensive. By then, the application of ATACMs merely contributed to an attritional wearing down of Russian systems. It did not enable manoeuvre. The point here is not that ATACMs were the answer to aviation. Russia tactically adapted to mitigate the risk to its airfields within days of these strikes. The point is that nothing was done to mitigate the risk when it mattered. This problem was not limited to the issue of aviation. Minefields were similarly identified as a major problem. At the beginning of the offensive, Ukraine had significantly fewer demining vehicles than would be considered the minimum required in doctrine. This had predictable results, which had been identified by Ukraine and its partners during the pre-offensive wargames. Yet Ukraine's partners continued to push demining vehicles into Ukraine as late as August, when the US provided M117s.¹⁰¹ The AFU took two months learning how to operate and maintain these vehicles so they were not ready to be used until October 2023, after the offensive had completely culminated.

The interesting thing about this is that Ukraine's international partners provided equipment in a manner that was completely inconsistent with NATO doctrine, such that Ukraine could not concentrate a critical mass of the relevant capabilities at the decisive point. Much of this failure was political. The US had recommended releasing DPICM to Ukraine in autumn 2022 and ATACMs early in 2023. The release of these systems was approved late.¹⁰² The question that NATO members must confront is whether their systems of government prompt leaders to make decisions when they must be made if they are to have their intended effect, or whether the system allows for delay beyond the point of relevance.

99. Author interviews with wargames participants, Ukraine, April and May 2023.

100. Caleb Larson, 'Ukraine Strikes Russian Airfield with ATACMS Missiles', *Politico*, 18 October 2023, <<https://www.politico.eu/article/ukraine-strikes-russian-airfield-with-atacms-missiles/>>, accessed 29 March 2024.

101. Author interviews with Ukrainian General Staff, J4 staff, Ukraine, February 2024.

102. Jack Watling and Justin Bronk, 'Giving Ukraine Cluster Munitions is Necessary, Legal and Morally Justified', *RUSI Commentary*, 10 July 2023.

IV. Identifying Emerging Tactical Challenges

The conduct of large-scale offensive breaching operations is one of the hardest tasks that land forces must be able to carry out. In the First World War, it took the Entente powers three years to develop the concepts and capabilities and generate the capacity to effectively breach German defences on the Western Front.¹⁰³ Holding units that are equipped and trained for this operation represents the largest resource commitment in most armies. For example, while the UK has many units that have widespread utility, only 3 UK Division, which is by far the most expensive element of the Field Army, is expected to be able to conduct large-scale offensive breaching, and it is at present not equipped to do so.

The doctrinal framework for offensive breaching has remained essentially unchanged since the formulation of AirLand Battle in the 1980s.¹⁰⁴ The last time offensive breaching was conducted by Western forces at scale was in Operation *Desert Storm* in 1991, and this appeared to vindicate the equipment, formation structure, tactics and doctrine underpinning AirLand Battle.¹⁰⁵ Prior to 2023, the only large-scale offensive breaching operation to have been conducted in a conventional war since 1991 was Azerbaijan's operation to retake Nagorno-Karabakh in 2020.¹⁰⁶ This operation was, however, carried out against an Armenian force that was barely modernised from the 1980s. Thus, the established formula once again proved successful. Breaching operations in Iraq during the war against Islamic State and in Afghanistan during fighting with the Taliban required clearing through complex fields of IEDs,¹⁰⁷ but these were not covered by artillery, and so coalition forces dictated the tempo of manoeuvre. It is therefore reasonable to argue that Ukraine's attempts to breach the Surovikin Line over summer 2023 were the first attempts at large-scale offensive breaching operations in 30 years.

Over that timeframe, new technologies have had a considerable impact on how armies fight. It is therefore worth examining the experience of Ukrainian forces

103. Paddy Griffith, *Battle Tactics of the Western Front: The British Army's Art of Attack, 1916–18* (New Haven, NJ and London: Yale University Press, 1994).

104. US Army, *FM 100-5: Operations*, 1982.

105. Mike Guardia, *The Fires of Babylon: Eagle Troop and the Battle of 73 Easting* (Philadelphia, PA: Casemate, 2015).

106. Phillip Andrews, 'Lessons from the Nagorno-Karabakh Conflict', Catalog, 21-655, Center for Army Lessons Learned, August 2021, <<https://api.army.mil/e2/c/downloads/2023/01/31/693ac148/21-655-nagorno-karabakh-2020-conflict-catalog-aug-21-public.pdf>>, accessed 29 March 2024.

