

BEYOND THE COUNTER-OFFENSIVE: ATTRITION, STALEMATE, AND THE FUTURE OF THE WAR IN UKRAINE

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SUMMARY

- Russia and Ukraine are engaged in a war of attrition – which on current projections Russia is set to win.
- Ukraine can only achieve its war aims if it moves to a war of manoeuvre; without this, it cannot regain its lost territory.
- Western supplies and efforts at defence-industrial consolidation are failing to provide Ukraine with the replacement armaments it needs to survive the war of attrition, let alone switch to manoeuvre warfare.
- The West and Europeans in particular need to overhaul their financial regulations and create economies of scale to radically stimulate the production of drones, ammunition, armoured fighting vehicles, and more.
- Only if they carefully absorb the lessons learned from this war will Europeans be ready for the types of great power confrontation that are becoming more likely in the 21st century

The war of attrition

The Russian war against Ukraine has become a war of attrition. Such a conflict will impose enormous costs on both sides, but over time it will favour Russia. The Russian defence-industrial base cannot compensate for Russia's current loss rates, but it can replace its equipment faster than the West is, as of now, willing to do for Ukraine. For the time being at least, a war of attrition implies a Russian victory.

This outcome is far from inevitable. But Ukraine cannot overcome Russia in a war of attrition without stepped-up Western assistance. Ukraine's Western allies thus have two inter-related tasks. Firstly, they need to dramatically increase their own capacity to produce key defence equipment. There can be no victory in a war of attrition against Russia with current stocks of equipment and current levels of Western defence production. Secondly, Ukraine's supporters need to provide the Ukrainian army with the equipment, training, and concepts necessary to return manoeuvre to the battlefield. Ukraine's victory requires offensive action – and so there can be no Ukrainian success without a restored capacity to take back Russian territory.

This paper describes what Ukraine's European allies need to do to help Ukraine survive in the war of attrition and eventually restore manoeuvre to the battlefield so that Ukraine can win the war. These are not easy tasks – they will require years of political commitment and a high level of sustained spending. But they are the only way that Ukraine can emerge victorious.

Why Ukraine needs to undertake offensive action

Warfighting does not happen in a political vacuum. Military operations are not isolated events – they seek to fulfil a political aim. To understand Ukraine's military thinking and planning, one needs to look at the country's economic and societal situation, which makes up the context in which military operations are planned and conducted.

Ukrainians – from the president to the people on the street – want a decisive outcome to the war. They have been struggling for their independence for more than a century. Now they want to secure it forever. They do not seek a ceasefire or a freeze in the war that would leave the issue undecided. No quasi-state, no occupied area to negotiate over should remain to provide Russia with a foothold in Ukrainian domestic politics. An opinion poll conducted by the Ilko Kucheriv Democratic Initiatives Foundation and the Razumkov Center in [August 2023](#) showed that 90.4 per cent of Ukrainians regard trading occupied areas for peace as unacceptable, while only 4.7 per cent would support such a deal. They also want to definitively defeat Russian imperialism and ensure that the Russian regime does not see the

war as a success that can be repeated or resumed. “We are fighting”, Ukrainians often say, “so that our children do not have to fight this all over again.”

Ukraine cannot achieve this goal without military offensives that can expel Russian occupation forces from Ukrainian soil. Hence, the state’s resources are geared towards such action. The various setbacks that the Ukrainian military has experienced do not change the necessity of offensive actions to achieve the desired strategic results.

Ukrainians have also not written off their compatriots living under Russian occupation. In the first phase of the war, the Russian occupation forces only targeted for execution those individuals who were obviously pro-Ukrainian, such as military and security service personnel, military volunteers, veterans, and people working for rule of law or democracy watchdog organisations. Now, according to Ukrainian investigators, [1] they target anyone who is not obviously pro-Russian, defined by whether an individual has applied for a Russian passport and publicly shown loyalty to Russia on social media. Those targeted suffer detention, torture, separation of families (including the removal of children from “disloyal” parents), and execution. The number of people in urgent danger now is much larger than it was at the beginning of the Russian occupation.

In the spring of 2023, this concern for those living under the occupation meant the Ukrainian government could not, from a political standpoint, postpone the counter-offensive to gather more ammunition, further train the troops, or for some other logistical consideration. But those considerations did mean that the offensive proved much less successful than the government had hoped. And that lack of success has created political problems for Ukrainian president Volodymyr Zelensky. According to Ukrainian diplomats, Zelensky’s international supporters, particularly sceptical Republicans in the US Congress, expect him and his team to come up with a clear and feasible strategy for victory. [2]

Ukrainian strategy in 2023 tried to achieve Ukraine’s aims with the least amount of offensive action possible, reflecting Ukraine’s materiel and ammunition deficiencies. According to Ukrainian officials, the primary goal of the 2023 offensive was for Ukrainian forces to reach the Sea of Azov, cut off Russia’s landlines of communication to Crimea and then put the peninsula under siege through drone and cruise missile attacks. The Ukrainian theory holds that Crimea is the centre of gravity of Russia’s neo-imperial ambitions, so putting it at risk should force Russian president Vladimir Putin to the negotiating table on better terms for Kyiv. Zelensky hinted at this plan when, in August 2023, he referred to the possibility of demilitarising Crimea through diplomatic means.

So, the Ukrainian government and society knows what they want to achieve, even if it is not

clear that they have the means to succeed. The same is not true for much of the international coalition supporting Ukraine. A few European states such as the Baltic states and Poland want to comprehensively defeat Russia (to include, if possible, dismantling the current Russian regime) so that Russia no longer poses a threat to their security. The United Kingdom, France, and most other European countries want Russian imperialist and revisionist ambitions defeated and Ukraine restored to its internationally recognised borders in order to defend the existing territorial and political order. The United States and Germany, however, (to be more precise, the White House and the Chancellery) only want to keep Ukraine from losing. They hope that a stalemate or a tactical Ukrainian victory would force Putin to reconsider his strategy and enter negotiations. Unlike Kyiv, they do not want a decisive outcome, predominantly (but not exclusively) for fear of escalation.

This disunity in aims and strategy has an important impact on the military support for Kyiv. How long the war is supposed to last? How is it supposed to end? The answer to these questions will in part determine the defence-industrial effort needed and the long-term planning of military and economic support to Ukraine. It is hard to allocate means if the ends are in dispute.

The military situation

This confusion over goals rest on top of a difficult military situation on the ground. Ukraine's 2023 summer offensive did not live up to Western or Ukrainian expectations. The Ukrainian military had hoped to liberate Kherson and Zaporizhia provinces and to reach the Sea of Azov, which would have severed the Russian ground lines of communications to Crimea and shortened the front line Ukrainian forces had to defend over the winter. In this scenario, the offensive would have regained control of critical energy infrastructure, particularly the Zaporizhia nuclear power plant and the Nova Kakhovka hydro power plant and thus eased the energy situation next winter. In the end, Russia destroyed the Nova Kakhovka dam and the Ukrainian offensive did not approach the Zaporizhia nuclear power station. The Ukrainian counter-offensive progressed somewhat and severely attrited Russian forces but has thus far failed to fulfil the goals of the offensive.

This setback does not change Ukraine's fundamental strategic position. Ukraine can only achieve its goals through offensive military action. The best Kyiv can do now is to draw lessons from this offensive to improve its performance in the next one.

