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Special Report

Stormbreak: Fighting Through Russian Defences in Ukraine's 2023 Offensive

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Special Report

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Cover image: A destroyed Russian military vehicle is pictured in Novodarivka village, Ukraine.
Courtesy of Raj Valley / Alamy

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Executive Summary

Irrespective of the progress made during Ukraine's counteroffensive, subsequent offensives will be necessary to achieve the liberation of Ukrainian territory. It is therefore important to assess the tactics employed and training provided during the Ukrainian offensive to inform force generation over the coming months. This report scrutinises tactical actions to identify challenges that need solving.

The prerequisite condition for any offensive action is fires dominance. This has been achieved through blinding the counterbattery capability of Russian guns and the availability of precise and long-range artillery systems. Ensuring the sustainability of this advantage by properly resourcing ammunition production and spares for a consolidated artillery park is critical.

Ukraine is suffering from heavy rates of equipment loss, but the design of armoured fighting vehicles supplied by its international partners is preventing this from converting into a high number of killed personnel. It is vital that Ukrainian protected mobility fleets can be recovered, repaired and sustained. This also demands a focus on industrial capacity and fleet consolidation.

Attempts at rapid breakthrough have resulted in an unsustainable rate of equipment loss. Deliberately planned tactical actions have seen Ukrainian forces take Russian positions with small numbers of casualties. However, this approach is slow, with approximately 700–1,200 metres of progress every five days, allowing Russian forces to reset. One key limitation on the ability to exploit or maintain momentum is mine reconnaissance in depth. The exploration of technological tools for conducting standoff mine reconnaissance would be of considerable benefit to Ukrainian units.

Another limiting factor in Ukrainian tactical operations is staff capacity at battalion and brigade level. Training of staff would significantly assist Ukrainian forces. This will only be helpful, however, if training is built around the tools and structure that Ukraine employs, rather than teaching NATO methods that are designed for differently configured forces. There is also a critical requirement to refine collective training provided to Ukrainian units outside Ukraine so that Ukrainian units can train in a manner closer to how they fight. This requires regulatory adjustment to allow for the combination of tools that are highly restricted on many European training areas.

Russian forces have continued to adapt their methods. Some of these adaptations are context specific, such as the increased density of minefields, from a doctrinal

assumption of 120 metres to a practical aim to make them 500 metres deep. Other adaptations are systemic and will likely have a sustained impact on Russian doctrine and capability development. The foremost of these is the dispersal of electronic warfare systems rather than their concentration on major platforms, a shift to application-based command and control tools that are agnostic of bearer, and a transition to a dependence on more precise fires owing to the recognised inability to achieve the previously doctrinally mandated weight of imprecise fire given the threat to the logistics sustaining Russian guns. It is vital that Ukraine's partners assist the country's preparations for winter fighting, and subsequent campaign seasons now, if initiative is to be retained into 2024.

Introduction

Russian forces suffered major setbacks in autumn 2022 with the collapse of the Western Group of Forces in Kharkiv and a compelled withdrawal from Kherson. In response to these setbacks, General Sergei Surovikin, then commanding Russian forces in Ukraine, adopted a new strategy. First, Russia would use long-range precision strikes to wage an attritional campaign against Ukraine's electricity and reticulation infrastructure with the aim of making Ukraine's cities uninhabitable during the winter. Second, the Armed Forces of the Russian Federation would build a series of defence lines across the occupied territories in a bid to blunt further Ukrainian advances and protract the conflict by exhausting Ukrainian troops. The extensive preparation for defensive operations – compared with the aggressive war aims of the Kremlin – contributed to Surovikin being removed in January, with General Valery Gerasimov, Chief of the Russian General Staff, launching an ill-prepared and costly series of offensive thrusts in January 2023. Nevertheless, the defence lines were completed, and Russia has been able to fall back on these defences after the failure of its offensive actions. The Surovikin Line now poses a major barrier to Ukrainian troops seeking to liberate the occupied territories.

During the preparation of Ukraine's offensive, various concepts of operation were examined. Much of the data supporting the tactics that Ukraine's international partners sought to train Ukrainian forces to adopt was based on operational analysis from the 20th century that did not contend with a range of technologies employed in Ukraine. Understanding how effective these tactics have been, therefore, is important for refining both the tactics of Ukraine's international partners, and improving the training provided to Ukrainian forces for subsequent operations. This report seeks to explore a set of tactical actions fought by the Ukrainian military in the opening phases of the counteroffensive and how both Ukrainian and Russian sides have refined their approach in response.

