In Focus

Was the Russian Invasion of Ukraine a Failure of Western Deterrence?
Bettina Renz

Ukraine’s Lessons for Future Combat: Unmanned Aerial Systems and Deep Strike
Harry Halem
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Welcome to the Winter 2023–24 demi-issue of Parameters. Released approximately one month before the full issue of the journal, the demi-issue addresses developing current events and topics critical to our readership, previews content for the forthcoming full issue, and tackles the big questions being asked today in the fields of military strategy and defense policy. This demi-issue includes two special commentaries focused on the Russia-Ukraine War.

In our first In Focus special commentary, “Was the Russian Invasion of Ukraine a Failure of Western Deterrence?,” Bettina Renz, a contributing editor of the Parameters editorial board, argues the West never articulated a clear strategy to deter such an invasion. Through an analysis of how deterrence works and what Western military and policy practitioners did and did not do leading up to the invasion, she shows the deterrence efforts were based on problematic assumptions about the Kremlin’s motivations.

The second In Focus special commentary, “Ukraine’s Lessons for Future Combat: Unmanned Aerial Systems and Deep Strike,” by Harry Halem, demonstrates how the reconnaissance-strike complexes used by both sides in the Russia-Ukraine War have changed modern combat. Based on his visit to the region in 2023, Halem provides lessons Western military and policy practitioners can learn about the roles these systems play; he also examines Ukraine’s development of a battle-management system that fuses unmanned aerial systems and satellite reconnaissance to coordinate deep strikes into Russia’s rear. ~AJE
Was the Russian Invasion of Ukraine a Failure of Western Deterrence?

Bettina Renz
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ABSTRACT: In February 2022, many observers initially evaluated the Russian invasion of Ukraine as a failure of Western deterrence. That assessment was and is flawed inasmuch as the West never articulated a clear strategy to deter such an invasion. Engaging with relevant conceptual debates about how deterrence works and relating this information to what the West did and did not do in the run-up to the invasion, this article shows that deterrence efforts were based on problematic assumptions about the Kremlin's motivations. The study concludes with lessons for Western military and policy practitioners with the intention to enable better future thinking about how to deter Russia.

Keywords: deterrence, Ukraine, Russia, Putin, NATO

One of the many questions observers asked when Russia launched a large-scale war of aggression against Ukraine in February 2022 was why Western deterrence had failed. As a long-time analyst of Russian foreign and security policy, I found it surprising that this question attracted so much attention. The West had long been concerned with the Kremlin’s increasingly aggressive foreign policy. After the annexation of Crimea in 2014, the West began to strengthen its own deterrence posture because of fears over a possible Russian incursion into NATO territory. The West also supported Ukraine in reforming its armed forces to stand up to ongoing and future Russian aggression. As evidence of an impending invasion mounted toward the end of 2021, I hoped the difficulties and potential risks of a full occupation of Ukraine would stop the Kremlin from proceeding. The possibility that the Kremlin’s failure to act would result from Western deterrence never crossed my mind. After all, the West had not articulated or communicated a clear strategy to dissuade Russian President Vladimir Putin from invading. A closer look at why some observers nevertheless believed Western deterrence should have prevented the February 2022 invasion offers valuable lessons for future thinking about how to deter Russia.

Western Deterrence and the Russian Threat

For the first two decades after the fall of the Soviet Union, few in the West pondered the need to deter Russia. Given the country’s economic and military weakness and apparent lack of global ambition, the question no longer seemed relevant. An increasingly aggressive foreign policy under President Putin—and especially Russia’s annexation of Crimea in 2014—reversed this trend. Policymakers recognized that NATO needed to enhance its conventional deterrence posture through increased defense spending and reinforcement of its eastern flank. At the same time, the West made considerable efforts to aid Ukraine in providing its own security. Arguably, however, these efforts did not amount to the formulation and articulation of a Western strategy to deter the Russian invasion of Ukraine.

Securing the West

The successful annexation of Crimea evoked fears that the West had overlooked important developments in Russian military capabilities and intentions. The defense posture of the West, and of NATO, specifically, required adjustments to deter the threat of Russian aggression. Consequently, Western defense planning focused on improving the means and ways necessary to deter a possible Russian attack on NATO territory. This preparation included debates about the need for European member states to increase their defense spending. The Alliance also strengthened its posture on the eastern flank and demonstrated unity and resolve to defend allied territory against Russian aggression. Such efforts included the Readiness Action Plan agreed upon at the NATO summit in 2014, which detailed assurance measures for NATO members in Central and Eastern Europe.²

Congruent Western defense debates and scenario planning related to the deterrence of the Russian threat since 2014 had the same geographical focus.³ Although the West perceived a militarily resurgent Russia as a potential threat to global stability, its dominant and perhaps reasonable concern was how to secure itself. The “Russian threat” that needed to be deterred

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was defined not principally as a threat to Ukraine but as “an armed attack by Russia against a NATO member,” as a 2020 RAND report put it.⁴

**Helping Ukraine to Help Itself**

The West’s preoccupation with deterring the Russian threat against itself did not mean it disregarded Ukraine and the devastation the country experienced at the hands of the Kremlin. Measures taken to support Ukraine, however, never amounted to a Western deterrent against an invasion. In response to the annexation of Crimea, the majority of Western states imposed punitive sanctions on Russia. With NATO-Ukraine relations dating to the early 1990s, the Alliance promised to “intensify political and military cooperation” and “support . . . the transformation of Ukrainian armed forces into modern and effective organizations, able to provide credible deterrence and defense against military threats.”⁵ These promises were realized in 2016 with the NATO endorsement of a Comprehensive Assistance Package for Ukraine, which offered tailored support measures, especially for the defense sector, and was intended to help the country “to become more resilient, to better provide for its own security.”⁶ The Comprehensive Assistance Package included training and the provision of some equipment under bilateral agreements, but it prioritized Ukraine’s long-term democratic development as the basis for creating effective armed forces. Glen Grant, a former British army officer and adviser to the Ukrainian Ministry of Defence, notes the United States and other NATO partners approached defense reforms in Ukraine like “any other peacetime country in Central and Eastern Europe.”⁷ Helping Ukraine to help itself was at best an element in the West’s broader efforts to contain Russian aggression, but it did not equate to a strategy to deter a potentially imminent invasion.