In launching this offensive, the Ukrainian military did understand the extent of the defensive fortifications Russia had built since the autumn of 2022. But defensive obstacles are only as effective as the troops that man and defend them. After Russia's botched winter offensive in

early 2023, the question was whether the Russian army was prepared to fight from these fortifications. The Russian military invested substantial effort in training formations to defend the fortifications and counter-attack from behind them. So far, they seem to be coordinating these efforts relatively well.

During Russia's winter offensive, the Russian military usually attacked in platoon- and company-sized detachments (that is, about 40-120 soldiers). Such small attacks could only achieve limited advances, but the Russian command structure seemed unable to coordinate battalion- or brigade-level assaults (about 400-4,000 soldiers). Defence experts have offered various explanations for this deficiency, including loss of officers and specialists and insufficient signalling equipment and improper training.

When on the defensive during the Ukrainian counter-offensive, Russia began to launch battalion-sized counter-attacks that were well synchronised with other elements and neighbouring battalions, suggesting higher-echelon coordination. The Russian military has invested heavily in special command and control structures and underground signalling equipment to achieve this level of coordination.

Beyond improved Russian command and control, a multitude of factors on the battlefield have made Ukrainian offensive actions with mechanised forces very difficult, overly costly, and usually unsuccessful.

The first is the ability of forces on the defensive to use rapid artillery fires from decentralised fire positions. Ukrainians pioneered this with their use of the digital GIS-Arta command and control software to coordinate artillery strikes. The GIS-Arta allows dispersed artillery to rapidly concentrate fire on a specific target. Dispersed positioning reduces losses from Russian counter-battery fire if one of the firing positions is detected. Russia countered GIS-Arta by fielding the "Strelets" fire control and communication system, which reduced the reaction time of Russian artillery to 2-3 minutes from the previous 20-30 minutes. Twenty minutes might allow mechanised forces to complete a surprise attack. Three minutes does not.

Second is the increased presence of reconnaissance drones. The saturation of reconnaissance drones has made the battlefield nearly transparent. During the 2022 Ukrainian counter-offensive in Kharkiv, air defence systems such as the Gepard could sweep aside the few drones Russia used for reconnaissance. But more recently, the widespread use of cheap commercial off-the-shelf drones has made it impossible for either side to deny the other side a view behind its lines. Assault forces are thus usually detected on their way to battle, before they even engage. This allows the defender to prepare and order artillery strikes in time to foil

that attack.

Rapid, flexible anti-tank fire has also blunted the effect of armoured vehicles. Both sides have converted so-called “First Person View” (FPV) drones to carry anti-tank warheads (usually rocket-propelled grenades) and to attack armoured vehicles. FPV drones have a greater range than conventional anti-tank missiles, allowing the defender to concentrate anti-tank fire over larger distances and to cover larger areas of the front. In the summer, Ukrainian experts claimed that Russia can manufacture up to 4,000 of these drones per month [3] in dedicated “Z-drone” workshops throughout Russia. By the end of 2023, the production capacity of FPV drones was estimated to have risen to 50,000 drones per month for each side of the war. This capacity surpasses the production capability of conventional anti-tank munitions. The FPV drones supplement more sophisticated loitering munitions (such as the Russian Lancet 2 or 3) which can operate at great distances and are more resistant to enemy jamming of their signals.

Extensive mining and anti-tank obstacles also complicate assaults as movements of forces are channelled into narrow, cleared paths. There, they become vulnerable to artillery, attack helicopters, loitering munitions, or fighter bombers releasing glide-bombs from a distance.

On both sides, the mass application of these factors has led to a superiority of defence over offence, and hence a relative stalemate on the front. They mean that both the Russian and Ukrainian army have difficulties massing sufficient forces to exploit an attack. Both are only able to mount limited, dismounted attacks that can push the other side from one position, but never create a sustained breakthrough.

Both sides frequently test the stalemate. Ukraine tried to accelerate its counter-offensive using more armoured fighting vehicles, just as Russia tried to assault Vuhledar and later Avdiivka with concentrated mechanised forces. In each case, the assaulting force made almost no progress and sustained heavy losses. These conditions distinguish the current war from recent, more fluid wars fought by Western armies and require new operational and tactical concepts as well as technical solutions.

The persistence of attrition warfare

All of this means that the Ukrainians need to defeat the Russian forces defending these obstacles bit by bit, relying on dismounted, carefully prepared assaults that dislodge the enemy one tree line at a time.

Russian forces put up a very active defence. They mount counter-attacks to force Ukrainian

forces from recently captured positions. Counter-attacks are often prepared by air strikes, making use of glide-bombs released at a safe distance against Ukrainian forces. These counter-attacks are mostly executed by seasoned, mechanised, or airborne troops, or even special forces.

Both sides appear certain that they can keep up the battle of attrition. The Ukrainians seem sure they can attrit Russian forces in battle faster than Russia attrits them. Similarly, the Russians seem confident that the current pressure on Ukraine's military will overburden Ukraine's Western supply lines. Meanwhile, both parties are seeking to overcome the stalemate. Russia is setting up new reconnaissance-assault brigades to test new equipment and tactical procedures that might overcome formidable Ukrainian defences. Ukraine has wound down offensive actions, but it has started a process to understand what went wrong and create new methods and materiel for a future offensive. [4]

An entrenched attritional battle is Ukraine's default option if it lacks the material or forces for manoeuvre warfare. Ukraine fought an attritional battle in Donbas from 2015 until the all-out Russian invasion in 2022. Many argue that a positional war of attrition works well for Ukraine and, indeed, that any attempt to force manoeuvre warfare on it would only increase its losses beyond what it can sustain. But positional warfare will not yield the strategic results Kyiv needs – especially in a difficult geopolitical environment where Ukraine cannot be certain that the support it needs from its international partners will continue.

Ukrainian military weaknesses

Ukraine thus needs an offensive capability, but it is quite far from achieving one. In 2023, some critical weaknesses were revealed which need to be addressed if the next effort is to be more successful.

Firstly, the rapid expansion of Ukrainian armed forces since February 2022 has created some problems for the cohesion of the force. Before the war, Ukraine had 25-27 standing manoeuvre brigades (armour, mechanised, infantry, naval and airmobile infantry brigades) and 11 ready reserve brigades. It had four regional commands serving as corps headquarters and coordinating the various brigades. On paper, the Ukrainian military also had 23 territorial defence forces (TDF) brigades, but these forces only really came into existence after wartime mobilisation began. Nearly two years into the war, the army has at least eight corps or corps-sized groupings of forces and up to 127 brigades. Roughly 70 brigades are engaged in combat operations; the remaining are guarding the northern border, undergoing training, or are in the process of formation.

Not all these forces were created equal. TDF brigades were not intended to be capable of manoeuvre warfare. They were originally intended to be predominantly rear-area security forces guarding installations and manning checkpoints. As such, the brigade and even battalion echelons served only administrative functions. Their operational tasks required only platoon- or company-sized actions. Once the war began, the Ukrainian high command used TDF brigades mostly as light infantry to fight static, defensive battles from fortified positions in at most battalion-sized formations. This effort already stretched their training to its limit.

Next, combat leadership has proven to be a problem. On mobilisation, around 400,000 veterans from the Donbas war rejoined the Ukrainian military. These experienced veterans provided a solid foundation for the lower and middle ranks of the newly mobilised forces. But finding higher-level officers to staff the command and control structures of new brigades and corps proved more challenging. Ukraine started to reform and improve its officer training in consecutive reforms starting in 2015, but a lot of the officers mobilised after February 2022 had completed their training before these reforms and remained wedded to the Soviet doctrine and culture that the Ukrainian army wanted to leave behind.