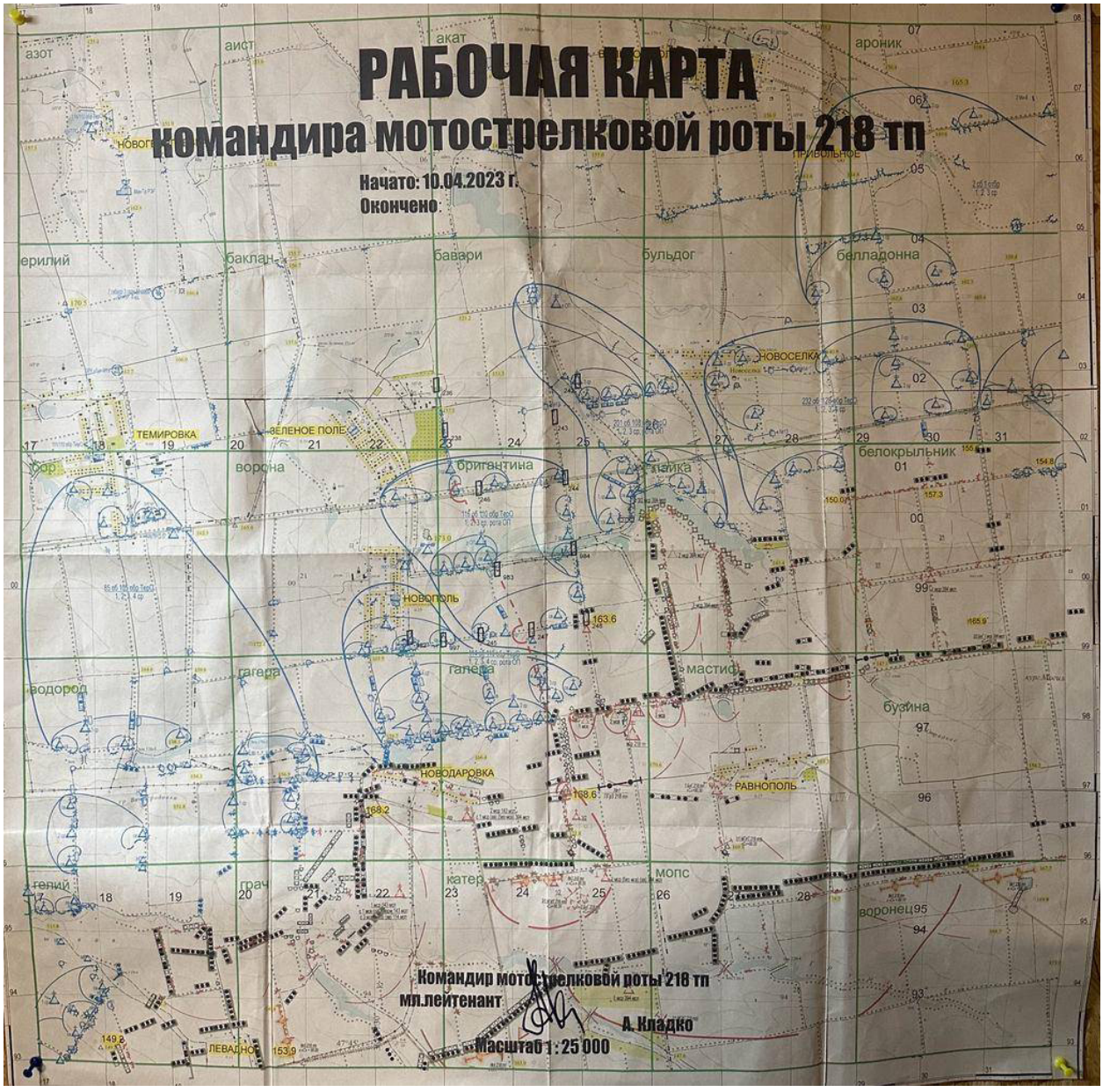
The overall plan for the offensive is highly sensitive. Detailed accounts of aggregate losses and other data are also sensitive because they would provide Russia with information about the extent to which they have written down Ukrainian units. Therefore, instead of trying to summarise progress throughout the offensive, this report presents a case study of a series of tactical actions, fought over a two-week period over the villages of Novodarivka and Rivnopil, straddling the border between Donetsk and Zaporizhzhia oblasts. The series of tactical actions is chosen because it is representative of wider trends, and informative as to how Russian forces manage different tactical challenges, and the various approaches employed by Ukrainian troops. The overview is based on accounts of the operations

by participants, captured documents from Russian command posts, open-source material including satellite imagery of the engagements, and a review of non-public videos of the relevant tactical actions. This report was presented to the Armed Forces of Ukraine (AFU) prior to publication to ensure that its release would not compromise any ongoing operations or tactics. The report remains solely the work of the authors named.

I. Taking Novodarivka and Rivnopil

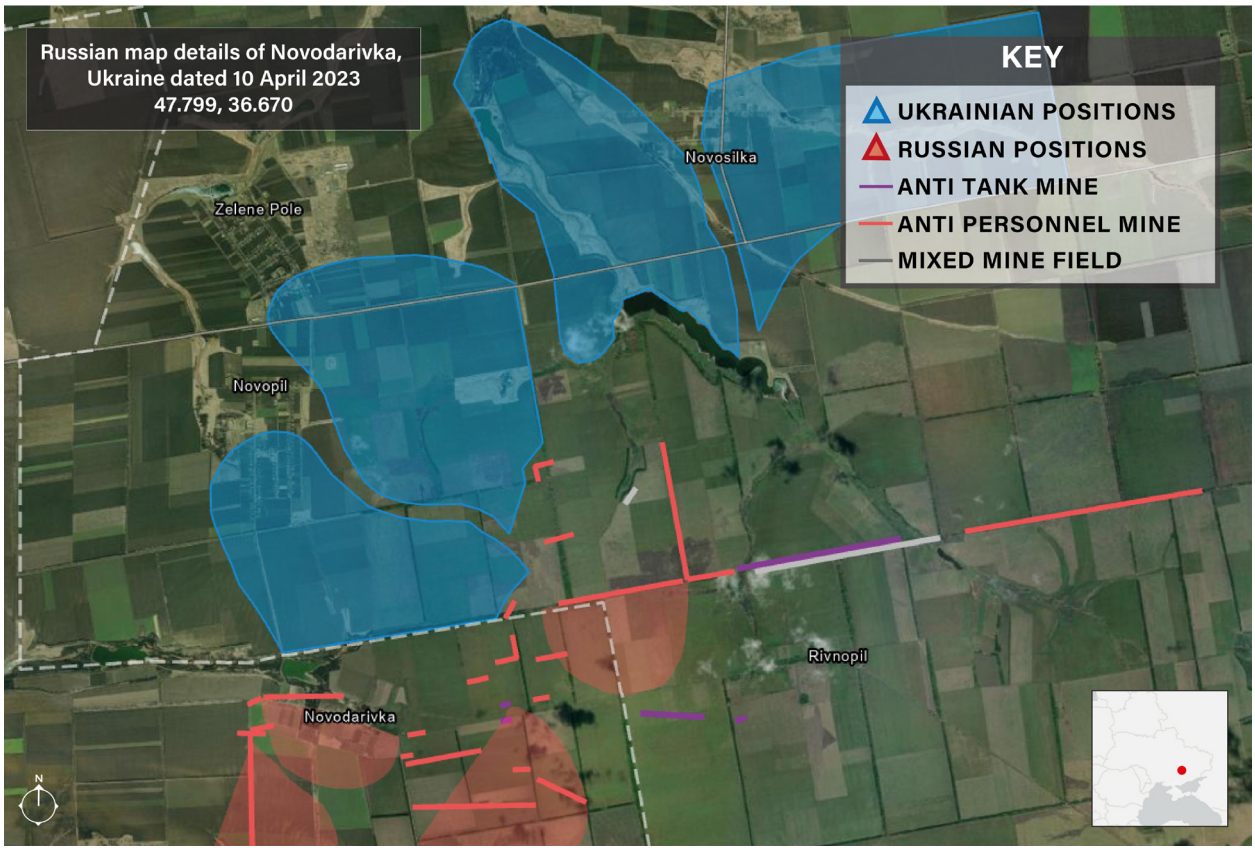
The line of contact between Ukrainian and Russian forces along the boundary between Zaporizhzhia and Donetsk oblasts had been relatively static over the months preceding Ukraine's offensive. Russian offensive operations in early 2023 had focused on Vulhedar, some 40–50 kilometres to the east, and Bakhmut. Ukrainian troops remained dug into tree lines around a kilometre to the north of Novodarivka, around the village of Novopil. A brigade of the Ukrainian Territorial Defence Forces (TDF) had been holding the line for some time, reinforced in May by a mechanised brigade and another line brigade in anticipation of the offensive. The mechanised brigade would spearhead the breakthrough. The Russians had a company in Novodarivka and another in Rivnopil, with a third holding a series of fighting positions between the two settlements. Behind this were additional reserves including armour. The approaches to the settlements were heavily mined. To begin advancing south towards the Surovikin Line, Ukrainian forces needed to break through these villages, and thereafter through Priyutne, approximately 6 kilometres to the south.