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Western Deterrence and the Invasion of Ukraine

General Deterrence

For most of 2014–22, the West did not articulate a strategy aimed specifically at deterring a Russian invasion of Ukraine. It seems that observers who evaluated the invasion as a failure of Western deterrence expected general deterrence to suffice. Colin S. Gray describes general deterrence as the assumed “effect of the threat latent [in a state or alliance’s] military power addressed ‘to whom it may concern.’”⁸ As such, general deterrence, unlike immediate deterrence, is not a deliberate strategy targeted at dissuading a specific actor (Russia) from resorting to force in a concrete scenario (the invasion of Ukraine). Instead, it is a much broader “expression of existing power relationships” between states.⁹

The invasion of Ukraine does not denote a failure of Western general deterrence in the sense that Russia saw the combined military power of NATO as inferior. Rather, since the collective defense clause did not cover Ukraine, as the Alliance consistently confirmed, the “latent threat” inherent in the Alliance’s collective military capabilities had little bearing on the Kremlin’s planning in this case.¹⁰ This situation should not have come as a surprise. General deterrence also had its limitations during the Cold War. Although Western deterrence of the Soviet Union worked in the sense that it never came to a war between the superpowers, it did not dissuade the Kremlin from using force in other scenarios—for example, in proxy conflicts in developing countries and in Afghanistan. As Ted Hopf explains, these armed interventions did not mean “the salience of absolute American military capabilities to Soviet calculations of American credibility” had been overestimated. Instead, “these calculations were not based on American use of these assets in third world arenas, but rather concerned the conventional and nuclear forces the United States had dedicated to the central front in Europe, Northeast Asia and the Persian Gulf.”¹¹

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Extended Deterrence

Observers might also have hoped that the effects of Western extended deterrence would discourage Russia from invading Ukraine. Extended deterrence is the idea that the latent threat of an actor’s military power is expected to prevent a direct attack and that this power can also be projected “to deter attacks on a third nation, usually the deterrer’s ally or protégé.” As Russia amassed military forces on Ukraine’s borders from 2021 and evidence of an imminent invasion started to mount, the West’s signaling to the Kremlin became more specific and included explicit extended deterrent threats. Putin was told in no uncertain terms that an invasion would have severe consequences for Russia. Some NATO Allies stepped up the delivery of weapons. As US President Joe Biden and other Western leaders have stated, these consequences would include the reinforcement of the posture of NATO on the eastern front, unprecedented sanctions, and the provision of defensive capability to Ukraine. Unsurprisingly, the effects of these threats on the Kremlin’s calculations turned out to be rather limited. It is widely acknowledged that it is particularly hard to make threats credible, in situations of extended deterrence, when an actor’s national security is not immediately at stake. With the option of NATO forces fighting Russia to protect Ukraine off the table because of the latter’s nonmembership in the Alliance, the West’s options to convey a credible extended deterrent threat to the Kremlin were severely limited at this point.

(In)credible Deterrent Threats

On the most basic level, deterrence works if the deterred nation is dissuaded from taking a desired course of action because it believes that the costs imposed will be unacceptable. None of the West’s signaled threats created this belief in the mind of the Kremlin. Warnings that NATO would strengthen its defensive posture on its eastern flank and in the Baltic States did little to deter an imminent invasion. This process had been ongoing since 2014, and Moscow likely expected such a consequence. Finland’s and Sweden’s subsequent memberships were perhaps unanticipated and went

counter to the long-standing Russian foreign policy goal of preventing further NATO enlargement. The Alliance’s efforts to bolster its own defense had little relevance, however, for the Kremlin’s central war goal of subjugating and occupying Ukraine.

Western threats of crippling economic sanctions did not constitute a credible deterrent factor. It has been suggested that sanctions did not deter the Kremlin because, based on previous experience, the Russian leadership underestimated the West’s resolve to implement ruthless and persistent sanctions that would be costly for the West itself.\(^{15}\) In this respect, it is possible that a more persuasive articulation of the magnitude of expected sanctions would have “impacted Russia’s calculations about the costs of the military aggression.”\(^{16}\) This outcome could not have been guaranteed, however. As Richard Connolly demonstrates in his book on Russia’s response to Western sanctions after 2014, there was a clear sense in Moscow that the sanctions, though not entirely unproblematic, also offered opportunities. Strengthening the state’s role in the economy, bolstering import substitution, and diversifying economic relations to regions other than the West meant that economic indicators quickly started to normalize.\(^{17}\) As such, there is a strong possibility that the Kremlin’s wish to take Ukraine was matched by the strong belief in its ability to withstand even much more stringent sanctions.

The threat of sanctions as the major form of retaliation was also insufficient. On the one hand, deterrence is an act of diplomacy and, as such, is about more than military capabilities and the willingness to use them. As previously discussed in the 2022 National Security Strategy, deterrence might work best if it integrates efforts from across the toolkit of modern statecraft, which includes economic sanctions.\(^{18}\) On the other hand, without the threat of armed force, many actors intending to launch a high-stakes war will accept the costs of sanctions and other nonmilitary responses.