The Ukrainian army formed at least twelve new assault brigades in the winter of 2022, drawing on personnel from both existing (TDF) formations and newly mobilised personnel. But that expansion increased Ukrainian training needs even more. Mechanised warfare is much faster than war on foot. Commanders need to coordinate units and weapons systems faster and more precisely, otherwise units either idle or fall behind. Fielding a mechanised brigade is also a huge logistical task relative to supplying light infantry in static defence. For unit commanders and staff officers to progress from managing a rear-echelon security task to directing a mechanised assault requires a lot training and adaptation.

In spring 2023, some of these units simultaneously sought to transition their role from light to mechanised forces and to train on new Western equipment. This dual effort made the training problem even worse. In retrospect, the Ukrainian military would have been better off if it had given the new equipment to established mechanised units that already had experience in fighting mechanised battles.

Ukraine's new brigades have also had problems synchronising forces and coordinating formations larger than company-sized (approximately 120 soldiers-). It takes much more than bravery to lead a mechanised assault. Mechanised warfare is mostly a coordination and logistical challenge that requires experience and training that the newly mobilised and expanded Ukrainian army lacked in sufficient quantity.

Overall, the Ukrainian military underestimated the training requirements for newly formed

brigades to become combat-ready. In the early stages of the counter-offensive, for example, the “old” 81st Airborne Brigade progressed faster against Russian opposition than the newly formed 47th Airborne Brigade. In the end, however, neither could achieve a breakthrough. Of course, the new brigades improved their skills in combat, but at a cost in human lives.

Ukraine still faces serious challenges in regenerating and sustaining well-trained forces over the course of a long war. Experienced instructors volunteered for frontline service at the beginning of the full-scale invasion and so no longer train new soldiers. Many of them as well many officers who had pre-war experience in Donbas have fallen in the last 18 months. The longer the war lasts, the worse these problems will become and the more difficult it will become to restore manoeuvre to the battlefield.

The course of attrition

Russia’s declared war aims of “denazification” (removing the current Ukrainian political and administrative system, and “cleansing” the country of the political, intellectual, and administrative elites that uphold it) and “demilitarisation” (disarming Ukraine so that Moscow’s demands can be enforced with military might) have not changed, despite all the Russian setbacks. On many occasions Putin, or Kremlin spokesman Dmitri Peskov, have reminded the international audience that these goals remain unchanged. And in November 2023, Putin again reiterated his desire to undo the “artificial separation of the Russian nation – the Russians, the Belarusians, and the Ukrainians” as the precondition to rebuilding Russian strength and reshaping the international order.

Unfortunately, Putin has a viable theory of victory in this war. While another effort to take the Ukrainian capital in a swift campaign is out of reach, eroding Western support for Ukraine is not. Time and again, Putin stresses Kyiv’s dependence on Western support, both economic and military. He often expresses his confidence that Russian endurance will triumph over the West. To exhaust Western willingness to support Ukraine, the Russian offensives do not necessarily have to conquer more Ukrainian territory. But they do need to put pressure on Kyiv by imposing manpower and materiel losses that Western sources will have difficulty making up. Unsurprisingly, Putin shows no interest in (serious) negotiations. Time and again, the Kremlin has said it will only negotiate if Moscow’s maximalist conditions are fulfilled. Moreover, the negotiations that are proposed are negotiations with the West, not Kyiv. In other words, until Moscow attains its goals one way or another, the war will continue.

The 2024 presidential and congressional elections in the US in November 2024 could also alter the stakes of the war in Putin’s favour. Former president Donald Trump, the Republican front-runner, has hinted at disengaging from Europe and Ukraine, which would substantially

weaken Ukraine. Even if President Joe Biden returns to the White House, the Republican control of Congress could mean paralysis in Washington over providing support to Ukraine. Russia has fully moved to a war economy and found new ways to coerce its male population into military service. Together, these efforts will provide the resources to continue the war.

Sanctions and export controls have hindered Russia's war economy, but they have not crippled it. China has been helpful in weathering this storm, but not essential. Instead, Russia has relied on the extensive experience of Russian intelligence to set up a network of front companies in third countries to circumvent sanctions. Imports of sensitive materiel and parts to Russia, particularly semi-conductors and machine tools, are now more or less where they were before the war.

Despite sanctions, Russia produces up to 100 cruise and ballistic missiles each month with which to conduct strategic bombing campaigns against Ukrainian infrastructure and industry. Starting in April 2022, Russia bombed the Ukrainian defence-industrial complex. From October 2022 and throughout the winter, Russian attacks shifted to Ukraine's energy grid. In summer 2023, grain storage sites and harbours became prime targets. Electricity and agricultural exports have been the two pillars of Ukraine's wartime economy, generating foreign currency revenues and employment. More recently, Russian strategic bombing has begun to focus on western Ukrainian cities which reportedly harbour the new factories of Ukraine's resurrected defence industry.

The strategic bombing campaign plays a critical role in the Russian war strategy. If, as noted, Russian leaders sees Western stamina as the weak link, then driving Ukraine into an even greater financial and economic dependency on its allies will only hasten Western war fatigue. Russia's largely inconclusive ground offensives might serve a similar purpose. Constant pressure on Ukraine's defences attrits Ukrainian forces and means that the West has to backfill Kyiv's capabilities, regardless of the progress the Russian armed forces make on the ground. Unfortunately, Russia can keep up the pressure through offensives and strategic bombing for some time.

Before the war, Russia claimed to be producing 100-150 T-90S main battle tanks and 100 BMP-3 infantry fighting vehicles (IFV) annually, predominantly for export as well as around 60 BMD-4M airborne IFVs and about 100 BTR-82A armoured personnel carriers (APC). Since the war began, Russia has achieved around a 50 per cent increase in production compared to pre-war levels, though it still hopes to reach much higher production rates.

The Russian defence industry is also rumoured to be developing cheaper "mobilisation" versions of its ground combat systems, based on modernised and simplified T-90 tanks, BMP-

3 IFVs, and BTR-82 APCs to allow for faster production.

Altogether, these production increases will not come close to replacing Russia's wartime losses. Indeed, at the current loss rate, Russia is depleting its reserve stocks. The Ukrainian KSE Institute estimates that Russia has removed 5,200 tanks and 4,500 infantry fighting vehicles from storage facilities – about half of the Russian reserves. Not all of these vehicles, however, have been fully restored to a serviceable condition, let alone deployed to the front. Western experts estimate that Russia can repair roughly 1,000 main battle tanks (T-72, T-80, and T-62) and a similar number of infantry fighting vehicles (BMP-1/2) and armoured personnel carriers a year.

The situation concerning artillery systems is probably comparable, although there are no reliable numbers available. Satellite photos show that Russian forces are ransacking their depots for spare gun barrels for their artillery, implying that they lack spare parts. They are also receiving spare barrels for their older D-30 and D-20 howitzers from North Korea to keep Russian artillery working. Overall, the Russian artillery system is degrading, but a little ingenuity and some foreign supplies mean that it will continue to function at some level.

In short, Russia is sustaining its war effort by depleting its stocks.

So is the West. Ukraine's partners have so far delivered 585 main battle tanks, 550 infantry fighting vehicles, 1,180 armoured personnel carriers, and over 350 self-propelled guns. These are impressive numbers, but so far these vehicles have come predominantly from reserve stocks. They have consisted largely of Soviet legacy equipment, such as numerous T-72 tank variants or BMP infantry fighting vehicles of all kinds left over from the transitions of new NATO countries to Western equipment. Other countries delivered a lot of light armoured vehicles that they had procured for the wars in Iraq and Afghanistan.