Figure 1: Russian Brigade Map of Force Laydown and Assessed Ukrainian Positions as of 10 April 2023



Source: Captured by Ukrainian forces during fighting in June 2023.

Figure 2: Recreated Map of Russian Positions at Novodarivka and Rivnopil



Source: Map captured by Ukrainian forces during fighting in June 2023; Maxar Technologies.

The Ukrainian offensive began in late May with a protracted period of preparatory artillery fires. For the Rivnopil sector, batteries of M777 155-mm howitzers had been assigned to support the effort, setting up their firing positions to the northwest. Usually, Ukrainian howitzers would have to displace 2–15 minutes from opening fire, depending on their distance from different threat systems. This time it was clear that Ukrainian intelligence had accurately marked down Russian firing positions, and with the greater range afforded by 155-mm guns, the Ukrainian gunners quickly caused Russian artillery to be pulled back. Since the targets in this phase were largely in the close, the Ukrainian artillery established a steady rhythm of strikes with little need to displace. There was a sense of elation among the crews and the infantry watching the fire. For months each gun was strictly limited in the number of rounds available. Ukraine had been trying to conserve its ammunition to stockpile for the offensive. Now there was freedom to fire and when calls for resupply were made, additional rounds were promptly delivered.

The Ukrainians also worked to degrade Russian tactical reserves using UAVs. Reconnaissance by day would locate Russian positions, which would be attacked at night using converted agricultural UAVs dropping RPGs. These tactics were

Agricultural UAV modified to drop munitions, Ukraine, July 2023. *Courtesy of Jack Watling*

fairly binary in their viability. If Russian electronic warfare (EW) was active, the UAVs could not get in and usually were not committed. If there was a relaxation in electronic protection, the effects could be dramatic. In one incident, a company of Russian tanks had taken up position in a woodblock behind the front. Five UAVs, each carrying four RPGs, were dispatched, destroying or seriously damaging seven of the tanks, although all of the UAVs were lost in the process.

The decision to attempt a breach of the initial Russian fighting positions was taken on the evening of 3 June, with mechanised troops assigned the task. There was a debate within the command group over the bogginess of the ground after recent rainfall. Nevertheless, the decision was to proceed. The initial attack was to aim to breach an area where the minefields were less dense, because of the short distance between the lines, and to break into the village of Novodarivka. The village had been almost entirely destroyed by Russian shelling when originally taken and was now simply a set of fighting positions for a Russian infantry company. Long and thin, running east to west, the village provided the Russians with covered positions that overlooked most approaches to their company positions to the east and west.

After identifying the points for the breach, the offensive started early in the morning of 4 June. Two UR-77 Meteorit charges were fired across the narrowest part of the minefield, blowing two 6-metre-wide channels from the treeline to

the north to the edge of Novodarivka. Under covering fire from artillery, the first column advanced along the eastern breach. The column was led by a pair of tanks, followed by MaxxPro MRAPs carrying the infantry. Unfortunately, the MRAPs struggled in the boggy ground, especially in the wake of the tanks. Several of the MRAPs bogged in, while the cleared lane was insufficiently wide for other vehicles to pass. It was at this point, with the column fully committed to the breach, that a pair of Russian tanks unmasked and began to engage the column. The Ukrainian tanks fired back at a range of around 800 metres. Nevertheless, the vehicles in the column were knocked out in succession. Infantry disembarking either turned back, or pressed forwards along the cleared lane, trying to find shelter. Some infantry sections made it to the edge of the village, but the open ground behind them, now scoured by fire, was perilous to traverse, risking this force's isolation. Too small to take the village, the Ukrainian military now had to press ahead or risk the destruction of the platoon that had made it to Novodarivka. The threat to those suppressed in the minefield eased after SPG-9 recoilless guns managed to engage the Russian tanks from the flank, knocking them out. This allowed casualties to be extracted.

The commitment of the second company to the western breach was necessitated both by the requirement to make progress against the objective and to reinforce the troops in Novodarivka. The ground proved firmer along this lane. However, when the column was fully committed to the breach, two more Russian tanks emerged, moving at pace towards the column and firing. Via UAV feeds, the command post watched the emergence of the enemy, and fires were brought down to try and disrupt the action. Exposed, the breaching company attempted to accelerate through the breach, but deviated from course. All vehicles in the company were then immobilised by mine strike in succession. Russian fires then began to range on the column. The dismounts once again bifurcated, some reaching the outskirts of the village and others withdrawing.