When the annexation of Crimea raised fears in the West about the dangers of a militarily resurgent Russia, NATO saw the need to bolster its military capabilities as essential. As Richard Dannatt, the then Chief of Staff of the British Armed Forces, put it, sanctions and diplomacy


were not enough of a deterrent because Putin “[would] look beyond those things to see where the real check on his actions might come from.”¹⁹ In its 2022 Strategic Concept, NATO confirmed that its deterrence posture required a “full range of forces, capabilities, plans, resources, assets and infrastructure . . . including for high-intensity, multi-domain warfighting against nuclear-armed peer competitors.”²⁰ As such, it is unclear why in the case of Ukraine the threat of sanctions, no matter how crippling, ever would have been enough.

The West’s threat to provide defensive capability to Ukraine in the case of an invasion did not deter the Kremlin. As mentioned above, the Comprehensive Assistance Package for Ukraine for much of the 2014–22 period focused primarily on long-term reforms of the defense and security sector, fostering shared norms and values and the strengthening of democratic institutions. Efforts to build up Ukraine’s immediate defensive capability, especially in view of the ongoing war in the Donbas, included military assistance through trust funds and bilateral training programs. These contributions ranged from intelligence support, the use of command-and-control and defensive weapons systems, secure communications, and military medical treatments.

Throughout much of this time period, the majority of Western states limited their materiel support to the provision of “non-lethal equipment” because of fears of escalating tensions with Russia.²¹ A few years into the war in the Donbas, a number of Allies, including the United States and United Kingdom, put some “lethal” defensive weapons, like anti-tank weapons systems, in their aid packages. The explicit threat to supply Ukraine with serious defensive capabilities was not articulated, however, until an invasion seemed inevitable in spring 2022. In fact, serious debates over the supply of heavy equipment required for high-intensity warfare, like main battle tanks, artillery rocket systems, and surface-to-air missiles, did not commence until after the invasion had started. The mere prospect of Western equipment for Ukraine did not deter the Kremlin.

The West’s threat to equip Ukraine with defensive capability lacked credibility. It has been argued that one of Putin’s major miscalculations before the invasion was to underestimate the West’s unity and determination

to support Ukraine, including with weapons. This assessment might well be true, but realistically, in February 2022, there was little evidence to suggest to the Russian leadership that such unity would be forthcoming. Even as the invasion unfolded, the West’s determination to provide Ukraine with significant defensive capabilities only emerged after lengthy and serious disagreements. The first Western tanks did not reach Ukraine until several months into the invasion, and debates over the delivery of other equipment, such as fast jets, are ongoing.

If the Ukrainian armed forces had at their disposal a range of Western military equipment required for high-intensity warfighting by the start of the invasion, their ability to withstand Russian aggression would have been stronger, and many lives might have been saved. The presence of this equipment might also have deterred the invasion in the first place, but that idea is far from guaranteed. Like many observers in the West, the Kremlin seriously overestimated Russian military capabilities vis-à-vis those of Ukraine based on mistaken assumptions about the effects of numerical superiority in equipment and personnel. In order to adjust this vast imbalance significantly, the West would have had to supply an unrealistic volume of equipment. The operations in Crimea and in Syria, which the Kremlin viewed as highly successful, had imbued the Russian leadership with a serious confidence in its military’s capabilities. Russia’s military was yet again seen—and not only by the Kremlin—as a global player that could compete with other great powers, such as the United States, and with China.

Within this context, it is unclear if the Kremlin would have considered the possibility of defeat by Ukraine, which it saw at best as a peripheral state, even if its armed forces had been equipped with Western weaponry.

Finally, the West never entertained the idea of providing Ukraine with more than a conventional deterrent. Unlike nuclear deterrence, conventional deterrence is contestable, meaning the costs of a conventional

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war will not necessarily be unacceptable. As a result, “history is replete with incidents in which those subjected to conventional deterrent . . . threats posed by even a vastly superior power adopted a ‘come and get it’ attitude,” as James J. Wirtz describes it. Assuming Putin saw the subjugation of Ukraine in February 2022 as highly desirable or even essential, even a stellar conventional deterrent might not have been enough.

Conclusions and Implications

Was the Invasion of Ukraine a Failure of Western Deterrence?

The Russian invasion of Ukraine was not a failure of Western deterrence in that the West had never articulated a clear strategy to deter such an eventuality. Having said this, it is obviously problematic if the West believed the measures it had put in place would deter such an invasion. This belief would indicate that the West had little understanding of the Kremlin’s motivations and overestimated its ability to influence Russian decision making.

Given the priority in Russian foreign policy afforded to controlling developments of what it has long described as its “sphere of influence,” it was unrealistic to expect the West’s limited deterrent threats would dissuade the Kremlin once Russia had decided to invade. At the same time, the Russian invasion of Ukraine should not be confused with a failure of Western deterrence on a general level. Western defense planning vis-à-vis Russia after 2014 focused on deterring an incursion into NATO territory and, as others have noted, this deterrence has held. The invasion of Ukraine did not mean Russia saw the West’s collective military capabilities as weak. Since the direct involvement of Western military forces in Ukraine was out of the question, it simply did not figure into Russian calculations. The invasion of Ukraine could even strengthen the West’s deterrence posture in the Kremlin’s eyes: for many years, the Russian leadership saw the West as weak, divided,

and hypocritical. The unity and resolve developed after the invasion surprised Moscow and might affect future decision making.

