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Critical Vulnerabilities to Russia's Military Operations and Systems

Rob Lee
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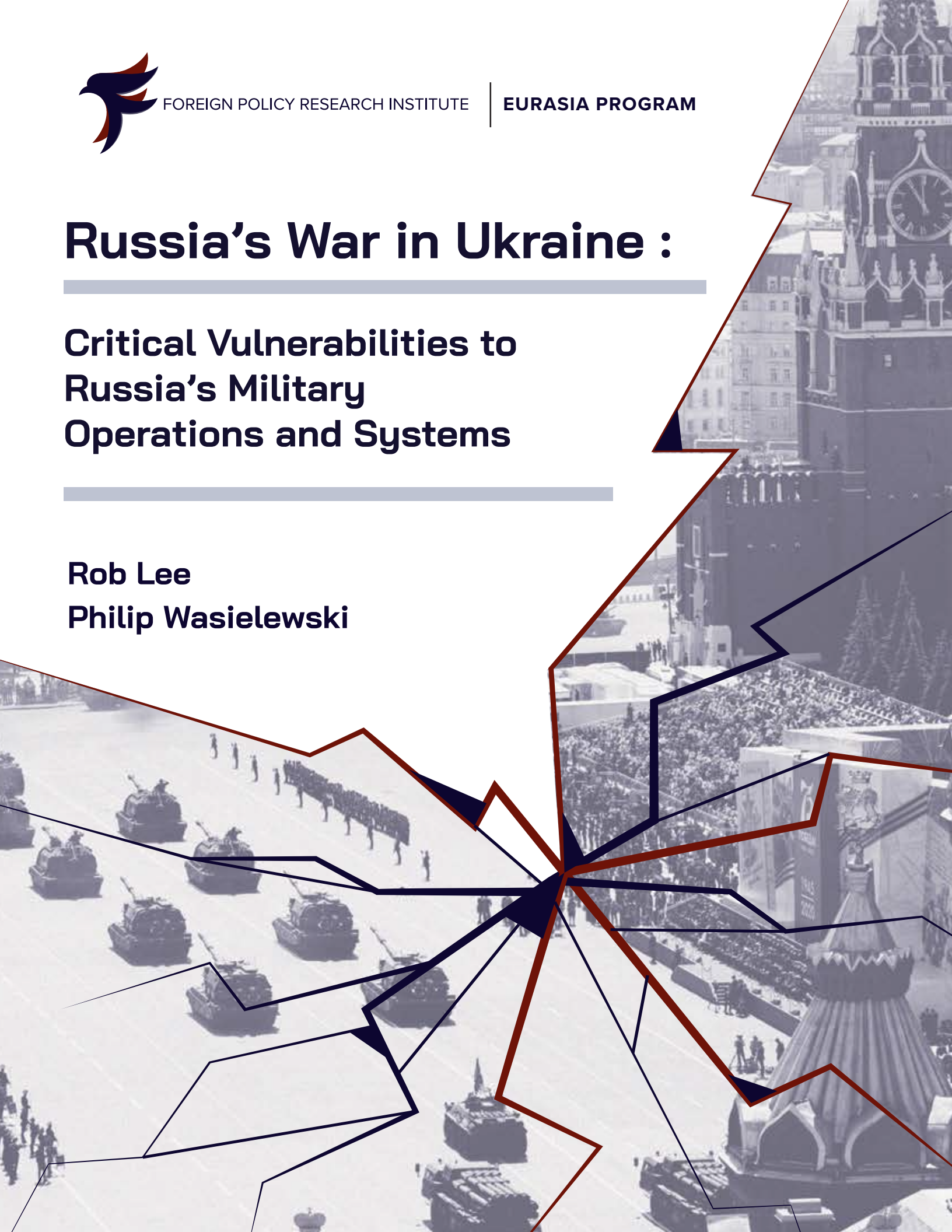

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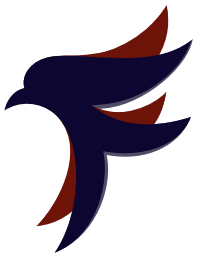

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KEY TAKEAWAYS

Some of the critical vulnerabilities to Russia's military operations and systems—revealed during the war in Ukraine—are due to its military culture and poor strategic choices at the beginning of the war including overly ambitious strategic aims. Deficiencies in Russian military culture include a highly centralized decision-making process, a disregard for the welfare of its soldiers, and flagrant dishonesty.