Figure 3: Assault and Aftermath of the Breach of Novodarivka

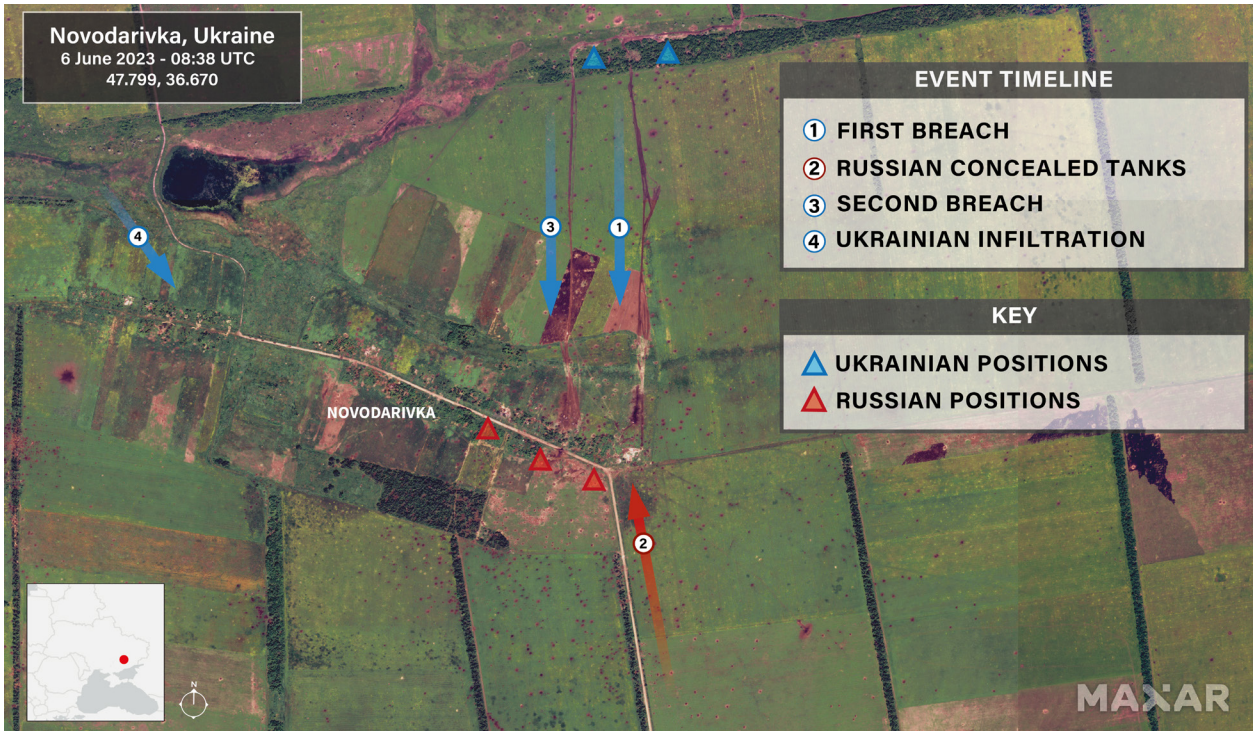
Source: Planet Labs.

Figure 4: Assault and Aftermath of the Breach of Novodarivka

Source: Maxar Technologies, 6 June 2023.

The Russian defenders inside the village displaced to account for the positions that had now been occupied, falling back to strongpoints in a farm to the east of the village, and to several fighting positions along the central road. Recognising the importance of expanding the ground held to disperse the force from Russian fires, the Ukrainian commander deployed two assault groups to reinforce. One group in platoon strength worked its way along the breach, using the immobilised vehicles as cover, while fires suppressed the Russian positions. Another platoon situated to the west noted that a fold of dead ground had become viable as the repositioning of Russian forces in the village removed it from view, while dense foliage prevented overhead observation by UAS. These troops advanced cautiously to the western end of Novodarivka and began to assault Russian positions to secure the crossroads that bifurcated the settlement. After some fierce fighting, the Russian troops withdrew eastwards to prevent their positions from becoming isolated. Fighting inside Novodarivka would continue for a further week with Russian firing positions in the eastern farmstead holding out until isolated by another Ukrainian action towards Rivnopil. Despite the Russians holding some positions, these no longer overlooked the approaches to other Russian units, opening up additional avenues of attack. The first new position to be assaulted was the elevated ground to the west of Novodarivka. Previously, Russian positions in the settlement had denied the approaches to the hill, but with these firing posts removed, Ukrainian infantry were able to contest the position from which Russian artillery spotters had previously directed fire against Ukrainian troops.

Figure 5: Advance on Novodarivka



Source: Maxar Technologies, Telegram, RUSI.

Figure 6: Advance on Novodarivka

Source: Maxar Technologies, Telegram, RUSI.

Before any further advances could be taken, it was necessary to deal with the Russian company in front of the village of Rivnopil to the east. This position controlled access to a series of woodblocks that ran semi-contiguously north to south. Ukrainian commanders were concerned that if they attempted to press ahead, Russian anti-tank guided weapons (ATGW) teams and other troops would work their way around the flank and cause significant damage to critical equipment. The position therefore needed to be taken. At the same time, however, Ukrainian commanders were wary. They had lost two companies of equipment to take Novodarivka. Such a loss rate was not sustainable if they were to eventually breach the Surovikin Line. It was therefore essential that the assault on the Rivnopil positions was accomplished without similar setbacks.