Deliveries to Ukraine had exhausted these pools of used equipment by the end of 2023. Ukraine's allies sent stocks of cold-war legacy equipment (Leopard 1 and 2 tanks, M113 armoured personnel carriers, and others) in 2023 and will deliver more in early 2024. Only the US still has a large reserve of stockpiled armoured vehicles, but the Pentagon refuses to draw on it. The continuous erosion of the US defence industrial base for armoured vehicles and heavy cannons during 30 years of low-intensity warfare now means that repairs take a very long time.

Once these stocks are depleted, the resupply situation will become very difficult for the West. European factories only produce 24 Leopard 2 tanks each year. On average, Sweden used to build just 45 CV90 infantry fighting vehicles a year, but contracts have been largely fulfilled and production rates have dwindled. There are no numbers yet for the German Lynx and

British Ajax infantry fighting vehicles as they are just entering production, but they will be no more than a few dozen per year. In the US, delays and disputes over successor programmes to existing vehicles have slowed vehicle production. M2 Bradley infantry fighting vehicle production continues at very low rate in order to keep the plant alive. M1 Abrams main battle tank production is kept alive by export contracts to Poland and may resume to a higher pace only after developing a new, lighter, and improved version.

These relative production capacities mean that Russia can conceivably win a war of attrition. Russia's reserve stocks deplete, but European stocks deplete faster, and Russia's wartime production, although not capable of fully replacing Russian losses, produces around ten times more fighting vehicles than the West.[5]

The same applies to ammunition. The British think-tank RUSI estimates that Russia can produce up to 2.5 million artillery rounds a year. That is far short of the estimated 12 million rounds fired in 2022 and the 7 million rounds estimated to have been fired in 2023. Even if Iranian ammunition (estimated by *The Wall Street Journal* to total 300,000 rounds in 6 months) and an unspecified amount of North Korean and Burmese ammunition supplement Russian production, Russian stocks will deplete. Russia resumed major offensive action in October 2023 only after it secured larger North Korean ammunition shipments, implying that Russian operations already have to wait for adequate ammunition supplies.

However, shell hunger on the Ukrainian side is far greater. Ukraine reportedly fires on average 5,000 shells a day, suggesting that it needs at least 1.8 million shells a year. And during the counter-offensive, shell consumption increased to 8,000 rounds a day, which if sustained would mean a requirement of 3 million shells a year. Ukraine imports about 85 per cent of its ammunition needs.

The US produces around 240,000 shells per year, but plans to expand production to 1,000,000 rounds by 2025. European artillery production is somewhat higher (around 650,000 rounds in 2023 across 18 different plants) but less than half of that production goes to Ukraine. The European Commission will almost certainly not meet its commitment to provide Ukraine with 1,000,000 artillery shells by March 2024. Tussles over costs, contracts, and financial guarantees have delayed production. Only a few EU member states participate in the commission's procurement initiative, while bilateral procurement efforts fall far short of the numbers needed.

In sum, the combined West will not come close to Russia's production in the next year. Current supplies for Ukraine come from existing stocks and whatever one can find on the world market. Ammunition reserves were low even before the war – many NATO countries

only stockpile a few days' worth of supply.

Even if Russia's defence-industrial output does not compensate for current loss rates, it will certainly outpace Western efforts as long as the West does not engage in a serious defence-industrial build-up to increase production. The bottom line is that, under current conditions, a war of attrition will come at a great cost for Russia, but over time would favour Moscow.

How Europeans can assist Ukraine

All of this means that, along current trends, Russia is winning the war of attrition. To reverse those trends, the European Union and its allies need to significantly step up military assistance to Ukraine and to outproduce the Russian defence industry. They also need to do so by a sufficient margin such that Ukraine can win the war even if individual countries have to reduce supplies. Currently, the war effort is so dependent on American support that US domestic politics constitute a single point of failure that could doom the whole effort. That weakness creates an incentive for Putin to simply wait for the next presidential election or domestic upheaval in the US.

Europeans have done a lot to keep Ukraine in the fight, from supplying vehicles to ramping up ammunition production. Ukrainian officials genuinely appreciate this effort and interlocutors in Kyiv expressed greater optimism that Europe could provide yet more substantial assistance than Europeans do. [6] Of course, there have been and still are political controversies around the provision (or lack thereof) of high-end Western weapons systems. But Ukrainians recognise that various specific European contributions, such as the provision of Bulgarian ammunition for Soviet weapons, have saved the Ukrainian army time and again.

But just keeping Ukraine in the fight will not win the war. Ukraine's Western partners – both the US and its European allies – keep repeating the mantra that they will support Ukraine “as long as it takes”; latterly Biden said “as long as we can”. But this slogan does not describe a strategy for outproducing the Russian defence-industrial complex and enduring in a long war of attrition. As long as the harsh arithmetic of attrition points toward an eventual Russian victory in what is a long war of attrition, Putin will keep Russia on the current path.

There is no silver bullet technology that can fundamentally change the military balance on the ground. To prevail in a long war, Ukraine will have to replenish and reconstitute its forces both in terms of material and personnel. The Ukrainian army will need not only to draft new personnel, but also to train them in modern warfare and assemble them into capable combat units that can work as a team with existing formations. Most policy discussions in Europe revolve around the provision of new individual weapons systems such as the German Taurus

cruise missile, but this is one out of many issues. In Kyiv, the issues of training and sustainability (in terms of ammunition, spare parts, repair facilities, and other seemingly mundane items) are at the heart of Ukrainian's defence experts' concerns. [7]

Training

The longer the war lasts, the more important training will become. Ukraine is constantly losing men in battle, particularly able commanders. It has expanded its armed forces to meet the quantitative needs of a long front line and insecure borders with Belarus and Russia, but it has struggled to maintain the quality of its soldiers. The US, the UK, and the EU have already provided some training for Ukrainian soldiers. The EU anticipates training 30,000 Ukrainian soldiers this year. The Western courses cover basic training, unit tactics, certain specialist training such as de-mining and combat medicine, and transitional training on new weapons systems delivered to Ukraine.

The bulk of EU-funded activities focus on basic training and unit tactics. The Ukrainians sometimes request basic training from member states on a bilateral basis, usually when Ukrainian training centres are overwhelmed with new draftees or damaged by Russian missile strikes. Ukrainian training centres were also quite stretched because many of their seasoned trainers volunteered to join the combat forces at the beginning of the full-scale invasion. The Ukrainian military tries to use wounded veterans for these basic training courses, but their background varies, as does their ability to train. There is a difference between being a good soldier and being able to train soldiers. A "train the trainer" approach, in which EU armies train Ukrainian instructors at training centres would help improve and standardise basic training.

Tactical training to increase the battlefield skills and cohesion of Ukrainian forces is unfortunately rare, because it requires equipment that usually stays in Ukraine. Often, tactical training is conducted instead of transitional training on new weapons systems. When Ukrainians are trained to use new systems such as Leopard 2 tanks, they also receive some tactical training on how to fight as a tank platoon or company. But back in Ukraine, these Leopards (or whatever individual system) must fight alongside other weapons systems and soldiers trained in another country or in Ukraine. This mix and match approach does not usually create cohesive units.

Tactical training above the company level is rare. The EU Military Assistance Mission in support of Ukraine (EUMAM) only has a mandate to train up to the company level. This training is still useful and necessary, but Ukrainians have less of a problem finding soldiers who can accomplish platoon- and company-level mission tasks (taking the famous tree line)

than those who can plan and coordinate battalion, brigade, or even larger combined operations.