Certain aspects of Russia's military culture, especially the disconnect between front-line soldiers and senior officers, complicate the Russian military's ability to adapt, develop solutions to obvious deficiencies, and institutionalize lessons learned from the battlefield.

Other critical Russian military vulnerabilities are not inherent to its military culture but to Russia's national demographic and industrial capabilities. Limits in these areas make it difficult for Russia to regenerate military power by either increasing the size of its military or increasing the quality of its weapons systems. Even if Russia's military culture experiences a post-war military renaissance, its ability to regenerate military power lost in Ukraine will be limited by its declining population and industrial bases as well as Western sanctions on high technology.

Russian conscripts called up for military service line up before their departure for garrisons as they gather at a recruitment centre in Simferopol, Crimea, April 25, 2023. REUTERS/Alexey Pavlishak

THE RUSSIAN MILITARY'S KEY WEAKNESSES

Fifteen months of high-intensity conventional war in Ukraine has exposed a variety of systemic Russian military weaknesses. These include significant equipment deficiencies, such as issues with the quality and quantity of precision-guided munitions, command and control systems, unmanned aerial vehicles (UAVs), communications systems, reconnaissance and command and control aircraft, and personal equipment. Among other things, the Russian military's recon-fire complex was ineffective at the beginning of the war with too few UAVs, command and control systems, and precision-guided munitions to employ it successfully, which left Russian ground units vulnerable. However, the primary weakness relates to the Russian military's doctrine and culture, which explains the Russian military's poor performance in learning lessons and adapting during the war. This fundamental problem affects how well the Russian military can identify weaknesses, develop solutions, and institutionalize lessons. Of course, this also affects how the Russian military procures new equipment and determines which systems are priorities, so it is fundamental to Russia's broader defense policy.

One of the difficulties in analyzing the Russian military's poor performance during the invasion of Ukraine is assessing the extent its performance was due to inherent weaknesses of the Russian military or due to the poor strategy and overly ambitious objectives set by Russia's political leadership. Indeed, many of the early failures were largely a result of the lack of warning Russian units received and the extreme compartmentalization that characterized the planning of the invasion. The strategy was underpinned by the flawed assumption that there would be minimal resistance.

The primary weakness relates to the Russian military's doctrine and culture, which explains the Russian military's poor performance in learning lessons and adapting during the war.

Most Russian soldiers invaded Ukraine with only a few hours of notice and little understanding of the war's goals, which contributed to confusion and serious morale problems. Units also did not have sufficient time to properly service their vehicles and equipment or acquire enough fuel, ammunition, and other supplies. Ground units received orders to proceed to cities as fast as possible, and they often left behind key support capabilities, which left them unable to fight in a combined arms

Russian Defence Minister Sergei Shoigu chairs a meeting of the Defence Ministry Board in Moscow, Russia, May 24, 2023. Russian Defence Ministry/Handout via REUTERS

manner effectively. The Russian military sustained heavy casualties and equipment losses during the first month of the war due to decisions made by Russia's political leadership. But the Russian military has also been slow to adapt even after it was clear that the assumptions that underpinned the invasion plan were flawed.

The extreme compartmentalization employed during the invasion is also a sign of the highly centralized decision-making process in the Russian military, which is a critical weakness.