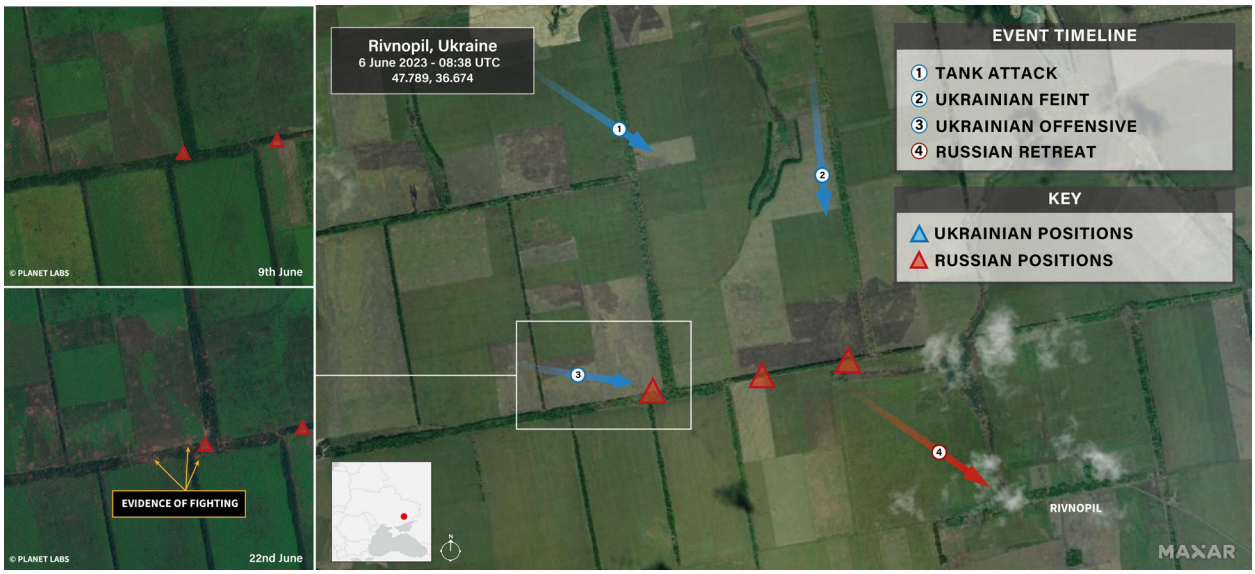
The attack on the Russian company position in front of Rivnopil would be led by TDF troops. In order to carry out the operation, the attacking force was augmented with two tanks from a neighbouring brigade and a battery of artillery. The attack began with artillery preparation of the Russian lines. Thereafter, the two tanks moved into positions where they had line of sight to the objective and began to deliver fire. The tanks, moving in and out of cover, engaged the Russian firing positions to draw the attention of and suppress the defenders. Shortly thereafter, artillery strikes on the fighting positions were combined with the

delivery of smoke in front of the tanks. The tanks worked forwards, giving the impression that smoke was being used to cover the advance of infantry.

While the tanks fixed the attention of the defence, a platoon multiple of Ukrainian assault troops moved along the treeline to the east of the Russian fighting positions. From there, it began to lay down suppressing fire and advance in pairs. The action drew the attention of the defence, which now recognised a clear tactical play, with a fixing action to its front, and a major assault about to be launched against its flank. The Russian unit began to reposition to prepare for this attack and attempted to win the firefight to the east. Reinforcing the perception that it was about to be assaulted, the Ukrainian artillery then delivered a heavy salvo against the positions, signposting an imminent assault.

The assault when it came did not materialise as the Russian defenders had envisaged. Instead, a platoon of assault troops, having infiltrated forwards along the western flank of the position then advanced rapidly, reaching the defensive positions that had been thinned out in anticipation of the assault to the east. Disorientated and fearing encirclement, the Russian troops began to withdraw towards Rivnopil, abandoning their communications equipment, and leaving five troops behind who were taken prisoner. Ukrainian forces had to exploit the attack quickly, advancing beyond the company position, because its coordinates were pre-registered with Russian artillery which delivered strikes on the trenches. Nevertheless, the rapid collapse of this position forced a redistribution of forces in Rivnopil itself, allowing another brigade to launch an attack on the village and, over several days, drive the Russians to fall back to the tree lines beyond the village. Eventually, Russian troops withdrew across a water obstacle behind the village and blew several agricultural dams to flood the area, establishing a string of ATGW firing posts in the tree lines beyond. The density of the ATGW screen was significant, with approximately four launchers per treeline with 50 missiles. These ATGW teams allow advances to be made past them and then conduct anti-tank ambushes from the flank before attempting to withdraw. They therefore had to be cleared deliberately before any armour could be pushed forwards. With only one obstacle-crossing vehicle available, the Ukrainian units had to pause to consolidate their gains.

Figure 7: Positions In Front of Rivnopil



Source: Maxar Technologies, June 2023; Planet Labs.

The capture of Novodarivka and Rivnopil took two weeks, with the need to secure flank positions being a prerequisite to further advances. Thus, the rate of advance during this period was one tactical advance for three days of fighting, with each advance moving the line of control approximately 700–1,200 metres forwards. The difference in methods for the various advances produced starkly contrasting results in terms of the level of expenditure for the gains made. Whereas the first tactical advance against Novodarivka cost two companies worth of equipment, losses throughout the attack on Rivnopil were light. Both Russian and Ukrainian forces made adaptations to their methods after these initial exchanges. The emphasis for Ukrainian troops moved to taking ground while conserving equipment and personnel.

II. Russian Lessons and Adaptation

The tactical actions around Novodarivka and Rivnopil were largely seen as successes by Russian forces insofar as they inflicted sufficient equipment losses in the early phases so as to degrade the reach of Ukrainian manoeuvre units assuming a consistent rate of loss through the depth of Russia's defensive positions. At the same time Russian losses in artillery and tanks were high, with the former being more concerning for the Russian command. Russian troop losses, while acceptable for the 58th Combined Arms Army as regards the level of attrition inflicted, were nevertheless unsustainable in the context of a protracted assault unless reinforcement was delivered. In short, Russia achieved tactical success in preventing a breakthrough, and could achieve operational success if it continued to inflict comparable equipment loss on the enemy. Attrition of personnel, however, if it remained consistent into the autumn, posed a risk of operational defeat, while loss of artillery systems threatened a reduction in capacity to attrit Ukrainian troops. Given this dynamic, several adaptations were made to Russian defensive operations.

The first adaptation was to increase the depth of minefields. Russian minefields had been doctrinally set down as 120-metres deep prior to the offensive. Following the early clashes, it was noted that this depth of mines was breachable by MICLIC and UR-77 to a sufficient depth to enable infantry to get into Russian defensive positions. The aim, therefore, has been to increase the depth of minefields to up to 500 metres, well beyond any rapid breaching capability. This has had a series of secondary implications. First, the Russian logistics systems were organised to equip brigades with sufficient mines to comply with doctrinal templates. The increased depth of the fields means that Russian forces have had insufficient mines to consistently meet this lay down with a density of mines consistent with doctrine. The result has been improvisation of explosive devices, the diversification of the range of mines ceded, and the decreasing regularity of minefields. Other common adaptations have included the laying of two anti-tank mines together – one atop the other – compensating for reduced density by ensuring that vehicles are immobilised by single mine-strikes, even when vehicles are equipped with dozer blades. Prior to this it was not unusual for a tank equipped with a dozer blade to survive three mine strikes before being immobilised by the fourth. Although the consistency of the minefields is now

diminished, this has significantly complicated Ukrainian planning and minefield reconnaissance.