**Could the West Have Deterred the Invasion of Ukraine?**

It is impossible to say whether the West could have deterred the Ukraine invasion. As Gray writes, “there is absolutely no way in which the success of deterrence can be assured, ensured or guaranteed.” Several relevant issues have also been raised due to the benefits of hindsight. Would a clearer strategy aimed specifically at deterring a Russian invasion of Ukraine have offered better chances for success? The West only made concrete deterrent threats about what would happen in the case of an invasion once it seemed almost inevitable. Should it have put forth this information sooner? Perhaps, but the formulation of such a strategy at an earlier stage required the conviction that a full invasion in the near future was highly likely. Clearly, this was not a majority view in the West until at least summer 2021. The prioritization by NATO of Ukraine’s longer-term democratic development as a basis for defense reforms over practical training and the supply of equipment certainly conveyed no sense of urgency in the matter.

Would stronger Western deterrent threats have dissuaded the Kremlin from invading? This question is difficult to answer. As is well known, many Western states were unprepared to risk their political and economic ties with Russia, and there were also concerns over the possible escalation of tensions. These barriers made reaching a consensus impossible at the time, but the lack of a unified Western approach was not the biggest problem. With the direct involvement of NATO forces in Ukraine ruled out, the options for ramping up deterrent threats were in fact severely limited. It is far from guaranteed that stronger sanctions or the delivery of serious defensive capability to Ukraine at an earlier stage would have been enough. Realistically, it is hard to envisage how any combination of threats that did not involve the prospect of devastating military retaliation could have been credible enough to deter the Kremlin from invading. Even though the threat or implication of such retaliation

would have increased the chances of successful deterrence, this is, understandably, not an option that the West seriously entertained.

Can Russia Be Deterred in the Future?

With the caveat that the success of deterrence can never be guaranteed, there is no reason as to why Russia would be less susceptible to deterrence than other states. Nevertheless, the question of whether Russia can be deterred begs a follow-up—deterred from what? The fact that some observers interpreted the invasion of Ukraine as a failure of Western deterrence, though there had not been a strategy aimed at deterring this specific eventuality, suggests there was a belief that a functioning Western deterrent should be able to prevent Russia from employing military force in all circumstances, unless perhaps in direct self-defense. This idea was unrealistic. A major reason why the Russian leadership invested so many resources in the revival of its military capabilities since 2008 was its desire to counter what it perceived as the Western—and, more precisely, American—monopoly on the use of force since the end of the Cold War.

The ability to pursue what the Kremlin calls an independent foreign policy, including military operations in support of its international interests like in Syria, is an important aspect of its military decision making. Dominating developments in what Moscow has long claimed is its “sphere of influence” is a central plank in Russian foreign policy priorities. For this reason, even the threat and implementation of crippling sanctions would never have deterred the invasion of Ukraine. It was an action Putin perceived as essential for achieving these goals. Although the costs of the invasion turned out to be significant for Russia and will undoubtedly continue to mount, the Kremlin likely sees them as a price worth paying to guarantee its ongoing freedom of action.

To increase the chances of deterring Russia in the future, the West needs a clearer understanding of what exactly it wants to dissuade the Kremlin from doing. This goal requires a detailed appreciation of Russian motivations and priorities, which include, but are not limited to, competition with the West that can be deterred with Cold War approaches. As Andrew Monaghan elaborates in his 2019 monograph, rather than reactive crisis management and the vague hope of figuring out the Kremlin’s decision making based on Cold War analogies and lazy stereotyping, the West needs a long-term strategy for dealing with the

Russians in the twenty-first century. Achieving this objective will not be easy. Deterrence cannot be successful unless it is based, in Monaghan’s words, on a “forward-looking approach that includes a sophisticated grasp of Russian defense and security thinking and the trajectory of Russian capabilities.”

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Ukraine’s Lessons for Future Combat: Unmanned Aerial Systems and Deep Strike

Harry Halem

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ABSTRACT: The Russia-Ukraine War holds many lessons for the US Army and American policymakers and leaders on the nature and role of reconnaissance-strike complexes in modern combat, especially Ukraine’s development of a battle-management system that fuses unmanned aerial systems and satellite reconnaissance to enable the fire coordination for deep strikes into the enemy rear. In the research presented here, open-source analysis and interviews in Ukraine focus on the development and employment of reconnaissance-strike complexes with respect to deep strike and the likelihood of mutual territorial attack.

Keywords: unmanned aerial systems, deep strike, reconnaissance-strike complex, electronic warfare, Russia-Ukraine War

The Russia-Ukraine War presents the first instance in which both combatants deploy robust, if still largely primitive, reconnaissance-strike complexes (RSCs) that they innovate during wartime. This situation allows observers to identify fundamental mechanics of the interaction between these complexes that provide programmatic and intellectual lessons for the US Army as it prepares to face near-peer adversaries for the first time since the 1980s. Ukraine’s experience demonstrates the relevance of RSCs to the deep fight—in Ukraine’s case, a complex enabled by unmanned aerial systems (UAS) is employed to allow for strikes deep into the Russian rear, using a handful of precision weapons to generate major effects.