107. Marc Tranchemontagne, 'The Enduring IED Problem: Why We Need Doctrine', *Joint Force Quarterly* (Issue 80, 2016).

to assess the extent to which established doctrine remains valid and where it may need to be adapted or revised. These lessons are not only relevant for Ukraine's forces, as they endeavour to recover and prepare for future offensive operations, but also for Ukraine's international partners, who must be credible if they are to deter Russia from challenging Article 5 of the North Atlantic Treaty in the years ahead.

The fighting in Ukraine during 2023 revealed several requirements and problem sets that have not widely confronted NATO forces and are not effectively accounted for in Western doctrine. These issues need to be thought through during the design of future forces and operations. Several of these challenges are unpacked in this chapter.

Pervasive Observation and Precision Fires

During the offensive, both sides made extensive use of UAVs to watch the battlefield over the frontline and into opposing rear areas. Russian troops made substantial use of Lancet-3M loitering munitions to deliver precision strikes against Ukrainian artillery and support elements.¹⁰⁸ Ukrainian forces, meanwhile, used an expanding number of first-person-view UAVs as they moved onto the defensive, and as their own availability of artillery ammunition diminished.¹⁰⁹ For both sides, these capabilities have proved more impactful for defensive than offensive operations. This is primarily because it is easier to deconflict these systems when one's own forces are manoeuvring less, because using them in the close against advancing troops means they are in closer proximity to their control antennae than to enemy jamming, and because it is the attacking party that must increase its signature and will outrun its ability to use deception or decoys to protect itself, as the attacker must advance.

The use of EW and low-altitude air defence for offensive operations did exist in older doctrine. Largely, however, this was a divisional responsibility, as it remains in US concepts.¹¹⁰ Today, the localised ability to generate precision fires means that all units require electronic protection. In concept, advancing formations must be able to create electronic barriers, and since sub-units are unlikely to have dedicated air defence, systems must be multifunctional, with the ability to engage small aerial targets. Electronic protection is too vulnerable if kept on a

108. Alistair MacDonald and James Marson, 'This Russian Suicide Drone is Blunting Ukraine's Advance', *Wall Street Journal*, 3 November 2023.

109. Jack Detsch, 'Ukraine's Cheap Drones are Decimating Russia's Tanks', *Foreign Policy*, 9 April 2024.

110. US Army Publishing Directorate, 'Record Details for FM 3-12', <https://armypubs.army.mil/ProductMaps/PubForm/Details.aspx?PUB_ID=1022713>, accessed 26 June 2024.

small number of dedicated platforms. Instead, while electronic protection modules must be programmable and relatively autonomous, they must be widely distributed. Antennae will become a crucial layer in a protection system, vulnerable to direct fire. They must therefore be replaceable, rather than integral to the unit generating the jamming frequencies. Projecting navigational interference is particularly important for providing area defence against precision fires.

At the same time, there is the dilemma, noted above, of how a force that must create a time-limited snowdome of protection from precision fires can avoid increasing its exposure to statistical artillery (non-precision munitions). The old answer – to win the counterfires battle – is only a partial solution, because high-fidelity ISR now allows fewer guns to deliver more concentrated effects, thus raising the threshold of suppression needed to protect the force. Thus, alongside the requirement to protect the force from stand-in observation, it is also necessary to be able to defeat enemy longer-range UAVs, either at low altitude but stood off up to 10 km, or at medium altitude above the MANPADS ceiling. Combined with the fact that the targets being engaged will often be relatively inexpensive, this presents a key challenge for short-ranged air defence. There is also the requirement to shift the task from counterbattery kills to left-of-launch targeting of enemy artillery. This brings into the close battle concepts that had previously been more relevant to discussions of Integrated Air and Missile Defence.¹¹¹

Electromagnetic Battlespace Management

The force that can employ precision fires responsively is likely to be disproportionately efficient compared with their adversary. The ability to minimise concentration is simultaneously dependent on coordination of activities at reach or beyond line of sight. This depends on access to the electromagnetic spectrum (EMS). The result is that even without enemy EW, the EMS is becoming crowded. The number of systems communicating is increasing. The volume of data being passed is increasing. And the advantages to be gained versus vulnerabilities ceded by not contesting the EMS are shifting to a point where although forces must be able to revert without their primary systems, this does not mean they should accept loss of communications.

The contested nature of the EMS and its impact on the efficiency of fires and manoeuvre must be addressed. In the defence, runners, ground-laid cable and other reversionary methods can be used to limit traffic, signature and vulnerability.