Russian forces have also assessed that the practice of setting pre-registered fires to engage their own positions once they are lost is inefficient and dangerous when the enemy has an artillery advantage in terms of counterbattery detection, range and accuracy. The problems with this method have included the exposure of friendly guns, reduced effectiveness because of the Ukrainian tendency to displace from the fighting positions as soon as possible, and a dependency on communications. To solve these problems the Russians have resorted to preparing their fighting positions for reserve demolition. This is often done with improvised charges. The template is to detonate the first line once Ukrainian troops enter the fighting positions, while Russian forces withdraw through the rear of the trenches. The Russians assess this to be more responsive and assured than the application of artillery fire, and to threaten the boldest and most capable assault troops in Ukrainian formations, deterring attacks on firing posts.

If the increased complexity and extent of the minefields imposes constraints on adversary tempo, and reserve demolition of fighting positions deters the rapid clearing of positions, this fixing of the enemy requires that the Russians have a means to inflict damage on advancing troops. Artillery remains the primary method, but with fewer guns and a requirement to protect them, there is now a greater emphasis placed on other means. One of the foremost methods adopted by the AFRF is the emplacement of ATGW teams to the flanks of their positions, prioritising better trained and motivated troops to conduct anti-tank ambushes. Although there are limited personnel capable and willing to fight forward in this way, there appears to be no shortage of Russian ATGWs, with Ukrainian troops noting that these teams are well stocked with recently manufactured munitions. These troops are also prioritised for directing fire from standoff aviation.

Self-propelled howitzers preparing to move, Ukraine, July 2023. *Courtesy of Jack Watling*

The use of attack aviation has posed a consistent challenge for Ukrainian forces throughout the counteroffensive. The foremost threat comes from Ka-52 Alligators firing Vikhr and Ataka ATGMs. However, the Russians have also begun mounting Ataka on Mi-35Ms, which also engage in area-effect strikes utilising salvos of lofted S-8 rockets. Aviation strikes are launched from a depth of approximately 8–10 kilometres from the target. Ukrainian forces note that the presence of attack aviation is often heralded by the lifting of GPS jamming among Russian formations, reflecting the need for precise navigation in order to coordinate strikes, given that both armies are using many of the same platforms. Russian helicopter groups are also often flying with an EW-equipped helicopter for defensive purposes, equipped with directional pods aimed at targeting radar. The Russians are having to keep helicopters relatively close to the front, making their forward arming and refuelling points and other infrastructure vulnerable. Nevertheless, shortage of Ukrainian tactical air defence, the low altitude maintained by these assets, and the limited period during which they are in the hover to deliver effects all make countering attack aviation difficult.

The Russian military has also determined to tactically exploit opportunities when Ukrainian forces have become bogged down by aggressive flanking with armour to knock out Ukrainian systems. It is worth noting that Russia often loses the tanks used for these counterattacks but they inflict disproportionate damage because the mines constrain Ukrainian vehicles in their ability to

manoeuvre or respond. This willingness to counterattack and a decision to defend forwards highlight how training for Russian tank crews and other specialisms has continued to function, generating new crews with some tactical competence compared with the disruption in collective training that has hampered Russian infantry.

There are also areas of adaptation that reflect a significant improvement in practice and are not specific to the current context. One area of continued Russian adaptation but also improvement is EW. Russian EW has been a major area of investment and Russian EW operators tend to be technically competent. Nevertheless, Russian EW platforms have largely comprised modernised versions of Soviet equipment, which placed each type of effector on a single large platform, with formations of platforms providing a range of EW effects. The vulnerability of this approach has been recognised by the AFRF given the targeting of specific emitters. This has, in the first instance, led to the much more subtle employment of large platforms such as Zhitel R330-Zh. It has also driven a preference for the mounting of antenna on light platforms, or the dismounting and distribution of antenna that can be placed to cover tactical positions. The channelling of effects through antenna can therefore be carried out by EW suites that are not tied to the emitting signature. The loss of antenna when they are targeted is a cost that the Russian military feels it can bear. This is a transition in progress and so is not a uniform approach. Nevertheless, the preference to use systems such as Pole-21 and to treat them as disposable systems in order to provide wide-area protection from UAV strikes reflects a change in mindset, and how the Russian EW branch is learning from the conflict.

Another interesting area of conceptual innovation – underway before Ukraine's offensive but accelerated by the dynamics at play today – is a transition of Russian fires doctrine. Based on statistics gathered during the Second World War, Russian artillery had established levels of fire that were assessed to deliver specified effects against defined targets. For example, 720 rounds were assessed to be necessary to achieve the suppression of a platoon fighting position. This is the basis on which Russian fires operated in the opening phases of their invasion of Ukraine. It is an approach that the Russians now assess to be non-viable. First, the Russian forces lack the ammunition to sustain this volume of fire. Second, the logistics enabling such a volume of fire is too vulnerable to detection and long-range precision strike. Third, the loss of counterbattery radar and barrel wear have meant that this mass approach to fire suppression is of diminishing effectiveness.

The general conclusion that Russian fires doctrine is non-viable has caused a doubling down on the concept of the Reconnaissance Fires Complex (RFC) with effect being prioritised over volume. While manufacture of a range of Russian

munitions has become constrained, production of Krasnopol 152-mm laser-guided shells has been prioritised, with newly manufactured shells being widely available across the front. The use of UAVs to designate for Krasnopol has also been increased. Lancet has also been used extensively, along with FPV UAVs, to strike lead elements of Ukrainian units. Flown in complexes with ISR UAVs, these effects provide precision. The Russian military is, of course, continuing to rely heavily on MLRS, 120-mm mortars and other imprecise systems, while corner-cutting in the production of its munitions is becoming apparent. Nevertheless, the trend appears to be towards maximising accuracy and reducing the number of rounds necessary to achieve the desired outcome rather than resorting to saturation fire. This is a concerning trend, as over time it will likely significantly improve Russian artillery. The growth in the complexity, diversity and density of Russian UAVs is concerning. The gains in both effect of the warhead and the economy of its design between Lancet-3 and Lancet-3M demonstrate how the Russians are actively improving their fielded equipment. Modifications to loitering munitions to achieve noise reduction on Shahed-136 and to harden navigation are also notable. Here, it is clear that the AFRF are actively learning from Ukrainian forces, and in doing so, reducing the extent of some Ukrainian advantages.