Unfortunately, larger exercises are almost impossible to conduct outside Ukraine. It is also hard to replicate in other countries the combat conditions and equipment Ukrainian forces use. Western countries usually have bureaucratic restrictions on the use of drones and other equipment. Ideally, Ukrainian soldiers should be trained the way they are expected to fight in Ukraine.

For these reasons, training of the newly formed assault brigades for the summer 2023 counter-offensive took place in Ukraine itself. The offensive would have benefitted from consistent advice and supervision from Western officers. However, NATO countries do not want to become directly involved in the war effort so they have imposed restrictions on their support to Ukraine, to include size limitations on their military missions to Ukraine. European military attachés and their staffs already in Ukraine could perhaps serve the function of supervising training activities. Alternatively, retired European officers could take on these tasks as employees of private companies.

The other problem is the incoherent state of training of mobilised Ukrainian officers and specialists brought into the armed forces since February 2022. Since its independence in 1991 and particularly since the start of the Donbas war in 2014, the Ukrainian armed forces have undergone several waves of reform that have affected their officer training and planning procedures. Now, officers from different stages of these reforms are mobilised into one army. The EU should offer assistance to Ukraine's defence academies as well as offering officer and staff officer courses in order to standardise command and control and planning procedures on a Western basis.

A huge bottleneck in the training effort are translators, especially translators with military knowledge. Ukraine does have a considerable stock of reserve officers with language education, many even formally trained as military translators. But Ukrainian law places a lot of restrictions on posting officers outside the country for longer durations.

Even within the EU, not all training Ukraine receives is coordinated by EUMAM. A lot of training happens on a bilateral basis. For unknown reasons, EU members are often much more secretive about the training they provide than the equipment they deliver. Training for commanding and staff officers above company level happens exclusively on a bilateral basis, as EUMAM does not have a mandate for this. And, to a large degree, it takes place in the US and other non-EU countries.

More effective training would need a format such as that of the Ramstein process, which

coordinates the sending of military equipment among Ukraine's partners. Ramping up training support in quantity and quality – training for officers and staff officers, tactical unit training above company size, sending experienced attachés to supervise training and manoeuvres – without duplication of effort will require the creation of a chief training coordination officer with a staff. This staff should coordinate efforts among allied states and develop materiel (such as textbooks and manuals) for Ukraine to use in its training efforts and to help Western partners adjust their training to Ukrainian needs. Western training has not focused on fighting conventional conflict since the end of the cold war. In the meantime, new technologies have dramatically changed the character of land warfare.

Ukraine's new defence minister, Rustem Umerov, is setting up structures to absorb the lessons learned from the war so far – tactically, operationally, and technically – and to develop the “New Force”: new orders of battle and force ratios, new systems, and new procedures that are required to fight the land war of the future. The West should support that effort, and not only for the sake of Ukraine. Western armies will need to understand how Ukraine fights to deal with the problems of the modern battlefield.

Ammunition

Shell hunger is a huge problem in the war. Ukrainians follow munition production statistics like bookmakers follow horse races. Both Russia and Ukraine lack sufficient air power to decisively support ground operations and so rely on indirect fires (such as mortars, artillery, and multiple-launch rocket systems) to defend against enemy advances and provide support for their own offensives. On paper, Ukraine already has more 155mm artillery guns than it has ammunition to fire from them (although at any one time a considerable number of these artillery systems are, in practice, undergoing maintenance and so are out of service). Nonetheless, ammunition production is the key bottleneck.

Ukraine most wants more 155mm artillery rounds, the munition used for Western-supplied howitzers. After the battle of Kyiv, Ukraine exhausted much of its ammunition stockpile of 152mm ammunition used by Soviet-era howitzers. And because 152mm rounds were in short supply in the West, the US and European allies decided to provide the 155mm artillery systems to allow Ukraine to draw ammunition from Western stockpiles. This conversion of systems has created a massive Ukrainian need for 155mm ammunition that the West is struggling to satisfy.

Speeding up ammunition production has been a slow and painful experience. Ramping up production, hiring new staff, and purchasing new machinery takes time. The European defence industry faced difficulties securing financing for such an expansion. Many member

states were reluctant to commit themselves to the long-term delivery contracts that were necessary to provide defence companies with the kind of stable income that could secure financing for new investments.

In March 2023, the European Commission finally stepped up to the challenge and proposed a plan to deliver 1 million artillery shells in one year. Unfortunately, political divisions on how to implement the plan soon limited the commission's capacity to meet that target. In July 2023, the commission had to allocate an additional €500m to subsidise expanding production for artillery ammunition because enterprises had difficulties securing credits to buy raw materials, machinery, and new production equipment. The European Defence Agency was able to sign the framework contracts to procure ammunition only in September 2023. Unfortunately, it takes 6-9 months to produce an entire artillery shot (the shell, fuse, and the propellant charge), in large part because powder for the propellant charge takes a long time to be produced and to stabilise. EU countries do not produce explosives and chemical precursors in sufficient quantities, so defence companies need to source them from non-EU sources (Bosnia and Herzegovina and Albania are the largest producers among friendly countries.) All of which is to say that the EU's ammunition plan will take time to materialise.

And 155mm shells are not the only item of ammunition in short supply. 120mm mortars have become a widely popular supplement to gun artillery. They are prolific in the Territorial Defence Forces, which are holding many sectors of the front. They are cheap, mobile, and easy to train crews on and so they consume a lot of ammunition.

Ukraine also still uses a lot of Soviet 122mm and 152mm guns, ammunition for which is produced in Poland, the Czech Republic, Slovakia, Romania, and Bulgaria. Sofia became one of the most important suppliers early in the war, in part because it was able to draw upon large stockpiles of Warsaw Pact-era ammunition. 122mm Grad rockets, most of which are imported from Pakistan, have become extremely rare, but they remain a very effective weapon.

227mm rockets for the Ground Launched Multiple Rocket System (GLMRS) – the M-270, M-142 HIMARS, and diverse successor systems – are also in high demand. Ukraine has received as many launchers as the US can supply ammunition for on a sustainable basis. In November 2022, Lockheed Martin and Rheinmetall signed a contract to build a production site for the missiles in Europe to increase production and diversify supply. German missile manufacturer Diehl is set to produce the ammunition. However, expansion of Diehl’s production facilities has stalled because the local council has denied them permission to buy more land. This limits Diehl’s capacity to expand its IRIS-T and HIMARS production. For similar reasons, Rheinmetall has already cancelled its planned artillery munition and powder plant.

Ukraine is also set to receive over 100 Leopard 1 tanks and so will become a major user of 105mm tank rounds. But more modern Western tanks have mostly moved to a 120mm cannon. Only the US and Italy still operate light tanks using 105mm tank rounds. Germany has ordered the resumption of 105mm ammunition production to meet expected demand in Ukraine. Demand for explosive mine clearing kits has also grown dramatically since the beginning of the counter-offensive.

Finally, Ukrainians also want more cluster munitions, which is a sensitive issue in both the US and Europe. Artillery cluster munitions are roughly eight times more effective than conventional shells and so can potentially greatly reduce the amount of ammunition Ukraine needs. The US began shipping cluster munitions to Ukraine in July 2023. So far, the Ukrainians have used cluster munition-equipped ATACMS cruise missiles for effective strikes on assembly areas, airfields, and artillery concentrations. The cluster munition ban was signed and ratified by most EU member states by December 2008, when a large-scale conventional war was seen as unlikely by many capitals. In light of the events in Ukraine, they should reconsider their decision.