One of the key problems demonstrated in this war is that the senior leadership of the Russian military ultimately executed an extremely flawed operation in which Russian forces did not fight according to their doctrine and training. The Russian military emphasizes the role of artillery and fires, but these capabilities were not emphasized in the invasion plan. The operation did not require the Ukrainian military to be defeated because it assumed little resistance. Consequently, the Russian military played mostly a supporting role while the Federal Security Service (FSB) was supposed to effect regime change in Kyiv. Senior Russian officers reportedly questioned the strategy for the war, including the thrust toward Kyiv, but they still executed the plan.[1] The poor results should have been foreseeable, but no senior commanders resigned. Russia's operation also lacked unity of command, a key principle of war that Russian officers understand. Ultimately, this demonstrated that Russia's senior military leadership was too compliant and subservient to its political leadership. Coupled with Vladimir Putin's micromanagement of the war and unrealistic view of what the Russian military could achieve, the senior military leadership's political compliance meant that Russian strategy was quite poor. Even after repeated failures, senior generals continue to order assaults with little chance of success, likely to please President Putin. This led to minimal gains during the winter offensive but potentially set the stage for Ukraine's counteroffensive by degrading Russia's most elite units.

The extreme compartmentalization employed during the invasion is also a sign of the highly centralized decision-making process in the Russian military, which is a critical weakness. Although it has sought to emphasize greater decentralization and innovation in units, the Russian military remains tied to its Soviet past. This is coupled without a strong emphasis on troop welfare, which has been exemplified by senior commanders repeatedly ordering units to conduct assault with little chance for success. In addition, senior Russian officers did not think it was critical to inform their subordinates they were going to war, leaving them unable to prepare properly. This lack

Russia's Deputy head of the Security Council Dmitry Medvedev visits the Prudboi military training ground in Volgograd region, Russia June 1, 2023. Sputnik/Yekaterina Shtukina/Pool via REUTERS

of warning and low priority to explain to soldiers why they were fighting in Ukraine contributed to serious morale problems and the significant number of soldiers and officers who refused to continue fighting. In practice, this means that more senior Russian military officers are often out of touch with the realities of junior soldiers and units. When Russia invaded Ukraine, it did so with significantly understrength battalions. Although every Russian brigade and regiment is supposed to be able to form two permanent readiness battalion tactical groups (BTGs) manned exclusively by contract soldiers with 700–900 personnel, Russian battalions were often only at 65–70% strength. Many of these units still depended on conscripts to fill out squads even though conscripts are not supposed to be deployed or assigned to these BTGs. If Russian regiments and brigades had enough time to prepare for the war, they could have fixed some of these issues. Instead, conscripts were deployed by several Russian units at the beginning of the war because they lacked enough contract soldiers. This suggests that senior Russian commanders were unaware of the extent of the personnel issues before Russia invaded.

Similarly, many Russian units had serious equipment issues, including a lack of UAVs at the outset. Some units had to rely on volunteers with commercial UAVs despite the emphasis that Russian officials had placed on UAV procurement over the past decade, which President Vladimir Putin repeatedly mentioned. This also indicates

A UAV is pictured during a drill of the aerial reconnaissance unit of one of the Territorial Defence brigades, Zaporizhzhia Region, southeastern Ukraine, March 7, 2023. Photo by Dmytro Smolienko/Ukrinform/ABACAPRESS.COM

that more senior officers were unaware of the situation in Russian tactical formations and were not conducting effective regular inspections. This disconnect continued as the war progressed and hindered tactical adaptations. Although Russian soldiers and units adapted, these lessons were not properly institutionalized within the military, limiting their effectiveness. Many Russian Telegram channels mentioned the resistance from more senior officers to procuring commercial UAVs, both used in a reconnaissance role and to drop munitions. This was a natural response to the lack of military UAVs, but senior Russian officers were often hesitant or prohibited their use. In contrast, the Ukrainian military made a much greater effort at procuring UAVs, including the more recent development of First-Person View UAVs as improvised loitering munitions. Ukrainian forces, often supplied by non-governmental groups through crowdfunding on social media, began using these UAVs effectively to target Russian forces over the winter, but Russia was much slower to adopt them. Soldiers and junior officers had a greater appreciation for the need for commercial UAVs and loitering munitions, but senior officers did not. Throughout the war, the Russian military has been slower to innovate than the Ukrainian military. The overly top-down method of leadership is a significant factor in the Russian military's poor performance in the war and as a learning organization.