This analysis first identifies the roots of Ukrainian military learning from 2014–22 and argues that the Russia-Ukraine War constitutes a watershed moment in combat because both sides employ a primitive RSC. It then explicates the technical and operational characteristics of Ukraine’s unmanned aerial system and intelligence, surveillance, and reconnaissance (ISR) system and identifies the manner in which Ukraine’s UAS–ISR system generates opportunities for deep strike. Finally, it outlines several programmatic and intellectual takeaways for the US Army, particularly on the role of deep strike.
Context: Ukraine's Strategic Problem and Military Learning

The current Armed Forces of Ukraine (ZSU) reflect a cross section of Ukrainian society, making civilian applications like Signal and Scribble Maps crucial to Ukrainian UAS-ISR use as new soldiers turn to technologies they know from civilian experience. Nevertheless, the system's basic idea—to create a pervasive UAS-ISR complex, link it to commanders, and enable distributed fires—has existed since the 2014 Donbas war because Ukraine has confronted a relatively consistent strategic problem.

The Russian armed forces have outmatched the ZSU since the Donbas war began. In 2014, Ukraine had around 6,000 combat troops, had just experienced a traumatic change in political leadership, and had virtually no international partners even when compared to Russian-backed forces in eastern Ukraine. Yet, Ukraine's ragtag forces gained an advantage over the Russian-backed separatists, prompting a Russian intervention, and despite setbacks, performed reasonably well. From that point, Ukraine's strategic problem was apparent: it confronted a qualitatively and quantitatively superior Russian military while lacking clear allies. The Ukrainian armed forces were, therefore, compelled to innovate.

Despite Ukraine's structural political issues, specific bureaucratic shifts and its political culture gave the ZSU a learning advantage over the Russian military. In 2018, Ukraine redesignated the Anti-Terrorist Operation—

Author's Note: In between this article’s composition and publication, one of its sources, and one of my close friends, was killed in action. His loss, like so many others, came in defense of his country and serves as a reminder of the sacrifices liberty demands.

Acknowledgments: I spent several weeks in Ukraine in March 2023 and discussed unmanned aerial systems (UAS) employment in intelligence, surveillance, reconnaissance, and targeting (ISR/T) contexts with a variety of active Ukrainian military personnel. My dataset is, of necessity, incomplete. Any number of interviews do not indicate a legitimate sample size for data experimentation. The nature of this war and the time that analysts have to collect and process information indicate that my conclusions are more inductive inferences subject to future refinement than deductive truths. Nor did my limited Ukrainian linguistic abilities help the situation. I am indebted to those Ukrainian soldiers and civilians, among many others in Ukraine, who were willing to help bridge the gap with subjects who would have struggled to communicate with me. Indeed, the openness of many Ukrainians to foreign observers should not be underestimated—in retrospect it should come as no surprise that a nation of 44 million struggling for its existence should welcome all the help it can receive from external assessors. One unimpeachable conclusion I can draw is that the United States and its allies should leverage this cultural reality and get as many analysts—uniformed and civilian—into Ukraine as possible. Moreover, in a war as violent and intense as this one, any data rapidly lose accuracy with time. All conclusions must be updated with fresh information.

the bureaucratic title for Kyiv’s operations in the country’s east—as the Joint Forces Operation. This change formally recognized Russia as a belligerent in the conflict and shifted command responsibility from the Security Service of Ukraine to the Ukrainian General Staff. This transition enabled a robust learning process within the Armed Forces of Ukraine since its soldiers and officers could openly discuss the war they were fighting. Internal learning dovetailed with the West’s training missions. The Russian military, by contrast, was never formally at war. The Syrian Civil War became its reference point—a conflict in which Russia held absolute air control and played an enabling role was not a helpful analogy to the current Russia-Ukraine War. Moreover, multiple high-level Ukrainian commanders today experienced combat in the Donbas or were part of the post-2014–15 training cycle and are far younger than their Western counterparts, indicating significant cultural turnover that enables innovation.

Also developed from 2014–22 was the sophisticated volunteer nongovernmental (NGO) system that interfaced directly with the military since the earliest days of the Donbas war. Most notable of these NGOs is the UAS-focused Aerorozvidka. Relations between the Ukrainian defense ministry and these NGOs have been fractious at times. Even in wartime, it took months for the defense ministry to begin procuring unmanned aerial systems for units directly—and today, private donations remain essential. The elements of the current Ukrainian system, however, have deep roots in the strategic culture of the ZSU.

**Historical Trends and Modern Strike**

The Ukrainian armed forces’ UAS-ISR system, an outgrowth of their unique strategic culture, is of interest for more than just tactical and

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5. Per the author’s work in Ukraine (March 29, 2023), these missions have had a cultural effect since the 1990s, which only intensified after 2014 when the ZSU pivoted to a war footing. See also John Jaworsky, “Ukraine’s Armed Forces and Military Policy,” Harvard Ukrainian Studies 20 (1996): 238–40.
programmatic reasons. The Russia-Ukraine War, the first large-scale conflict since the 2003 invasion of Iraq, is also the first war during which both sides have had to innovate and modify their reconnaissance-strike complexes and, indeed, the first conflict in which both combatants have something approximating RSCs.

The RSC concept has its roots in Soviet and Russian doctrine but is conceptually identifiable in Western military thought. In brief, the reconnaissance-strike complex is an integrated intelligence, surveillance, reconnaissance, and targeting (ISR/T) fires system, in which the time between target identification and engagement is extremely compressed. Sensors and shooters operate together in a harmonized network that makes combat a game of target identification, in which the side that is found first is usually killed.

The RSC concept is inextricably linked to intellectual-doctrinal developments in the 1980s in the United States and Soviet Union. Both doctrines increasingly pointed toward attacking the enemy at operational depth, a more natural line for the Soviets with deep operational theory, but one that finally translated into the West.