Air defence

Air defence is also critical. At the beginning of the war, the Ukrainian military originally had over 30 batteries of S-300 and 11 batteries of Buk-M1 surface-to-air missile systems. Ukraine’s air force had more mid- to long-range ground-based air defence than all EU members put together. But ammunition for these systems is produced exclusively in Russia, so Ukraine has by now used up most of its pre-war supply of Soviet legacy air defence missiles. It now has to rely on just a few NATO surface-to-air systems including three US Patriot batteries, one French-Italian SAMP/T battery, four German IRIS-T-SLM batteries, four US-Norwegian NASAMS batteries, and three US MIM-23 Hawk batteries. As a result, the density of air defence coverage over Ukrainian cities has decreased. The Ukrainian air force is trying to fill

these gaps through fighter patrols, but the Ukrainian fighter fleet is also coming under increasing stress.

Stepping up the delivery of air defence systems is not easy. For many European-made systems, particularly the French-Italian SAMP/T and the German IRIS-T system, missile (munition) production is the key bottleneck. Germany created the European Sky Shield initiative in 2022 to stimulate more orders for Patriot and IRIS-T systems, which in turn should create a better business case for expanding ammunition production. But while the German government signed a letter of intent in October 2022, the government contracts to enable MBDA Germany to build the production line for Patriot missiles was only agreed upon at the end of December 2023. In January 2024, other NATO companies also signed contracts for air defence missiles. But the first missiles will only arrive in 2030. Meanwhile, Russian missile production is expanding, while international demand for Patriots exceeds production capacity. The US may soon have to reduce the delivery of Patriots to Ukraine.

France could also deliver the MICA-VL ground-based air defence system, which can fire MICA air-to-air missiles (albeit at reduced range of about 20 kilometres) and thus tap into larger stocks of munitions. Germany and Sweden have delivered short-range IRIS-T-SLS launchers for the same reasons: they use the air-to-air version of that missile. The range is reduced to about 12 kilometres, but they can draw the munition from larger air force inventories.

The West also hopes to convert Ukrainian Buk-M1 missile launchers to fire the Western AIM-7 Sparrow series of air-to-air missiles as well as the shipborne Sea Sparrow variants. There are plenty of old Sparrow and Sea Sparrow missiles in the arsenals of European air forces and navies respectively. Using Buk launchers would free the West from having to manufacture extra launchers. Buk launchers are mobile and capable of operation on any terrain, making them, in theory, good platforms to escort Ukrainian mechanised forces and protect them from high-flying drones or helicopters and aircraft that remain out of the range of shoulder-launched air defence missiles. Unfortunately, this so-called “FrankenSam” conversion process has proven challenging. It works on the practice range, but making it work under challenging electronic warfare conditions close to the front is more difficult because it is easily jammed by Russian electronic warfare efforts.

The West has even less capacity to supply Ukraine with tactical surface-to-air weapons that can directly support troops on the battlefield. In 2022, Ukraine received two batteries of Crotale missiles from France, which is a mobile, vehicle-mounted surface-to-air missile system with a range of up to 11 kilometres and capable of accompanying Ukrainian mechanised forces. But the French defence industry would need to drastically increase missile (munition) production rates if the system was to spread further in the Ukrainian land

forces.

There are few other alternatives. The US has sent large numbers of crew-launched Stinger missiles to Ukraine from stocks, but that missile is no longer in production and resuming production would be technically difficult. Poland has sent Piorun short-range, surface-to-air missiles, though Ukrainian use of this missile has now tailed off. France has delivered the Mistral missile, production of which increased from 40 to 60 missiles a year. In Ukraine, one year's production would last hardly more than a day. The Swedish RBS-70 missile system performs well, but neither the Swedish nor Ukrainian governments will say how many launchers or missiles are in Ukraine or Swedish stocks. Overall, Ukraine is now paying the price for 30 years of European procurement policies that de-prioritised air defence.

All the air defence gaps – both at the front and over Ukrainian cities – have to be filled by fighter patrols. Ukraine started to ask for F-16s in January 2023, but only in August 2023 did Washington allow the Netherlands, Denmark, and Norway to pass on phased-out variants of the F-16 to Ukraine. But these planes are F16 A/B MLU, meaning they are among the earliest versions of that fighter. Their radar and self-protection jammers, as well as their ability to use the most modern Western ammunition is limited. Hence, even with these planes, Ukraine will struggle to establish even temporary air superiority over the Russian lines.

Still, Ukraine will use these fighters in the same roles as it uses its current fighter force: predominantly to defend against the Russian air force and occasionally to support ground forces. Ukraine does not have the pilots, doctrine, training, armament, bases, or command and control structures to conduct large-scale air operations to gain air superiority and then use that superiority to significantly degrade Russian ground capabilities. To evade Russian missile strikes or limit their damage, Ukraine will continue to operate its aircraft from dispersed bases and often improvised runways.

Ukraine needs Western fighters first and foremost because it needs to replace the losses from its existing fleet. Moreover, some Western fighters with more modern radar, electronic warfare suites, and missiles than ageing Soviet-era fighters are much more survivable while carrying out the same mission that Ukraine's current fighters undertake. More survivable aircraft will also preserve pilots, who will be a scarce resource in a long war.

Ukraine started to ask for F-16s because it believed large numbers of them were potentially available. The US and various European countries are phasing out F-16s in favour of the modern F-35 aircraft. However, the F-16 is an American product, and if Washington is unenthusiastic about delivering them to Ukraine, this will put at risk deliveries from other countries, as they need US permission to re-export the plane. Moreover, the F-16 is not ideally

suitable for the operational conditions in Ukraine, particularly Ukraine's improvised landing strips. Its fragile landing gear does not allow for steep angles of approach and its air intake is close to the ground and so susceptible to sucking in debris. It does not have a breaking parachute or arresting gear for short landings and requires a long runway for fully laden take-offs.

The French Mirage 2000 has often operated from improvised strips in Africa. Swedish Gripen are also made for dispersed use from improvised runways. Mirage 2000s are being replaced by Rafales and so might be available. The Swedish Gripen, in the A and B version, might also be available from Swedish stocks as they are being replaced by newer E/F versions. Ukraine will not want to operate two different types of fighter during the war, but both the Mirage 2000 and the Gripen A/B should be kept in mind as back-ups if the F-16 plan does not materialise.

The armament sent with the planes is just as important as the planes themselves. Modern air-to-air combat is almost exclusively conducted beyond visual range. To compete with Russian aircraft, Ukrainian aircraft would need at least to be armed with AIM-120 AMRAAM or MICA-ER air-to-air missiles, both of which have fire-and-forget capabilities. And given the range advantage of Russian air-to-air missiles, only the delivery of European Meteor air-to-air missiles would put the fight on an even footing. Meteors would require that Ukraine's partners either provide newer models of F-16s or that the variants from the Netherlands, Denmark, and Norway undergo extensive modernisation.

Land vehicles

The US and Europe have also been unnecessarily slow in providing Ukraine with land vehicles (main battle tanks, infantry fighting vehicles, armoured personnel carriers). The US and its European partners Germany and Sweden took the decision only in January 2023 to supply Ukraine with Western infantry fighting vehicles; and with main battle tanks only in February 2023. The [2023 IISS Military Balance](#) shows that 65 per cent of Ukraine's armoured personnel carriers, 7 per cent of its infantry fighting vehicles, 37 per cent of its towed artillery, and 32 per cent of its self-propelled artillery were already of Western origin at the beginning of 2023. Since then, every Ramstein process meeting has promised further deliveries of Western heavy ground vehicles. Bit by bit, Western vehicles will replace Soviet systems in the Ukrainian inventory because there is a limited supply and limited ammunition production capacity for Soviet equipment among Ukraine's supporters.