The Russian military is also overly bureaucratic, which often prevents soldiers and officers from exercising initiative and solving problems at their level. A common complaint among Russian Telegram channels was that units of mobilized soldiers trained to serve as artillerymen or in other specialties were used as infantry in Ukraine. In other cases, former *Spetsnaz* servicemen were sent to serve in tank units where their skills and experiences were not maximized.

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Additionally, assignments to assault or storm units, which are designed to conduct assaults, have often become a punishment even though they should only be manned by the most motivated and capable soldiers, according to Russian combat manuals. Numerous anecdotes indicate Russian officers followed regulations that did not apply to the circumstances of the war and focused on garrison disciplinary measures. This included banning MultiCam uniforms by certain senior officers, conducting garrison-style unit inspections, and diverting soldiers from training and combat-related tasks in Ukraine. There is a widespread perception among Russian military bloggers that many senior Russian military officers cannot identify the most important issues facing Russian troops, including equipment

problems, and instead focus on peacetime methods of leadership.

There was a clear disconnect between soldiers on the front line and senior commanders before Ukraine's successful offensive in Kharkiv.

There was also a clear disconnect between soldiers on the front line and senior commanders before Ukraine's successful offensive in Kharkiv. Soldiers and commanders on the front line had seen a buildup by Ukrainian forces and Russian Telegram channels warned about a potential breakthrough. Russia's defenses in Kharkiv were weak and many units were significantly understrength. Despite this perilous position, senior leaders failed to make any serious effort to fix the situation or prepare for Ukraine's offensive. It is unclear if senior Russian generals alerted President Putin to the situation, but they could have taken greater efforts to improve their defenses in the area. Ultimately, the Russian chain of command has repeatedly failed to address problems recognized by units on the front line.

This was one of the many foreseeable mistakes the Russian military committed during this war. Another likely contributing factor to Russia's failure in Kharkiv is the wide-scale practice of lying and filing false reports to senior officers. Another common complaint among Russian military bloggers is that equipment or personnel shortages are not addressed because officers will simply lie to their superiors to say they are at their authorized strength. Of course, this is also related to the issue of troop welfare since junior soldiers are placed in a worse position when their units are understrength, but they are still ordered to perform missions as if they are at full strength. This also contributes to the poor situational awareness of senior Russian officers. Lying and falsifying reports are culturally entrenched practices that will likely be difficult to fix quickly through reforms.

These issues with centralized decision-making, lying, troop welfare, and a disconnect between senior officers and junior soldiers, which often reinforce one another, are significant weaknesses. Taken together, they hinder the identification and institutionalization of lessons learned. The Russian military reacts far too slowly to problems or does not address them until they become a serious issue. As for the problems in the Russian reconnaissance-fire complex, senior officers were unaware that many units lacked the right equipment to effectively employ the complex, units were not empowered to operate in a decentralized manner to locate targets, there was often minimal coordination between ground and air units, and units had little time to prepare for the war. Senior officers were likely not aware of how bad the problem was and may have expected it could still be employed at the outset of

Collection of rockets and ammunition fired by Russian army on Kharkiv. As of 6 December 2022, Emergency Service of Ukraine reported collection of over 5,000 items, including Grad, Uragan, Smerch, Tornado-S, Kalibr and Iskander missiles and rockets. Kharkivoda.gov.uaWikimediaCommons

the war. Even after early deficiencies were identified, Russian units were still slow to adopt commercial UAVs, which could perform the reconnaissance role.

Looking to the future, these issues are significant because they affect how the Russian military operates, learns, and procures equipment, and they are very difficult to ameliorate because they are so ingrained in Russian military culture. The Russian military requires substantial reforms, but it is unclear if it will have the political will to implement them. This also affects the type of weapons Russia is procuring and the long-term structure of the military. There is less oversight of the Russian military and there is a perception among military bloggers that the Russian military does not promote the best officers to senior positions. Without much room for bottom-up refinement, the senior Russian military officers who make these decisions may not have the best understating of the needs of their units, and they have not demonstrated the willingness to push back against political leaders. In addition, there is a perception among Russian military bloggers that, unlike the Russian-proxy LDNR units, Russian military commanders often receive promotions with less merit, and their promotions are often due to their performance in garrison. Regardless of the truth of the matter, that perception among Russian servicemen is a critical problem. Long-term, Russian conscripts will be less likely to volunteer to serve as contract soldiers because they will not trust the military's leadership. These systemic cultural and doctrinal issues will be difficult to fix, and they will affect the quality of Russian servicemen and officers who will serve in the Russian military in the future. Indeed, despite fighting in several wars, senior Russian commanders have not demonstrated keen strategic insight or an understanding of how to fix the Russian military.