A properly constructed RSC should enable the synchronization of violence across an immense battlespace at depth and width, creating a combat area orders of magnitude larger than what was historically feasible. The US military deployed an early reconnaissance-strike complex in the Iraq wars, while China and Russia have deployed their own RSCs since the late 2010s. These complexes should also include artificial intelligence (AI); the fact that neither Ukraine nor Russia employs major AI indicates the degree to which their reconnaissance-strike complexes are still primitive.

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Ukraine is not the first conflict in which UAS and loitering munitions have been deployed at large scale. The Second Nagorno-Karabakh War included extensive UAS employment and, arguably, a nascent RSC on Azerbaijan’s part. Azerbaijan’s success (at least partly) stemmed from structural deficiencies in the Armenian military, namely its lack of short-range air defenses against loitering munitions, inability to intercept fixed-wing UAS consistently, and limited electronic systems.

By contrast, the Russia-Ukraine War provides sufficient scale and sophistication for conclusions to be drawn. Indeed, it is the first case of two militaries deploying and modifying their reconnaissance-strike complexes at scale in a competitive manner during wartime. Ukraine and Russia use much of the same equipment in their RSCs, while Russia has replicated Ukrainian employment methods.

**Ukrainian UAS-ISR System**

The ZSU has developed a sophisticated method of UAS employment that is integrated with a broader battle-management system that also receives information from US and private satellites. Precision-guided munitions are increasingly capable of hitting any individual target. Historically, however, weapons performance has exceeded practical ISR range. Ukraine demonstrates how unmanned aerial systems can narrow the precision-ISR gap through the creation of a UAS-enabled reconnaissance-strike complex.

Ukraine’s UAS-ISR system accomplishes two goals. First, it transforms traditional artillery fired in battery into “precision” weapons that can individually engage targets and rapidly improve accuracy. Second, it enables the Ukrainian armed forces to employ artillery in a distributed manner by facilitating responsive surveillance over a much wider area when combined with

a fluid battle-management system. This capability reduces the need for exposed logistics hubs and decreases Russian counter-battery effects, thereby allowing the ZSU to remain competitive despite a materiel disadvantage.

Ukraine’s UAS–ISR system requires the four types of UAS outlined in table 1 below. 20 It must be noted that Russian forces increasingly replicate Ukrainian practices, though on average without commensurate results because of poor training standards, less effective equipment, and a lower-quality officer and technical specialist corps. Given the author focused overwhelmingly on Ukrainian tactics, techniques, and procedures during his time in-country and only incidentally discussed Russian practices, the UAS description focuses largely on Ukrainian ISR/T practices. Moreover, while factory specifications vary from the information depicted below for each type of unmanned aerial system, battlefield conditions often limit operational range.

Table 1. Four types of unmanned aerial systems required by Ukraine’s UAS–ISR system

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Cost</th>
<th>Range</th>
<th>Service Ceiling</th>
<th>Special Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small &gt; 1 meter</td>
<td>&lt;$1,000</td>
<td>5 kilometers</td>
<td>&gt; 1,000 meters</td>
<td>First-person view, copter, used for very short-range reconnaissance and as loitering munitions</td>
</tr>
<tr>
<td>Medium 1 meter</td>
<td>$1,000 – $10,000</td>
<td>6 kilometers</td>
<td>1,000 meters</td>
<td>Short-range reconnaissance, light ordnance, and night work</td>
</tr>
<tr>
<td>Large 1–3 meters</td>
<td>$10,000 – $30,000</td>
<td>10 kilometers</td>
<td>&gt; 1,000 meters</td>
<td>Backbone of Ukrainian ISR</td>
</tr>
<tr>
<td>Fixed-Wing &gt; 3 meters</td>
<td>&gt; $30,000</td>
<td>&gt; 20 kilometers (some reach several 100 kilometers)</td>
<td>1,000 meters plus</td>
<td>Highest-quality sensors</td>
</tr>
</tbody>
</table>

Units often share information at the fireteam and squad level, but most intelligence analysis and target distribution occurs at the company to battalion level. The system’s flexibility stems from Ukraine’s technological literacy and extensive efforts to shift UAS-dense units around the front line. Much UAS training occurs through private charities that acquire unmanned aerial systems on the European market, transfer systems to units, train operators, and conduct the equivalent of doctrinal development.

The Ukrainian battlespace is extraordinarily congested. A 20-kilometer zone around the contact line contains extensive trench lines, ground-based electronic warfare (EW) systems, air defenses, artillery batteries, and counter-battery radars. Moreover, most Ukrainian UAS are dual use, making them operationally intuitive and cheap but decreasing their resilience to electronic warfare and the quality of their sensors and optics. Copter optics, with their roughly 20-kilometer daytime range, create a 30-kilometer ISR range. Major Russian targets are beyond this bubble, however, given Russia’s adjustment of logistics after its 2022 deployment of the high-mobility artillery rocket system (HIMARS). While large unmanned aerial systems have optics that can identify targets 40–80 kilometers away—and much better range than copter UAS—they are loud and vulnerable to point air defense and EW. Even large copter UAS are too loud for night operations, but smaller copters with worse optics limit the range of artillery.

To compensate for electronic warfare, Ukrainian units deploy all unmanned aerial systems, barring first-person view drones, with four-man teams comprised of a driver or scout, drone operator, navigator, and gimbal operator. Since UAS are jammed so often, the crew must track movements manually to prevent losses from inattention. Experienced UAS operators are the most valuable military occupation specialty to the ZSU, bar combat medics, and they lose far fewer unmanned aerial systems than the publicly quoted average would imply.

