
Lessons for Poland from the War in Ukraine. Part 3

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In February this year, war broke out in the east. Russia attacked Ukraine. A certain stage in the history of our region and in the history of the world has come to an end. For years, we have been talking and writing here at Strategy&Future about the need to prepare for new times, and to prepare for the reform of the Polish military. These new times have come. Today - part three about lessons from the war, for Poland and for our military.

1) Ukrainian command, control, connectivity, computers and the cyber network linking the command and communication system worked very well, although there was also chaos. At the beginning of the war, the Ukrainian government transferred critical government data from government buildings and servers to virtual clouds. At the same time, it started working with private companies to be able to stop cyber attacks. For example, it collaborated with Elon Musk and SpaceX, which allowed the acquisition of thousands of Starlink terminals, i.e. providing access to the internet from space, including high-speed internet. The armed forces of Ukraine gained safe and very good internet connections, which with time were available even at the level of infantry teams or platoons. This contributed to the enormous communication advantage of the Ukrainians over the Russians.

These advantages, combined with the proper decision-making loop, based on a distributed system connected by Starlink, gave the Ukrainians a better situational awareness. Thanks to the help of the Americans, they knew better where the opponent was and what he was going to do. The Ukrainians, with the help of the Americans, are winning the war of sensors, which is of the greatest importance on the modern battlefield. The Ukrainian side is winning the sensor-based reconnaissance battle and this allows it to use the effectors as and wherever it wants.

In addition to securing data and connectivity/communication, the government in Kyiv distributed a mobile phone application so that all citizens could send data from the battlefield to the system, report on Russian movements, etc. Then the Ukrainian army used artificial intelligence to verify and process the collected information and integrate it with the identification and targeting process, for example for Ukrainian artillery.

2) Drones have become a very valuable off-line combat vehicle, both for finding and destroying Russian troops, especially manoeuvring mechanised troops that can be easily detected from distance. The same applies to cheap civilian drones for the military. Circulating ammunition triumphed. It is cheap and very effective, widening the field of operational activities of the ordinary soldier at the front. The autonomy of drones will deepen and this will change the battlefield more and more.

Tactical-scale anti-tank guided missiles (already commonly present today) give infantry a good chance of surviving a confrontation with a tank, as long as the infantry is sheltered and uses the terrain, preferably urbanised terrain. Additionally, drones are appearing more and more commonly as sensors, but also as ammunition circulating on the kamikaze principle, which makes light infantry an effector with a naturally very low emission signature (more difficult to detect), and therefore a very difficult opponent, if the terrain allows it.

For example, between the Donbas and the Dnieper Line, there is less suitable terrain for light infantry, and it is more difficult to prepare places in which resistance is possible. In eastern Poland, the terrain is excellent for light infantry, although it is diverse: urbanised, rural, fragmented rural, forest, forest-field, etc. There are certainly a lot of all kinds of buildings and structures. Again, the decisive factor here is the use of this combat effector, which is infantry - as always, depending on the terrain and the equipment, as well as the behaviour and intention of the opponent we want to destroy.

There is also a revolution in the price of precision weapons, especially those used by an ordinary soldier, with a small, tactical range. Electronics and warheads are not so expensive anymore. The price is increasing mainly due to the propulsion and range of the missile. This means that, on a tactical scale, precision weapons and drones will be more and more commonly, not to say massively, used. This changes the structure of the tactical battlefield. It can be expected that the proliferation of technology and its cheapness will expand the direct field of tactical combat to the unimaginable today 10-30 kilometres, because this is how much a foot soldier with a guided missile will be able to interact with a sensor - whether it is a hidden special forces officer, who guides the missile at the target, illuminates it or give GPS coordinates, or a drone that sends information to the soldier. The revolution will accelerate when artificial intelligence and algorithms are introduced to the battlefield that will support the decision-making process of soldiers and their commanders.

3) Rocket artillery, especially precision artillery, makes it possible to destroy Russian logistics to a great depth, changing the calculation of ammunition consumption and support for Russian offensives.