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These considerations lead to the second half of this study on critical Russian military vulnerabilities exposed by the war in Ukraine. This portion will concentrate not on cultural but on capacity issues and their possible effects on Russian military capacity in the future.

Members of the Russian Volunteer Corps are seen, amid Russia's attack on Ukraine, near the Russian border, in Ukraine May 24, 2023. REUTERS/Viacheslav Ratynskyi

WEAKNESSES NOT IN CULTURE BUT IN CAPACITY

One critical vulnerability to Russia's military operations and systems revealed during the war with Ukraine is Russia's difficulty regenerating military capacity after high casualties, equipment losses, and munitions expenditures. While Russia's partial mobilization in October 2022 temporarily met manpower needs in Ukraine, the challenges to rebuilding its military are daunting. Regenerating Russian military capability presents challenges in terms of both personnel and major combat systems for Russia's ground and air forces. This study concludes with a brief analysis of what this means for Russia's military capabilities later in the decade, whether the war in Ukraine has concluded or turned into a "frozen conflict."

PERSONNEL

If demography is destiny, Russia's destiny as this decade continues will be one of slow decline, which will be reflected in its ability to man the military, paramilitary, and police forces the Kremlin thinks necessary to maintain sovereignty and keep order in the world's largest country by land mass.

According to Russian government statistics, its population at the beginning of 2023 was 146.4 million, a decline of 600,000 people from just the year before.[2] However, there is doubt that this figure is accurate. Some sources, based on projections of the United Nation's data, estimate Russia's population today at 144.5 million. The Central Intelligence Agency's World Factbook estimates Russia's population at 141.7 million.[3] President Putin himself raised doubts about Russia's true population when he possibly misspoke, or spoke the truth, on March 14, 2023, in Buryatia, stating that only 12 million Russians live east of the Ural Mountains. Official statistics put this number at 27 million.[4] If true, Russia's publicly released population statistics could be ten or twenty million people too high; its real population figure could be 130 million or less.

If demography is destiny, Russia's destiny as this decade continues will be one of slow decline.

Whatever Russia's actual population, it is undeniable that it continues to decline due to decreased fertility and increased emigration and death rates. If Russian deaths continue to outnumber births in this decade by almost 800,000, then its total population by 2030 would certainly be under 140 million.[5] Considering this was the approximate size of the United States during World War II, Russia should still be able to field a considerable military force from this population base. A Russian population in

Residents of the Shebekinsky district of Russia's Belgorod region, who were evacuated following recent attacks on settlements near the Russia-Ukraine border in the course of a military conflict, stay at a temporary accommodation centre located in a sports facility in the city of Belgorod, Russia, June 7, 2023. REUTERS/Maxim Shemetov

2030 of approximately 141 million people would include 7.9 million males between the ages of 20–29 and 11.5 million males between the ages of 20–35.[6]

Thus, Russia's current and near-term manpower base could support a war in Ukraine *and* increase the size of its military to 1.5 million men, including 695,000 contract service personnel, as announced by Minister of Defense Shoigu in December 2022.[7] However, there will be difficulties maintaining a military of this size including economic costs and political risks.