111. Sidharth Kaushal, Eran Ortal and Ran Kochav, 'Integrating Offence and Defence: Lessons from the Israeli Experience', *RUSI Commentary*, 11 October 2023.

On the offence, these are not viable options. Without careful frequency management, forces are liable to engage in widespread fratricide in the EMS, including degrading the efficiency and survivability of their own UAVs. This was a serious problem in Ukraine, and often caused commanders to limit electronic protection to their forces, thus increasing their own situational awareness but also giving freedom to enemy ISR and fires.¹¹² Russian forces would reset their frequencies every 24 hours, deconflicting UAV orbits, and would synchronise EW with manoeuvre, so that when precision coordinates needed to be generated, electronic protection would dip before being brought back up. This was achieved despite the AFRF distributing EW capabilities to the company echelon. For Ukraine, absolute shortage of systems reduced the complexity of the task, but most EW was nevertheless managed at the brigade echelon, and even then was often not maximally exploited, because of the difficulties it created for C2 and ISR.

The need to allocate sufficient bandwidths for software-defined systems to avoid broad-band jamming, and yet have enough spectrum available for the range of systems in a modern force, is a serious problem. It is also one that most military personnel are not trained to manage. Yet this is becoming a key planning constraint at all echelons. There is a need for signallers to be trained differently to support these requirements down to brigade and battlegroup level. At the same time, commanders in the combat arms need to be better trained in how to use EW troops and how to plan manoeuvre in the EMS. Increasing the skills of signallers is of little value if the level of understanding among the other arms diverges rather than converges, leading to the capabilities being neglected or misapplied.

Accelerated Capability Refresh Cycles

It is not a new observation to say that innovative capabilities have their greatest impact when first fielded and then offer less advantage as the enemy adapts.¹¹³ This problem was well understood in the wake of the First World War. Today, however, software-defined systems are highly vulnerable to bespoke electronic countermeasures, while also being disproportionately effective when compared with non-software-defined capabilities. The result is that a force must use software-defined systems to be competitive, but the peak effectiveness of a software-defined capability is therefore operationally short-lived and, once the enemy has adapted, tactically volatile.

112. Author interviews with Ukrainian brigade and battalion staff, Ukraine, July 2023 and February 2024.

113. Heinz Guderian, *Achtung-Panzer!: The Development of Tank Warfare*, translated by Christopher Duffy (London: Cassell, 1999).

This manifested in various ways during the 2023 offensive. First, Western planning assumptions about the effects deliverable by precision munitions proved exaggerated, owing to enemy countermeasures. Excalibur and GMLRS suffered from this. Second, Ukraine found that with systems such as UAVs, a rapid refresh rate of both software and radios was necessary to maintain their effectiveness.¹¹⁴ This impinged, however, on their ability to scale production and therefore to reap the rewards of their technical advantage. Instead, innovations would be tested at small scale and deployed at moderate scale when industry could begin supplying a solution. However, the adversary would develop exquisite countermeasures before production could be accelerated.

It is evident that this interaction is going to be a feature of future conflict. It poses major challenges to how NATO militaries contract industry, how systems are tested and validated, and how training and safety of systems is managed. Other than for night-one capabilities, designed to open the door, it is clear that maintaining technological advantage, and thus a qualitative edge, must be premised on having software engineers in tactical formations empowered to interfere with systems, and the ability to rapidly swap out hardware components like radios without having to discard the platforms to which they were attached. Vendors must be incentivised to provide sub-systems and to understand that there will be repeat custom cyclically as they adapt their products, rather than refining a single product and endeavouring to lock the customer into keeping with it. In many states, this will require legislative changes to oversight. Within operational – rather than tactical – timeframes, however, this is crucial to maintaining tempo.

Diversification of Last-Mile Resupply

The persistence of surveillance over the frontline, combined with cheap and scalable precision strike using UAVs, poses a particular threat to the resupply of forces on the offence because the available ground lines of communication become constrained to established breaches and are therefore easy to monitor. Furthermore, deception and other methods aimed at keeping resupply vehicles alive are irrelevant once they are forced to traverse known routes, where the enemy will not have to deal with false positives. Moreover, the pressure put by the enemy on lead elements through counterattack means that they can impose when resupply and casualty evacuation is most critical, limiting the agency the offensive force has to shape conditions to enable last-mile resupply. Resupply vehicles must also be supported in breaching artillery-delivered scattered mines.