Barrel and rocket artillery have turned out to be extremely important in this war, but it is not only about the number of barrels or launchers, but mainly about the ISR system (intelligence, reconnaissance, observation), which causes the artillery to know where and at whom it is firing in instant decision windows thanks to real-time or near-real-time target identification. Thus, domination in the navigational battle, as well as in the reconnaissance battle and the decision loop is decisive on the battlefield. The barrels and missiles themselves are only effectors, there must be an ISR system that ensures the proper level of combat capability. This ability will not exist without domination in the cyber and space domains. These domains supplemented by drones provide observation, identification and communication. The main strike force of Russia's ground forces is artillery, not air force or armoured forces. Thus, an artillery battle won thanks to ISR creates an asymmetry which disables Russian fire domination. Such a state of affairs was seen in the war in the east at the turn of July and August, when the Ukrainians received the Himars and other Western artillery systems along with the ISR systems, which translated into an increased ability to use indirect fire on a tactical and operational scale against the concentration of Russians, Russian staff, command centres and ammunition and logistics warehouses. Reconnaissance in all this is decisive, because it is known where or which way the enemy is coming, and therefore what is the axis of his movement, whether they are the forces of mock diversion, or perhaps the main forces, which are the centre of gravity of his action. Therefore, in the context of counter-battery fire, i.e. artillery duels, the most important information is to determine the location of the enemy's artillery, and this is what ISR capability provides. Of course, the whole thing is more complicated, because in an artillery duel, taking blows may pay off, so that the opponent shows his position and emission signature (which is targeted with sensors), so that counter-battery fire can be opened. Here again, the field commander must strike a critical balance: the need to destroy enemy systems is balanced against the need to find the enemy and understand how he works, and each action can lead to counterattack. So the underdog has to think about striking as well as surviving. This is where technology comes in. If you want to involve Russia in an artillery duel, drones and counter-battery radars are crucial, as they identify missiles in the air and can count enemy firing locations and positions. Systems of acoustic detection of where the shot was fired are also helpful.

This means that land warfare takes place at greater and greater distances, often beyond the line of sight (drones) and the horizon (artillery). Only two percent of small arms damage is recorded (a similar

percentage to the use of melee weapons in World War I when machine guns first appeared). Artillery ammunition is consumed enormously. A duel means a range fight and reconnaissance. Huge amounts of ammunition are used up, artillery barrels wear out quickly, so you need reserves and quick service. It is still important to cheat, mask, camouflage, hide. In fact, with the massive use of drones, troops are still hiding.

Initially, in the Donbas, the Russians achieved dominance in the artillery battle due to the quantitative factor alone, and their ammunition stocks were to be sufficient for several years of shooting. The ammunition production capacity of Russian industry remained enormous. While the Russians had a problem with moving targets, because they have a weak C4ISR, they achieved excellent results against fortifications and cities. The Russians position cannon howitzers at a distance a third less than their maximum range, and the mortars one and a half kilometres behind their own infantry line. Organic brigade artillery lines up eight kilometres behind the front, and long-range artillery lines up 10-15 kilometres behind their own line of troops. The battery is 100-300 metres wide with up to 40 metres between guns. Russian rocket artillery stands in a line 150 metres between each launcher, using mock stationing sites to draw Ukrainian fire and respond with counter-battery fire. They use area-based missile artillery to stop the movement of Ukrainian units. They use their cannon howitzers for specific, identified purposes. Surprisingly, they use Tochka-class ballistic missiles for counter-battery fire, including heavier artillery systems. They can cover with fire as early as three to five minutes after drone detection.

An important change is that the artillery hits not only the frontline troops, as before, but also hits facilities, communications and ammunition depots. With Himars strikes against Russia's rear, the Ukrainians have increased Russia's logistical inability to wage a major war at the end of the summer of 2022, stopping the Russian steamroller in Donbas, and then laying the groundwork for a counter-offensive, because after the Kyiv defeat the Russians only perform offensive manoeuvres when they have artillery dominance. This was followed by the destruction of junctions and railways of key importance to the way the Russians waged war, which has exposed the weakness of Russian circular logistics. This, in turn, results in the operational shallowness of the Russian troops. This explains the slow advance of Russian troops in the Donbas from March to July 2022. In addition, ammunition depots at the division and brigade levels are very large, difficult to defend and conceal, and cannot be relocated. So the Himars are wreaking havoc. The Ukrainians have found a weak point and are exploiting it towards a critical imbalance - they are carrying out deep fire operations against ammunition depots and logistics.

In addition, there is concern about a bold manoeuvre caused by the existence of a precise battlefield already in the line of contact between the troops and more and more often lost artillery duels after the delivery of 155 mm Western artillery systems to Ukraine. On top of that, a situational awareness system that is failing. Due to the fact that the battlefield is dominated by sensors and the manoeuvre is highly risky, especially in terms of mass, defence has an advantage in the manoeuvre performed. If it knows the enemy's approach axes, it can shoot "at speed" along sectors and approach axes, even not necessarily at one recognised target.