The bulk of Western land vehicles provided to Ukraine are not the modern types. They are most often cold-war legacy equipment that can be provided in larger quantities, such as the

M113 armoured personnel carrier or the M109 self-propelled howitzer. The only legacy system that the West has had trouble providing in sufficient numbers is the Leopard 2A4 main battle tank. Polish-German disputes over spare parts and maintenance services have created questions about the tank's serviceability and sustainability in Ukraine. Various partners have sent Leopard 1 tanks as a stopgap measure, but they are a finite resource that will be used up in early 2024. Similarly, former Warsaw Pact countries have ended deliveries of the Soviet T-72 main battle tank and its variants because there are none left in stock. Only 15 T-72s are undergoing restoration at a facility in the Czech Republic, compared to 90 at the beginning of 2023. It is increasingly difficult to find T-72s worth restoring. The same is true for BMP infantry fighting vehicles or European stocks of M113 armoured personnel carriers.

For all of these reasons, European armies will not be able to sustain support for Ukraine if they do not embark on large-scale modernisation programmes of their own armed forces and send the replaced vehicles to Ukraine. As of now, few countries have put in large orders for new land vehicles. The current level of orders will not allow the European defence industry to quickly scale up production, particularly as various countries will demand local shares of any new production, which will create further delays. It still seems as if defence procurement is more about industrial policy than about defence in many if not all EU countries.

Most EU member states politicians and officials interviewed for this paper feel that new vehicles would take too long to make a difference in the war in any case and that they would rather consider such programmes after the war. Many European military representatives cite the current NATO defence and deterrence needs as another reason not to deliver more from existing stocks. However, as the Ukrainian military has destroyed large swaths of the Russian armed forces, there is no longer a pressing need to deter the Russian army from invading NATO territory – at least until it undergoes some post-war reconstruction. But after 30 years of tough austerity, European militaries fear that calls for a new “peace dividend” will follow the war in Ukraine, which would mean that any vehicle they donate to Ukraine will never be replaced. So they hold on to what they have.

Currently, a truck-mounted self-propelled gun takes 18 months to assemble; most other armoured fighting vehicles take two years; and a Leopard 2 main battle tank or a complex infantry fighting vehicle takes up to three years. To shorten these times and reduce costs, European militaries need to make large orders that create economies of scale.

If Europeans want to produce land vehicles in the numbers required, just as with munitions, the European Commission will have to act. If the commission orders vehicles in bulk – say, 500 main battle tanks, 1,000 infantry fighting vehicles, 500 mobile short-range, air-defence systems, and 100 self-propelled artillery systems, as well as other speciality vehicles – it could

make a real difference in Ukraine. These vehicles would then either be handed over to Ukraine, or to an EU member state if that member state agrees to immediately provide equivalent systems to Ukraine. Without a pan-European vehicle plan, Europe will not generate the quantities required to sustain Ukraine.

Defence-industrial cooperation

The more Western equipment Ukraine uses, the more Ukraine and its military partners need to pay attention to the issue of repair and maintenance. Ukraine will become one of the largest operators of Leopard 1 platforms, which include the Leopard 1 main battle tank, the Bergepanzer 2 armoured recovery vehicle, the Gepard self-propelled anti-aircraft gun, the Bieber bridge-laying vehicle, and the Dachs armoured engineering vehicle. The German companies Rheinmetall and FFG have thus opened factories in cooperation with local partners in Ukraine to repair and maintain these vehicles.

But the Ukrainian government is interested in industrial cooperation on more than just repair and maintenance, particularly because deliveries of armoured fighting vehicles remain below expectations. It is therefore turning to domestic production. Rheinmetall plans to produce armoured fighting vehicles (the Fuchs armoured personnel carrier and Lynx family armoured fighting vehicles and the British-Swedish BAE Systems CV90 infantry fighting vehicles) in Ukraine. Both vehicles will likely become the next main ground combat systems in the Ukrainian military. Ukrainian officials are confident the production lines will become operational much faster than they would under the peacetime conditions in Europe. But it will still take time. It remains an open question how big the gap will be between the Western reserve stocks expiring and the weapons platforms produced in Ukraine entering service in large quantities.

Other companies have also indicated interest in opening various types of defence production and maintenance facilities in Ukraine. The US, the UK, Sweden, Germany, France, the Czech Republic, and Turkey are the top seven countries investing in the Ukrainian defence sector. There is ample space for deals. Ukraine wants to have its equipment maintained, while the various defence companies want to see how effective their product is, which will help their research and development effort for the next generation of vehicles or systems.

Ukraine has committed itself to a “10-100-1” defence industrial programme for 2023. This means the government intends to increase the production of conventional armoured vehicles and weapons systems ten times, the production of expendable goods (such as ammunition and drones) 100 times, and for the first time create the next generation weapons systems Ukraine needs for the future. Because of the slow pace of Western deliveries, initial Ukrainian

defence-industrial efforts will focus on producing those systems with the highest attrition or consumption rate: armoured fighting vehicles, ammunition, drones, and electronic warfare equipment. Complex air defence systems, fighter aircraft, and aircraft munitions are too complex and expensive to justify an indigenous industrial effort.

Drones are a particular area of focus. The race to produce drones has accelerated dramatically during the war. At the beginning of the war, Ukraine had a distinct advantage over the Russian military in using drones for reconnaissance, targeting, and correcting artillery fire. Since then, Russia has adapted its electronic warfare procedures to restrict Ukrainian use of drones, while the Russian army has grown more skilful in its own use of drones and loitering munitions.

Both sides treat drones like ammunition. Ukrainian forces alone lose up to 10,000 drones a month. Ukraine now has 200 companies producing 300 different types of drone for the war effort.[8] The innovation cycle in this field is particularly short – usually about 14 days after Ukraine introduces a new drone, Russia comes up with counter-measures; the model may need adaptation. Large conventional defence companies simply cannot sustain such a rapid innovation cycle. Most Ukrainian drone manufacturers are small, highly innovative start-ups. Only larger, long-range drones are developed by the traditional defence industry.

European companies – and even some American ones – cannot compete in this race. Because of underfunding and lack of interest, few enterprises in Europe produce drones, particularly small ones. With a few exceptions, European drones are five years behind Chinese commercial models.[9] For this reason, Ukraine now offers experience and know-how in a key technology that many European countries lack. The European Commission is looking into ways to link up Ukrainian and European producers, particularly to increase the security of drone supplies for Ukraine in the face of Chinese export restrictions. If European subcomponents and parts could substitute for Chinese ones, Ukraine's war effort would be more sustainable. For the time being, however, these linkages are just ideas percolating in Brussels.

Software development has progressed even faster than drone development. Both Ukraine and Russia code specific software to operate commercial drones under adverse electronic warfare conditions or to make their targeting more efficient. Artificial intelligence will make them less vulnerable to jamming and spoofing and ease the burden of controlling them on operators.