114. Justin Bronk and Jack Watling, 'Mass Precision Strike: Designing UAV Complexes for Land Forces', *RUSI Occasional Papers* (April 2024).

One answer for this is that last-mile resupply becomes a combined arms endeavour requiring the layering of air defence, counterbattery fires, EW, engineering support and other measures to create windows of opportunity for movement. This is extremely resource intensive and, in Ukraine's case, resources are lacking. In certain circumstances, resupply may have to become the main effort of a force's supporting arms, but this is highly undesirable and, in any case, limits the number of resupplies that can be achieved. Although not directly related to last-mile resupply, the inability to advance less protected support platforms such as artillery and medical support, owing to the persistent threat of precision strike over the forward line of own troops (FLOT), is a further challenge that limits the ability to keep support and enablers moving forwards with the combat arms.

Alternatively, methods must be found for diversifying last-mile resupply. The UK, in particular, has been experimenting extensively with uncrewed systems in this role.¹¹⁵ While helicopters are expensive to operate and vulnerable in the face of Russian air defences, UAVs may offer a means to move pallets of food, water and ammunition forwards. Using uncrewed ground vehicles for breaching similarly offers the opportunity to widen and multiply the lanes through which supplies can pass. Uncrewed ground vehicle technology is not currently ideally suited to offensive obstacle breaching, because it is easily knocked out through damage to key sensors and often depends on remote control, while such breaching must be done either from close proximity to the vehicle or via fixed cable. Once behind the FLOT, however, such systems have significant potential, and experimentation in this space could mature the capability until it is able to support offensive breaching operations. Increasing the throughput of materiel and thereby extending the reach and endurance of a given assault unit buys time for the breach to be expanded, for additional forces to echelon through and ultimately for the maintenance of momentum. Medical evacuation via UAV is more morally complex, but in many instances may improve the rate of survival considerably by allowing casualties to be recovered across complex or denied terrain to a medical facility in a hardened position where a better standard of care can be provided. Improving the rate of survival from injury also has a positive effect on morale, contributing to the maintenance of momentum.

Perhaps the most important context in which NATO members should examine this problem is how it relates to gap crossing. Russia's control of Kherson Oblast was ultimately rendered unsustainable because of Ukraine's ability to interdict crossing points. Ukraine's decision not to exploit its opportunity in Krynky was driven by the assessment that a force large enough to have any significant impact on the left bank of the Dnipro could not be supported across it. Any terrain

115. Defence and Security Accelerator, 'Competition Document: Autonomous Last Mile Resupply', updated 29 June 2017, <<https://www.gov.uk/government/publications/accelerator-competition-autonomous-last-mile-supply/accelerator-competition-autonomous-last-mile-resupply>>, accessed 16 April 2024.

analysis of NATO's eastern flank shows that wet gaps are regular terrain features. How NATO members can develop capabilities for emplacing and protecting crossings is therefore a vital conceptual area for exploration.

Vulnerability of Critical Enablers

A final significant challenge that must be overcome conceptually is the vulnerability of critical enablers such as engineering vehicles. Historically, this has been addressed by heavily protecting these platforms and by having them covered by main battle tanks. The concept has been that although ATGM operators and hostile main battle tanks will seek to engage breaching vehicles, this will reveal their positions and allow them to be engaged and destroyed by overwatching direct fires. Psychologically, the threat of this rapid and lethal response has the effect of suppressing the scale at which threats manifest. Speed then reduces the time available for the enemy to safely execute engagements.

Under modern conditions, this concept of overwatch is deeply flawed. The problem is that an increasing array of threat systems, from FPV drones to non-line-of-sight ATGMs and UAV-mounted laser designation for artillery munitions, can be launched and directed from concealed positions. This means that individual prestige equipment can be picked out. It also extends the timeframe within which it can be targeted, because those launching these munitions can fire multiple times and can concentrate on guiding their munition without concern about receiving fire. The result is a high probability of mission kill against key enabling equipment.

Resolving this problem requires new approaches to offensive suppression and to the design of enabling equipment. For offensive suppression, the utilisation of loitering munitions, provided with target coordinates by EW baselines, could enable strikes on operators of threat systems that are otherwise safe beyond line of sight of their targets. An equivalent to the Lancet-3M would be very useful for this. It would also require an uplift in the density of Ukrainian EW baselines at brigade level to identify enemy UAV operators and engage them. For defensive measures, the utilisation of multispectral smoke would help, although not entirely alleviate, the problem.