The first of these challenges is the increasing unwillingness of young Russian men to serve in the military. The actual manpower *cost* of the October 2022 mobilization of 300,000 men to Russia's workforce was at least 600,000 men if one includes the more than 300,000 draft-aged males (many educated in high-technology professions) who fled Russia to avoid the draft.[8] One estimate is that Russia could lose 10% of its 20–29-year-old male cohort due to battlefield casualties and emigration.[9] This is consistent with Moscow's own public figures that show approximately one million Russian males have left the country to either fight in Ukraine or have emigrated.[10]

The reluctance of Russians to fight in Ukraine is clear. However, even if the war ended today, this would not alter the propensity of most Russian men to avoid military service. Draft evasion among Russia's youth has become almost a national sport with the majority of those drafted unable to use bribes or influence to avoid conscription. Recognizing this, Russian military reforms purposely decreased

the size of its military and tried to attract more contract volunteers. This worked to a degree. When the war in Ukraine began, 70% of Russia's enlisted men were contract volunteers. However, the remaining manpower requirements of even a much smaller military (900,000 in 2022, vice 1.7 million in 1998) still required two semiannual call-ups of conscripts each year totaling approximately 260,000 men for one year of service. Since most contract soldiers seldom reenlisted due to poor living and working conditions, it is hard to imagine how—after the war—enough young men would volunteer to meet Shoigu's goal of 695,000 contract soldiers.

Besides its military, Russia has other national security forces to man, mostly with military-age males. The three largest organizations are the 900,000-man Ministry of Internal Affairs, the 340,000-man paramilitary Rosgvardia, and the 170,000-man Federal Border Guard Service, part of the Federal Security Service. When one considers the size of the various internal security organizations, approximately 1.5 million, in comparison with the size of Russia's military, 900,000, it is clear from where Russia's leadership really believes its greatest threats come.

Between its intended increased military and its current police and paramilitary forces, the Kremlin plans to put approximately three million men under arms. This is its *actual* staffing requirement to protect Russia. Due to cultural norms, women will only make up a small percentage of this need. As of 2020, only 5% of Russia's military cadres were women.[11] The use of prisoners in penal battalions to make up for military shortfalls in combat cannot be replicated in police and security units. It is doubtful that using prisoners will work again for the military due to the high casualty rates suffered by these prisoners, and the reluctance of many others to volunteer.

Draft evasion among Russia's youth has become almost a national sport with the majority of those drafted unable to use bribes or influence to avoid conscription.

When one considers the desire to increase the military to 1.5 million people and maintain internal security forces at that same level, the total of three million men under arms will require a considerable part of the 20–29-year-old cohort of 7.9 million men. This is especially so considering, based on years of poverty and poor health care, a substantial percentage of that cohort may not meet even Russian military health and fitness standards. Given these challenges, how will Russia keep three million men in arms? Is this even possible?

Volunteers will gravitate toward the paramilitary, police, and security services because of greater security and the chance

Russian conscripts called up for military service take part in a ceremony marking their departure for garrisons as they gather at the Trinity Cathedral in Saint Petersburg, Russia May 23, 2023. REUTERS/Anton Vaganov

of personal gain through corruption. The proclivity of some people to embrace military service based on family traditions, a sense of adventure, patriotism, etc., will attract some contract soldiers or officer candidates. Economic conditions will bring in more. However, based on past contract reenlistment rates and the recent experience of the war in Ukraine, it is unlikely that Russia can solve its manpower requirements as before with a 70/30 ratio of contract soldiers to conscripts. It must either lower its manpower requirements or increase conscription to meet those requirements. For an authoritarian regime obsessed with maintaining power, the latter option is more likely. There are several consequences to this: military, economic, and political.

The primary military consequence will be to return to the Soviet tradition of an army made up of one- or two-year conscripts, a small number of senior noncommissioned officers and warrant officers, and an oversized officer corps. In the Soviet era, the training of short-service conscripts emphasized rote learning of basic combat skills, with no room for initiative or innovation. As in Soviet days, a challenge will be retaining highly skilled personnel to operate, maintain, and fix high-technology weapons and equipment.