Here is a key problem - the cyber domain for military purposes. It is about the aggregation and evaluation of data, which translates into the time of making and implementing decisions in the decision loop. Time is crucial for counter-battery fire, because leaving a cannon howitzer in place ends up with it being destroyed. Whoever moves faster in the decision loop stays alive. This is the reason for the rapid

development of digital mobile phone applications to support the decision-loop, the success of Starlink's communication in space by SpaceX, which allows the Ukrainians to maintain full satellite communication, and the need for internet access even at the lowest tactical level of teams. It is also a success of fledgling artificial intelligence, which will change the battlefield in the coming years, significantly improving the quality of decisions by strengthening all elements of the decision loop.

Therefore, towed cannon-howitzers are worse, as it takes many minutes to get them started. And then many minutes to get them on the road. They require a tow vehicle and a carriage that carries the ammunition. Time delays are extremely dangerous and shrapnel injures exposed crews. Russian electronic warfare systems are delaying Ukraine's decision-making loop, which reduces the possibility of destroying Russian artillery. In addition, the domination of the Russian artillery between March and August 2022 meant that the Ukrainians were unable to move or gather mass for offensive actions and manoeuvres.

In general, when operating in a manoeuvre, the Russians were unable to maintain the pace of the attack due to lengthy delays in logistics and artillery. In addition, there was a great deal of disorganisation due to poor command, soldiers untrained to manage a modern battle, local commanders who did not have a joint picture of the situation, which seems to have been tried successfully in Syria along the lines of the US art of war. In modern warfare, the way it works is that ISR capabilities and the units in the field feed the situational awareness system with information about what is happening, coordinating fire from different effectors. This is not the case with the Russians.

In their case, the lack of adequate communication, command system and training of soldiers led to the defeat at Kyiv. In addition, large losses in the war exacerbated this problem, as the reserves were even less well-trained. They ended up not keeping up with the actions and their pace. The organic artillery of the battalion tactical groups no longer even encrypted communications or talked on the phone because encryption was taking too long and it was unclear whether recipients "understood" the messages well. This caused a pressing need to centralise the manoeuvre and fire, the workload of the staff, often very distant from the place of action, not understanding well what was happening on the rapidly changing battlefield. Thus, the decision loop was additionally slowed down and the combat effectiveness of the Russian army was weakened. Regardless of how many barrels, tanks, and infantry fighting vehicles it had, it did not constitute an effective and coordinated combat force flexibly responding to emerging challenges on the battlefield.

Ukrainians keep MANPADs to destroy drones near artillery, they do the same with advanced anti-aircraft systems like Gepard. Tanks don't have a chance against artillery, minefields, circulating ammunition and the drones that observe the front line at great depth. The tank is easily detectable, and many tanks in one place are even easier to spot; then in the line of sight guided anti-tank missiles arrive. Before the tank-to-tank battle takes place, one of them is gone. Meanwhile, the Russians are "tied" to their vehicles (even in the VDV), they do not go further than 100 metres. The Ukrainians, on the contrary, are more difficult to detect, they are not afraid to go on foot, and they often use civilian cars.

Russia has a soldier quality problem. The level of completion of units varies, as well as the level of training, experience and the quality of the equipment. The Russian military has little time for integration and coordination. The lack of a corps of non-commissioned officers who would be permanently in the unit has

a very negative impact on the capabilities of modern war, so there is no internal cohesion of units, because the officer cadre is rotated, climbing in a career, often dependent on the patrimonial political system in places far away from Moscow such as Omsk, Chelyabinsk or Saratov. The beginning of the war was additionally associated with great losses of experienced contract soldiers, especially VDV and special forces. Those who survived the bloody slaughter near Kyiv were not prone to offensive actions. They were immediately detected on the full sensor and precise battlefield. As a result, the intensity of the attack in the Donbas was not displayed by the Russian army. Troops in an offensive operation, even on a small scale, must be supported by the massive use of artillery in order to move from static positions. In addition, often with a seven-fold superiority in numbers. Despite the fact that from March to July, when Ukrainian artillery without Western systems was clearly weaker, they could concentrate in mass more than the Ukrainians, who found it difficult to assemble a tank company for active defence in one place, because Russian artillery was quickly attacking it. In the urban struggle, which prevailed in the Donbas, because the front was moving from town to town at a rapid pace, and the lines of defence were in agglomerations, not in the middle of nowhere, the Russians began to use mobile assault groups, as in Chechnya and Syria, roughly 20 soldiers and tanks. Such combined groups fought competently, incurring losses, but also inflicting them on the other side. So the Russians can fight. They don't lack character. What they lack, however, is a modern way of conducting operations and command, which proves what's long been true, that war is a way. Or as we would say in Polish, *wojna jest sposobem*.