The critical line of effort, however, is that if these vehicles can be picked out then it follows that they will be attrited. More of them are therefore required. At present, these are often prestige assets and are heavily protected, able to carry out a range of functions. It seems likely that the number of vehicles in engineering units needs to increase, while their flexibility and complexity needs to decrease to make such an uplift in platforms affordable. Furthermore, the diversification of tasks that can be carried out with modules mounted on other

armoured vehicles should be prioritised. If such systems are targetable, then the aim should be to make fewer targets single points of failure in the ability of the force to breach obstacles. It is notable that Israel, when entering Gaza, determined that it required 20 D9 armoured bulldozers per brigade to overcome the anticipated IED threat.¹¹⁶ D9s may not be ideally suited to combat in Ukraine, but the density of such vehicles is a good yardstick for what should be the aim. The requirement for such an uplift in the number of platforms speaks to a need to change the design priorities for the platforms dedicated to these tasks.

116. Jack Watling and Nick Reynolds, 'Tactical Lessons from Israel Defense Forces Operations in Gaza, 2023', *RUSI Occasional Papers* (July 2024), p. 19.

Conclusion

The causes of the failure of Ukraine's offensive operations in 2023 may be summarised as a lack of personnel and critical materiel, inadequate time to train and cohere the relevant forces, the misallocation of personnel to the identified axes, and a lack of solutions to several identified tactical problems. Ensuring that these mistakes are not repeated requires a more deliberate and longer force generation process, and for Ukraine's international partners to calibrate equipment provision to the outcomes they have stated they want, rather than to what is politically convenient to provide in the short term. Given that addressing these challenges requires the industrial mobilisation of Europe, and that this has started late, it will take some time before Ukraine can recommence major offensive operations. Creating the conditions for the eventual termination of the war on favourable terms must be achieved through shaping in the intervening period. This has driven a change in how Ukraine looks to fight the war.

During the current phase of the conflict, the AFU's focus is on inflicting maximum damage on the Russian Federation, not on liberating Ukrainian territories at any cost. On the battlefield, the AFU is prioritising the destruction of those systems that the AFRF will struggle to replace or repair. The AFU is also building extensive defensive positions to try to maximise the AFRF rate of losses for any gains made on the battlefield. Such a damage-centric approach is intended to buy the maximum possible time, both for force generation and for damage to be inflicted in the deep. For Ukraine's international partners, provision of artillery ammunition and long-range strike systems are most important in support of this effort.

Russia's capacity to continue its aggression against Ukraine is fundamentally a result of its large capital reserves. The ability to pay high salaries to contract soldiers is enabling Russia's regeneration of forces, while money generated from petrochemical exports allows Russia to expand military equipment production, even as sanctions and supply chain disruption drive up the price. Ukraine is therefore targeting oil and gas infrastructure in Russia to initially reduce its reserves and thereafter the availability of liquid capital.¹¹⁷ Ukraine's international partners can support this effort by targeting the manufacturing facilities of Russia's defence industries, and the global supply chains that allow Russia to sustain the war, through rigorously enforced sanctions.

117. Michael Liebreich, Lauri Myllyvirta and Sam Winter-Levy, 'Why Ukraine Should Keep Striking Russian Oil Refineries', *Foreign Affairs*, 8 May 2024.

Another line of effort for inflicting damage on Russia is the use of information operations to reduce Russian confidence in the rouble, and to take measures to drive up inflation. Creating a felt cost of the conflict for the Russian population, and ascribing blame for that feeling to local officials, increases the jeopardy for the Russian government as the war protracts.

Buying time and slowing Russian force expansion are ways to support the regeneration of offensive combat power. To regenerate this power, Ukraine must levy troops that it does not immediately commit as battlefield replacements, but instead allows to train collectively until they are tactically proficient. This requires the opportunity to exercise headquarters to enable Ukrainian units to operate at scale. The combat arms officers leading such formations must also be familiar with using electronic protection, reconnaissance and attack so that they can protect their units once committed.

Planning for the commitment of additional forces should not be fixed in relation to a timeline governed by political expectations. Instead, the AFU should plan a shaping operation to create the conditions for offensive operations to be possible. While critical conditions are being established, Ukraine's international partners must work with these units to develop methods of overcoming the threat from Russian long-range fires. These include effective counter-reconnaissance capabilities, and the ability to protect the logistics routes in support of offensive operations and key enablers supporting offensive action. If these measures are not taken, Ukraine risks prolonging the conflict without shifting its trajectory, with tragic consequences for both the country and the security of Europe.

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