Enabling the RFC depends on communications. Here too, the Russian military is making important progress. At the beginning of the full-scale invasion, Russian forces depended heavily on bespoke military radios. In the scramble for equipment late last year, a wide array of civilian systems was employed. Conceptually, however, the Russians now appear to have moved on, increasingly relying on military bearer networks but app-based services for encoding and accessing data. The result is that a system such as Strelets can provide a 3G connection to multiple devices operating applications that are intuitive for civilian users. This separation of bearers and services is nascent and the security and robustness of the systems being tested must be doubted. Nevertheless, the reduced training burden of this approach and the improvements in fire direction already achieved mean that the AFRF are likely to continue to push in this direction and increasingly systematise their communications architecture around these methods.

III. Ukrainian Challenges and Requirements

Ukrainian adaptation to overcome these challenges is sensitive. Instead, therefore, this report will outline several areas of persistent challenge that Ukraine's international partners could focus on to refine the support they offer to the AFU. Given the trajectory of the offensive it is now clear that major ground combat operations will continue in 2024 and so improving support to Ukraine's force generation process now is critical.

Insofar as Ukrainian forces have been able to make progress during the offensive it has been dependent on fires superiority. Outranging the Russians, combined with having better means for detecting enemy artillery and carrying out counterbattery fires, is an essential Ukrainian advantage. This advantage is limited in its duration by the serviceability of Ukrainian artillery pieces, the availability of replacement barrels, and the continued supply of 155-mm ammunition. With 17 artillery systems in operation, it is evident that replacement barrels cannot be produced for all systems, because of the shortage of barrel machines across NATO. It is therefore vital that Ukraine's international partners invest to ensure that there is a sustainable supply for a consolidated artillery park, focusing on maintaining a more limited range of guns at greater scale. If this is not achieved, it will undermine the preconditions for Ukraine to continue to make progress next year. The protection of guns from Lancet-3M and other loitering munitions is also becoming a critical priority and research into methods of force protection should be accelerated.

The importance of sustaining combat platforms provided by Ukraine's international partners is also important for protected mobility. There is a diverse range of vehicles that have been donated, from MRAPs to IFVs. Some are no longer in production, while others are still in widespread service. Ukrainian troops note that Western-provided platforms are vastly superior to their Soviet-legacy protected mobility platforms for one fundamental reason: crew survivability. Whereas for a Soviet mechanised section, its BMP was its primary weapons system, and so Soviet planners treated as synonymous the loss of the BMP with the loss of the section, Western armies treat mechanisation as an addition to basic infanteering. Protected mobility is aimed at delivering infantry to their objective, which the infantry then assault. This difference in mindset, combined with a different approach to losses, means that there is a heavy emphasis in Western platforms on the survivability of dismounts even if the vehicle is mission killed. By contrast

A Ukrainian BTR moves position, July 2023.
Courtesy of Jack Watling

with Soviet-legacy platforms, the compromise of the vehicle's armour is also usually catastrophic for those inside it. Life support systems are a secondary consideration. Given that Russia has greater mass than Ukraine, the accumulation of experience and longevity of troops is strategically vital for the AFU. But while Western-supplied protected mobility may be doing a good job at enabling their dismounts to survive – as demonstrated by the infantry still making it to Novodarivka despite their vehicles falling victim to mines and enemy fires – there is still a high loss rate of platforms. These platforms are often mobility killed rather than destroyed. But rebuilding them demands a consistent provision of spare parts. That is challenging for vehicles that are no longer in production. Again, therefore, Ukraine's international partners need to ensure that the industrial support is available to make the Ukrainian military sustainable.

The depth of exploitation of the conditions created by fires superiority is significantly limited by the capacity for minefield reconnaissance. At present, Ukrainian operations are inherently limited in their tempo by the fact that as Russian minelaying becomes less and less uniform and omnipresent, it is necessary to thoroughly recce ahead of any major push lest equipment loss becomes unacceptable. This cannot be carried out in depth and often relies on dismounted engineers. It is therefore very difficult to plan operations beyond the defences immediately in front of Ukrainian positions, meaning that breaches forwards are difficult to exploit. A note of caution is that because of the deviation from doctrine, minefields differ in their actual contours from what is shown on Russian plans. Assistance, therefore, should focus on equipment and techniques for detecting mines. One critical area that could assist is the use of algorithmic image analysis that could be conducted using UAVs to map minefields more quickly.

Planning remains a significant challenge for Ukrainian units because of the limited availability of trained staff officers. The rapid expansion of the AFU with the mobilisation of civilians means that there are many more units than staffs.

Although brigades have technical specialists able to run the communications and support systems they need, and often have skilled commanders, planning shops and experienced G3 staff are scarce. This limits the scale at which brigades can combine arms, especially during offensive operations where planning times are compressed. This was an area of support identified as a requirement as early as June 2022 but Ukraine's partners have not effectively provided it. It is vital that any staff training that is offered is not premised on putting Ukrainian staff through academic courses aimed at creating NATO staff officers. A relatively small number of staff applying NATO processes will have to revert to the mean once they are back in Ukraine and working with the bulk of a staff who has not received training on the same procedures. Instead, training should be based on observation of how Ukrainian brigade staffs operate and the tools they depend on and then offering training on techniques that maximise the efficiency of how those staffs function within this context. The training must be bespoke. Ideally, it would be of a whole staff. It must also accurately represent the communications and ISR tools employed by Ukrainian brigades.