Software will play a key role in systems integration as well. As of now, a drone operator must get out of their vehicle and set up their antenna to operate a drone. From well behind the

front lines, the drone operator can see and understand what is happening in the somewhat distant battle. But commanders at the front cannot benefit from that operator's knowledge unless they also sit in the rear, which would often mean losing contact with their men. In this way, new technologies such as drones have slowed or disrupted the traditional "workflow" of mechanised forces. More integrated systems could fix these problems by incorporating new technologies into "old" weapons platforms. For example, an existing tank could achieve the capacity to receive drone footage directly to help its targeting. Eventually, systems integration will be the key to allowing Ukraine to resume manoeuvre warfare.

Drones also play an increasing role in the fight against the opponent's defence-industrial base and rear area. Russia first imported and then started to produce Iranian-designed Shahed 136 drones for the purpose of attacking Ukrainian military and civilian infrastructure. Ukraine, meanwhile, converted reconnaissance drones to attack targets inside Crimea and Russia. These drones are taking over the role of strategic bombers and submarines in the second world war – that is, to cripple the enemy's war effort. Today's strategic bombers and submarines are so expensive, complex, and rare that no one can afford to use them very much. Drones now fill this role.

What it takes to win the long war

All of these problems mean that, if current trends continue, Russia is winning the war of attrition. Drip-feeding small amounts of military supplies to Ukraine signals to Russia that the West is not very sure of what it is doing, nor how to achieve it. Incrementally introducing new weapons and munitions has allowed the Russian military to adapt to each new Ukrainian capability. The West has given Ukraine a substantial amount of equipment, but it has mostly come from excess stocks. The defence-industrial effort to sustain Ukraine thus far is limited to certain kinds of munitions. 2024 will be a difficult year for Ukraine, but the war is far from lost. To turn the tide, both the West and Ukraine need to address the shortfalls and problems that emerged in 2023.

Scaling up ammunition production was a painful exercise for Europeans, but a necessary one that may have benefits for European military logistics and the European defence industry in the future. In the event of a larger war, NATO governments will need to deal with issues of scalability and supply chain security for munitions, spare parts, and drones under even greater political and time pressure. Only if they carefully absorb the lessons learned from this war will Europeans be ready for the types of great power confrontation that are becoming more likely in the 21st century.

One recurring issue keeps arising in trying to supply the Ukrainian war effort. The European

defence industry is not regarded as a “sustainable industry” and is hence excluded from many of the financial instruments created during the financial and covid crises to facilitate access to credit and insurance. Even in the current crisis, when excess demand almost guarantees that the defence industry will be able to sell greater production of ammunition, companies have faced difficulties receiving loans to start production before government contracts materialise. Investment costs in the defence industry are higher than in other industries; research and development and investment always depends on governmental contracts. An overhaul of the EU’s financial regulations in light of the current war is necessary.

The West has relied on sanctions to strangle the Russian war economy. While sanctions have caused delays and disruption, they have not resulted in any sort of systemic failure of Russia’s defence sector, nor of its economy at large. Proposals to increase the efficacy of sanctions abound, but the West should not base its plan for the war on the idea that sanctions can deny Russia the ability to continue the war. If the West wants to sustain a war of attrition against Russia, it needs to outproduce it. As of now, Russia is outproducing the West. If nothing changes, Putin need only wait for the harsh logic of attrition to set in.

In the EU, member states have proven unable to collectively organise the necessary defence-industrial effort. National divisions run deep, and the commercial interests of various companies often hinder effective collective action. Furthermore, the strongest political supporters of Ukraine – and a Ukrainian victory – are not the largest states in Europe. They are small states that are not capable of fulfilling the large orders necessary to allow for economy of scale advantages in defence-industrial production. To gain those advantages, they would need to pool their efforts. The only solution is for the European Commission to procure new systems in bulk and then either send them to Ukraine or provide them to member states to replace equivalent equipment that they send to Ukraine. Such a centralised effort would spur both military modernisation and harmonisation in Europe and free up sizeable numbers of vehicles for immediate use by Kyiv.

The West should also help Ukraine build up its long-range drone arsenal. If used in large numbers, attack drones can disrupt and degrade Russia’s defence economy, slowing the production of critical vehicles, and challenging the idea that a long war favours Russia.

Winning the long war also requires preserving and reconstituting the fighting power of Ukraine’s military units. The issue is not that the Ukrainian armed forces are too casualty- and risk-averse. It is rather that they lack the training and qualitative edge necessary to avoid simply battering their forces against the Russian lines for no particular strategic purpose. Bravery cannot overcome these deficits.

The West needs not only to recognise the factors limiting manoeuvre warfare, but also to work with Ukraine to try to overcome them. As noted, Russia is setting up new reconnaissance-assault brigades to test new tactical procedures and equipment to overcome the obstacles of rapid artillery fire, drone reconnaissance, fast anti-tank forces, and field fortifications. Whoever overcomes these obstacles first will have a huge advantage in the current war. It is therefore urgent that the West step up training efforts for Ukraine and ensure that it possesses the qualitative edge over the Russian armed forces necessary to produce strategic effects on the battlefield.

Even after the war is over, a hostile, anti-Western Russia will remain and any military confrontation with Russia will likely be a land war. Hence, whoever reintroduces a working concept of manoeuvre warfare into its armed forces will enjoy a distinct military advantage on the continent – much like Germany did from 1939 to 1941.

For EU member states, this task is much more critical than for the US. Containing China's ambitions in the Pacific will be more of an air and naval war than any conflict in Europe, and for the few land theatres of the upcoming great Pacific war, static attrition may work well from a US perspective. But the EU has a 2,000-kilometre land border with a hostile Russia and remains vulnerable to strategic surprises. In the European theatre, the ability to dislodge Russian troops from occupied areas after a surprise attack is an important task European armies need to be able to perform. And being able to do so is an important factor in their capacity to deter Moscow.

Overcoming the current stalemate has both doctrinal and technical elements. The technical elements comprise improved counter-drone and mobile air defence and electronic warfare systems, as well as systems integration to allow all operations to be conducted on the move. The doctrinal aspects call for a rethinking of established tactical and operative procedures such as how to plan, prepare, and execute manoeuvres that depend on new technologies; how to achieve surprise; and how to coordinate traditional manoeuvres with new assets such as drones and modern electronic warfare. Both sides will also need to reconsider their “orders of battle” – that is, the mix of mechanised infantry, armour, artillery, air defence, engineers, drone operators, electronic warfare systems, and intelligence cells needed at each echelon to reinvent combined arms operation under 21st century conditions. To develop both new procedures and new equipment, understanding the experience of the war in Ukraine will be vital. The West, and Europeans in particular, should learn as much as possible from the training and defence-industrial cooperation that has become a necessity in this war.

All of the measures described above would turn “as long as it takes” – or even “as long as we

can” – from empty phrase into a viable strategy for victory. But, as of now, the West lacks a single vision of how the war should end and what means should be allocated to achieve that end. Unfortunately, without a unified strategy, it is hard to achieve a unified effort.

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[1] Author interview with Ukrainian investigators of war crimes, Kyiv, 7 July 2023.

[2] Author interview with Ukrainian diplomats, Berlin, 26 September 2023.

[3] Author interview with Ukrainian military experts, Kyiv, 6 July 2023.

[4] Author interview with Ukrainian government representatives, Berlin, 23 October 2023.

[5] Author's own calculation based on figures available.

[6] Author interviews with Ukrainian ministers and cabinet officials, Kyiv, July 2023.

[7] Author interviews with military and defence experts in Kyiv, July, 2023.

[8] Author interview with high-ranking Ukrainian government official, Berlin, 23 October 2023.

[9] Author interview with Ukrainian military expert, Kyiv, July 2023, and author correspondence with German volunteers supplying drones to Ukraine, 2023.

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