There is an egalitarian culture in the Ukrainian army, possibly also caused by the chaos of the first days of the war, when local commanders took command without watching out for the headquarters in Kyiv. Therefore, chaotic discussions in platoons and companies are frequent, what to do and how to approach the recommended task, which leads to innovative solutions, often technically complicated (drones, sensors, artificial intelligence applications), which, nevertheless, citizen soldiers approach with enthusiasm, using their civil knowledge to execute them and ultimately win. On a tactical level, it works, so the Ukrainians have an asymmetrical advantage of motivation, creativity and broad competences of soldiers from civic mobilisation who want to share their knowledge and enthusiasm. This is good for platoons and companies, but not so much at the battalion level and above, because there are combined operations and operational targets, not only tactical ones. A platoon or company has to perform some interlocking tasks in order for the battalion to get to another place, and there is no room for debate here, only for orders, because higher-level commanders have to take the risk and divide the risk, often unevenly, among sub-units, which might not be appealing the citizen-soldiers who are used to heated councils. You cannot argue with soldiers at this level. There must be unity of command, a clear order-issuing process, discipline and mechanisms for supervising the implementation of orders in subunits. It was different in the Ukrainian army, which was growing rapidly during the war. This is also the difference between attack and defence.

It is much more difficult to conduct offensive actions, also due to the lack of staff, experienced officers and non-commissioned officers, which means that offensive orders do not translate into coordinated actions in the appropriate time windows of specific units in the transition from defence to attack. Defence is much easier and the logistics of keeping troops in the field is much easier when defending. From September 2022, an improvement has been seen in this aspect of the Ukrainian army. This allowed her to launch a series of counter-offenses. You must have good soldiers in an attack, but together, in one unit, in defence, you can disperse them among sub-units. Three things are needed for offensive operations: training infantry for a large-scale offensive, training staff at the level of battalions and brigades so that they can manage the

flows on the battlefield (people, equipment, logistics, ordering them and moving them in rhythm in the appropriate time windows - like in a ballet...). For this you need vehicles and tanks in the offensive, but they should be standard and logistic so that they don't fail. A manoeuvre on a battlefield full of sensors also looks different. There must be reconnaissance from space and drones on a tactical scale. Light units are directed only at the identified axes, preferably where there is no enemy. And it cannot be everywhere, because in the 21st century in land war, there are few troops and the area is usually large. The Ukrainian army often uses civilian vehicles, but with equipment to fight planes and tanks, penetrating the rear, wreaking chaos, destroying communication lines. Thanks to their own anti-tank systems, they can occupy towns and, importantly, stay in them, keeping the counterattack of Russian mechanised units at a distance, especially when they receive support from their own artillery and remain in constant communication. In this process, they recognise the enemy's weak points, pores and gaps in the defence system and penetrate them. Or heavier troops consisting of tanks and IFVs are sent in these directions, creating relatively small (so that they are difficult to detect and cover with artillery fire or the action of aviation) tactical combat groups. But they face an already recognised opponent with a specific task, and not in great mass, to avoid recognition and destruction from beyond the horizon or in an ambush prepared in advance, when the opponent expects a marching column. This is being avoided, so tank combat and the use of tanks have changed their character.

In addition, the wise management of air defence systems and the extensive use of MANPADs by the Ukrainians chases off Russian aviation from the sky over its own front in the Donbas. The Russian air force supporting the battlefield flies only at dawn and in the falling dusk or very high and without precise targeting in the attack (and it has no ability to destroy land troops in a tactical clash from beyond the horizon). Air defence above MANPAD level is point defence.

It is clear that in the modern land war, in which the Polish army may take part, the most needed are: drones, including electronic warfare, missile artillery to destroy logistics and ammunition centres for Russian artillery, cannon-howitzers to prevent the concentration of Russian forces and to support their own concentration of cover, safe communication systems, ATGMs and MANPADs, armoured cover for the manoeuvre in the event of artillery fire, so that the infantry will not be pinned to the ground without the possibility of manoeuvre, but not for the tank fire effect itself, unless by indirect fire from tank unit cannons, point air defence of critical infrastructure, large-scale training for offensive actions (which are more difficult than before) and the integration and coordination of sub-units.

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