Another area of critical priority is training junior leaders to conduct tactical battle drills. Again, attrition and the expansion of the Ukrainian military mean that junior leaders with deep expertise in offensive operations are not universally available across Ukraine's formations. This manifests in referring of combat management to higher echelons, where there are more experienced officers. This drives the continuation of combat management at higher echelon and limits mission command. Additional pressure is placed on the brigade, limiting the scale and complexity at which it can operate. This was demonstrated during the attack on Rivnopil. Only 3% of Ukrainian artillery-fire missions are smoke missions. As demonstrated during the assault on the company position north of Rivnopil, smoke can be extremely useful in confusing the enemy ground force and obscuring assault actions. But smoke also has the effect of obscuring the view from UAVs which higher Ukrainian echelons and command posts use to coordinate activity and conduct combat management. Commanders persistently prioritise maintaining their own understanding of the battlefield over laying down smoke and concealing their personnel's movements. Given the criticality of rapid application of artillery to support movement, this prioritisation is understandable, but it also reflects limitations in the ability of the brigade to trust tactical commanders to execute actions when not directed by high headquarters with greater situational awareness. Given the saturation of the headquarters that results, it is vital to train junior leaders, in combination with expanding staff capacity.

Another area where training needs to be refined is in gearing the support provided outside Ukraine with the AFU's training structure inside Ukraine. At present, individual training conducted outside of Ukraine builds upwards from individual

skills. There is not enough time in the course to move on to collective training at the company, while the safety cases on Western ranges require certification of individual skills before more complex activities can be trained. This approach to safety may make sense in peacetime for Western armies. For Ukraine, it simply transfers risk from training to operations. The reality is that individual training can be delivered by the AFU in Ukraine. What cannot easily be delivered is collective training. This is because the AFU does collective training 'in the unit'. Soldiers who are certified in their individual skills by training centres are assigned to units and it is up to the brigade commander to carry out training activities. If a brigade is fighting a sector of the front, it must establish a training area behind the frontline and rotate troops back to exercise. This limits the scale of training to company-sized activities at maximum, with the level of training undertaken entirely dependent on the intensity of operational activity at the front. This approach to force generation means that most Ukrainian battalions are generating approximately two platoons of troops which are considered fully capable of leading assault actions. While the rest of the battalion provides reinforcement, and the ability to hold ground, the size at which formations can conduct offensive action is severely constrained.

Collective training outside Ukraine is hampered by the fact that because of the safety culture in NATO, Ukrainian troops cannot train as they fight. Moreover, many NATO tactics either require a level of training that is not feasible within the timeframe available, or are not validated in the modern threat environment. A good example here is that Ukrainian training emphasises the threat from artillery even when teaching squad tactics. For Western armies that build skills incrementally, artillery is introduced into training after basic infantry tactics are mastered. More complex training involving artillery cannot be conducted until troops are certified in their basic skills to be able to exercise safely. For Ukraine, however, troops who are not prepared to deal with artillery are not prepared for the fight. Another example is the shaping effect of UAVs. Most NATO training areas are severely restricted in the types of UAVs that can be flown and how they can be used. This is because of fears that UAVs will malfunction and fly into controlled airspace, such as the area around civilian airports. The problem is that for collective training above company, Ukrainian troops need to be prepared for and practise tactics in an environment where there are up to 25 UAVs observing their movements, while UAVs are also critical to their own combat management. Thus, on partner training grounds where they could conduct collective training that is hard to carry out in Ukraine, they are prevented by regulation from either actually practising and refining their own command and control procedures, or exercising tactics that realistically represent the threat. This gearing of training to meet Ukraine's needs is critical if future rounds of mobilised Ukrainian troops are to be properly prepared to continue the liberation of their territory.

Conclusion

Operational analysis of tactical actions during Ukraine's summer offensive reveals a range of important areas where Ukraine's international partners can refine their support. Improvements in international training and other assistance will not have an impact on the current offensive. They will be critical however for Ukraine next year in its next round of force generation. Confidence that forces can be regenerated and that equipment can be repaired and sustained is also important for the AFU in shaping its planning for the current phases of operations. Delays in improvements to training or the industrial investment in making Ukrainian capabilities sustainable will similarly not have an immediate effect, but will impose a considerable cost on Ukraine next year. Some of the challenges currently limiting Ukrainian operations are a direct consequence of the failure to address identified requirements with sufficient alacrity in 2022.

It is also important to recognise that Russian forces are fighting more competently and with reasonable tenacity in the defence. Although they are losing ground, Russian forces are largely conducting orderly withdrawals from positions and are effectively slowing down and thereby managing Ukrainian advances while imposing a considerable cost in equipment. Another important point is that scarcity of systems that Russia had previously depended on to offer advantages are causing significant adaptation in the Russian armed forces and some of the solutions arrived at are likely to be continued and built on after the war. Most consequential of these are the move to application-based command and control services, agnostic of military bearers, and the shift in fires to emphasise effect for rounds fired rather than volume of rounds delivered on the enemy.

The Ukrainian military has learned from initial setbacks during its summer offensive. Even if a rapid breakthrough has proven difficult, the attrition being afflicted on Russian forces will see a degradation in the defence over time, and once a critical mass of losses is reached, that degradation may become non-linear. Given that it is unlikely, however, that this offensive will deliver a decisive liberation of ground, both Russia and Ukraine now face the question of how to regenerate combat power for the next round of fighting, into 2024 and beyond. For Russia, mobilising people is simple, but providing trainers and equipment for them remains a bottleneck. The conditions under which mobilisation is conducted are also constrained by Russian political considerations. Although it would make most sense to mobilise personnel before they are needed, Moscow consistently defers taking critical decisions until there is an immediate need. For Ukraine, there is first the question of how to retain as much of its experienced

forces as possible, and second how to expand the scale at which its forces can operate by working with its international partners to improve collective training. Whether Ukraine's partners can overcome their habitual sluggishness in doing what they have identified as necessary will be critical in determining whether Ukraine can maintain the initiative into the next fighting season in 2024.

Given the lead-times involved, one question that should dominate the thinking of Ukraine's international partners today is the dynamics of winter warfare. Last year, Russia prepared its troops poorly for winter conditions and suffered disproportionately as a result. Ukraine's current offensive operations are likely to continue into the autumn, but the question should be asked whether actions can be taken now to maintain the pressure through the winter. It is highly likely that Russia will hope that the winter will cause Ukraine to pause its offensive efforts, while Moscow will likely return to the attempted destruction of energy and reticulation infrastructure across Ukraine. It is now clear that the conflict will protract. It is therefore important that Ukraine's international partners invest now to give Ukraine protracted advantages. Failure to make timely adjustment to support will come at a heavy price in 2024.

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