Deep Strike and Fires Corridors in Ukraine

While skilled operators can reduce EW disruption to UAS, the range question remains. An effective RSC must be capable of facilitating strikes across the battlespace, particularly into the enemy’s depth. Fighting deep is critical in the Ukrainian case because of the need for a breakthrough and Russian fires volumes.

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22. Per the author’s interviews (March 24, 25, and 27, 2023), two-man teams are uncommon. They are restricted to medium UAS and highly competent operators.
23. The author’s interviews (March 25, 27, and 30, 2023) indicated the majority of losses came from inattentive operators.
24. The author’s interview subjects emphasized both military occupation specialties. Particularly in drone-specialist ISR units and artillery formations, UAS losses are extremely low. Moreover, by recovering hostile or lost friendly unmanned aerial systems, units can augment numbers over time. The author found that an average loss rate of one unmanned aerial system per month was typical for his subjects, though once again, line unit UAS losses are dramatically higher. The RUSI team, from which the 10,000-per-month figure generally stems, has also found the same need for contextualization.
Beyond the first few weeks of fighting, particularly around Kyiv, thickening front lines have defined the war, necessitating a breakthrough. Conducting or foiling a breakthrough requires winning the deep fight. Breaking through a thickly defended front line and defending it requires extreme effort. A sophisticated logistical system is crucial because artillery amplifies the role of logistics, which urban combat amplified again. On the offensive, artillery is needed to suppress and destroy defensive positions to enable an armored breakthrough. On the defensive, artillery is needed to blunt attacking spearheads and ultimately destroy them. Deep strikes are needed both to starve the front line of shells, disrupt electronic assets, and suppress defender command-and-control (C2) nodes and to disrupt the attacking force.

The difficulty, therefore, is applying precision at distances of 30–100 kilometers: the Ukrainian armed forces must sequence fires to maximize precision effects and avoid Russian counter-battery fire. The solution is to create what can be termed fires corridors, gaps in the electronic warfare and antiair warfare (AAW) defensive system that UAS and long-range fires can exploit.

In Ukraine, US space-based capabilities and commercial satellite imaging help the ZSU identify targets. Suppressing or destroying the Russian EW-AAW blanket that defends the front line, however, currently requires unmanned aerial systems simply for their imaging responsiveness, even if these civilian-specification models are vulnerable to Russian jamming.
The UAS-ISR complex is remarkably effective at mapping Russian frontline forces, enabling decentralized battery operation. To strike deep, enough fires must be concentrated to suppress or destroy multiple AAW, EW, artillery, and counter-battery assets 10–15 kilometers into Russian-held ground. This action creates a hole in the enemy AAW- EW network through which fixed-wing UAS can be used to identify the target and engage it with precision weapons at 70-plus kilometers. The deeper the target, the longer the window must be.

Fires corridors allow Ukraine to conduct deep strikes at scale, thereby targeting the logistical underpinnings of the Russian military. Indeed, the primacy of the deep fight is the central lesson analysis of the Russia-Ukraine War provides for future combat.

Ukraine has waged three successful anti-logistical efforts demonstrating the relevance of deep strike. First, Ukraine used a handful of Western-provided HIMARS to derail the summer 2022 Donbas offensive. A limited Ukrainian attack in the forest west of Izyum, the Russian forward supply hub in the Donbas, provided Ukraine an ideal position for HIMARS strikes against Russian logistics and C2 nodes. The effect was almost immediate: after taking Syeverodonetsk and Lysychansk and surging forward toward the Bakhmut–Siversk–Soledar line, Russian forces abruptly halted in the face of Ukraine’s deep strikes. The relevance of deep strike is reinforced by the fact that Russia had continued its advance before the HIMARS campaign began. Naturally, other factors were relevant here, particularly Ukraine’s choice to commit reserves to Syeverodonetsk, thereby prompting Russian reserve commitments as well. Nevertheless, deep strike plays a crucial role.

Second, in the fall of 2022, Ukrainian deep strikes helped enable the Kharkiv offensive. Along with a deception campaign to reduce Russian force density, long-range strikes disrupted Russian logistics command and control, generating the operational vulnerability Ukraine exploited.

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34. Franz-Stefan Gady and Michael Kofman, “Ukraine’s Strategy of Attrition,” Survival 65, no. 2 (April–May 2023): 10. Although Gady and Kofman do concede that long-range strikes against C2 and logistics degraded Russian responses through three months of careful strikes, they correctly insist upon the broader theater strategic context, Russia’s rotation of quality units, and limited remaining forces in Kharkiv oblast. The point is that an undercurrent of deep strikes prompted other changes that hollowed out Russia’s defenses in Kharkiv, enabling major gains.
Third, Ukraine leveraged the unique conditions of the Kherson bridgehead between September and November 2022 to erode the Russian position, ultimately prompting a withdrawal from the Dnieper River’s right bank. Long-range artillery played a decisive role in this campaign, hitting Russian rail and road links to the bridgehead and ultimately hollowing out Russian logistics so thoroughly as to compel a withdrawal.

In each case, the operative factor was a general hollowing out of enemy capacity. By shortening some aspect of the Russian system—typically Russia’s ability to sustain large-scale forces deployed forward, but also by disrupting the Russian C2 network—Ukraine could compel Russia to roll its forces back, either retreating or halting an offensive.

As of this writing, Ukraine is on the offensive again. Although there are weeks to months of fighting ahead, the ZSU engaged in another deep-strike campaign that includes loitering munitions, cruise missiles, and sabotage.35 The Russians, however, have responded with a UAS-RSC of their own. Russia’s greatest innovation has been on the counter-battery side.36 Russia’s Lancet loitering munitions, cued by the Russian UAS-ISR system linked to counter-battery radars, attack Ukrainian artillery as Ukraine seeks to create fires corridors. The Lancet flies fast enough to evade most Ukrainian short-range air-defense weapons. Ukraine’s response has been better dispersion as well as disruption to ISR-focused unmanned aerial systems, alongside a probable reduction in the number of towed artillery pieces deployed near the front line. Russian and Ukrainian RSCs are therefore interacting in a fluid manner.

Winning the deep fight need not entail completely paralyzing enemy C2 and logistics, though paralysis is ideal on the offensive. The objective, rather, is to impose costs upon enemy logistics. This burden will force the enemy to extend the distance between its major logistics hubs and the front line, complicate transportation, and force the enemy to devote time and resources to defending against deep attack. The result will be a diffusion of enemy resources even after logistical adjustment.

Russian fires weight has decreased across the front, as the Russian military now struggles to sustain the countrywide bombardment curtain it employed throughout 2022, primarily because deep strikes have forced


a logistics redistribution. This change creates additional failure points in the system. Defensive forces in fixed positions receive less materiel. Mobile reserves are exposed to long-range strikes with outsized impact, as incidents like the Makiivka Strike demonstrate.\textsuperscript{37} Moreover, C2 nodes must be light and mobile, or very well hardened, either requiring more defensive resources or increasing the cognitive load on commanders.

The Russian logistical system was likely more exposed to pressure than other alternatives because of its lack of truck-based transports, manpower-intensive system, and emphasis on rail transport.\textsuperscript{38} Yet, the United States has logistical chokepoints as well, in particular, a reliance upon large depots—admittedly much farther from the combat zone than the Russian system—and upon civilian transports that may not be available in wartime.\textsuperscript{39}

Ukraine’s success has stemmed from an ability to leverage a small number of long-range precision weapons to hit high-value targets in the Russian rear area. Leveraging precision effects requires careful preparation to ensure, in the Ukrainian case, they can be applied through the creation of fires corridors to strike deep. In a competitive duel with Russia’s reconnaissance-strike complex, striking deep allows Ukraine to roll Russian forces back by creating C2 and logistical seams. Ideally, over time, this situation will enable a breakthrough and exploitation.

**Implications for the US Army**

While the Russia-Ukraine War is an illustrative case, it is unique in many respects. Both sides derive their doctrine from similar sources and employ similar or identical weapons. Neither side can break the other’s integrated air defense network—Ukraine for lack of modern airframes, Russia for lack of enough precision-guided munitions—meaning deep strike is primarily a missile-based phenomenon. Russia and Ukraine also field armies with far less overall experience than anticipated before the war, having gone through several rounds of mobilization, making logistical and command centralization all the more appealing and strikes against logistics and C2 nodes more fruitful. Russia has refused to deploy


kinetic anti-satellite interceptors, nor is there much available in the open source about satellite jamming, an undeniably relevant factor in future wars. Ukraine and Russia both defend some of the world’s most extensive ground fortifications—in the Ukrainian case, built over years of positional conflict in the Donbas. The US Army should not plan to fight the last war, let alone a war it has not actively fought.

Ukrainian and Russian UAS-enabled RSCs, however, and the need to conduct deep strikes to attrit an RSC, will only intensify over time as RSCs become more sophisticated. The US Army will likely face near-peer conventional adversaries with a distributed reconnaissance-strike complex that has multiple redundancies and, critically, includes AI to shorten the kill chain.40

This future RSC will need to be tugged in or disrupted to create opportunities for US land, air, and sea power to deliver the heavy capabilities needed to break an enemy position and achieve a combat decision. The Ukrainians do not face an abstract network that they must attrit but a specific, geographically textured adversary they must hollow out. Much in the way Russian forces that mass too early are extraordinarily vulnerable to a precision strike, so too are the Ukrainian forces at risk. The United States will face a similar type of threat, albeit at a greater degree of sophistication. If it seeks to mass, it must reduce the enemy RSC’s ability to hit concentrated forces—otherwise, the combat power that mass generates will be wasted.

From this reality stems the need for a fluid reconnaissance-strike complex that includes a distributed ISR system, one that enables the specific application of precision effects to hit RSC nodes in the enemy’s depths. Perhaps penetrators can help, whether this assistance entails an electromagnetic pulse warhead that can knock out jammers or, in the future, directed-energy weapons used for air defense or a fires corridor akin to that of Ukraine. Unmanned aerial systems will almost certainly be part of the solution. As commercial UAS technology develops, small, cheap UAS hardened against some electronic effects will proliferate. Artificial intelligence and edge computing will reduce UAS reliance on GPS and human control, while smaller, higher-quality optics will increase the ability of unmanned aerial systems to operate undetected and identify targets at range. Satellites will also matter, especially microsatellites with advanced sensors.

The technology, however, is not the point. The Russia-Ukraine War demonstrates the intensity—in materiel, manpower, and cognitive load—

of combat between adversaries with actual RSCs, even if both parties suffer from obvious technical, organizational, and logistical limitations. In a conflict with a near-peer adversary, the United States will likely face a reconnaissance-strike complex with greater range, comprehensiveness, and scale. This network will likely involve units and positions on enemy territory. Ukraine, even with limits on its ability to engage targets within Russia, has managed to fight effectively, but it has been nearly helpless against the Russian strategic-strike campaign. The United States is unlikely to face an adversary it can defeat absent some consideration of strikes on its territory, at least if it hopes to win on a timescale more closely approximating months or years than a decade. Two equally sophisticated RSCs, then, can increase the likelihood of mutual territorial strikes and the potential for escalation.

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