The primary economic consequence of this will be the number of people removed from Russia's workforce and its effect on productivity. Given the birth slump of the past two decades, Russia's native-born labor force, which is already shrinking, is bound to be yet smaller in 2030 and 2040 than it is today. The number of working-age Russians (ages 25–64) peaked in 2011 and

is on a path of steady shrinkage through at least 2040, while the prime-age group (25–54) actually peaked two decades ago.[12] Increasing Russia's military from its 2022 size of 900,000 to 1.5 million will decrease Russia's available labor force. These numbers do not reflect the losses the labor force has already sustained due to the war and resulting emigration. Since the size of a country's labor force is a factor in its gross domestic product (GDP), maintaining a larger military and security force will affect GDP and the standard of living at a time when both are already stressed by sanctions. Declining GDP decreases the government's ability to meet both military and social spending needs. The former will influence the ability to regenerate military capacity, the latter will impact political stability.

The primary political consequence of maintaining a large military and security establishment at the expense of other social requirements will be the risk of public unrest.

The primary political consequence of maintaining a large military and security establishment at the expense of other social requirements will be the risk of public unrest. Many observers believe the fear of public unrest is what kept President Putin from announcing a mobilization earlier than October 2022, and may yet keep him from announcing a second mobilization to make up for battlefield losses since then.

Therefore, while Russia probably could meet its desired military and security force manpower requirements, it will come at costs that will continue to weaken it economically, as well as risk undermining political and social cohesion. Meeting manpower requirements will only be the first step in regenerating military capacity, especially for the ground and air forces. Russia's major combat systems have suffered significantly in the war to date, and this analysis considers what the Russian military-industrial complex is capable of replacing.

GROUND FORCES

According to the International Institute of Strategic Studies (IISS), in February 2022, Russia's ground forces consisted of an army of approximately 280,000 men—airborne forces and special forces with 45,000 and 1,000 men respectively—and a naval infantry force of approximately 35,000 men. Since the war began, Russia has conducted two semiannual conscript drafts totaling approximately 260,000 men for its entire military (not just ground forces) and mobilized an additional 300,000 (mostly for its ground forces fighting in Ukraine).[13] IISS also estimated that Russian ground forces at the beginning of the war in Ukraine had 2,927 main battle tanks (MBT), 5,180 infantry fighting vehicles (IFV), 1,968 self-propelled (SP) and 150 towed artillery pieces, and

1,056 multiple rocket launchers (MRL), with an additional 10,200 tanks, 8,500 IFVs, 4,260 SP artillery pieces, 12,415 towed artillery pieces, and 3,220 MRLs in storage (mostly older Soviet models).[14]

Since the war began, there is evidence that in some cases official Russian troop strengths and equipment combat readiness had been exaggerated not only to foreign observers but also to its own chain of command. The war has produced high personnel and equipment losses. While the extent of loss is difficult to determine accurately with open sources, the following represent estimates based on available data.

In a December 2022 Foreign Policy Research Institute (FPRI) analysis, Russian military personnel losses by the end of November 2022 exceeded 100,000.[15] On April 30, 2023, National Security Council spokesman John Kirby provided a US assessment that Russian casualties since December were approximately 100,000, with 20,000 dead and 80,000 wounded.[16] Considering Russia's inadequate medical services, nearly nonexistent rapid medical evacuation capabilities, and the fact that many of these casualties were former convicts serving in Wagner and therefore considered expendable, this 1:4 killed-to-wounded ratio was probably too optimistic. Based on a 1:2.3 killed-to-wounded ratio consistent with Russian casualty rates during World War II, there were likely 30,000 killed and 70,000 wounded in action from December to May 2023. Adding these two estimates plus casualties since May 1, 2023, Russian ground forces have arguably suffered at least 200,000 casualties, and probably more due to the intense combat around Bakhmut in recent weeks.

Equipment losses are somewhat easier to estimate thanks to the work of open-source organizations such as Oryx, whose database of equipment losses requires photographic evidence for verification. According to Oryx's data, as of May 31, 2023, Russia had lost a minimum of 2,001 MBTs, 2,366 IFVs, 405 SP artillery pieces, 187 towed artillery pieces, and 202 MRLs. One hundred and thirty of the 2,001 MBTs counted by Oryx as destroyed, damaged, or captured were T-62 and T-64 type tanks not counted in IISS data as front-line equipment and most likely reserve stocks brought out of storage. The same applies to the figure for towed artillery pieces. Oryx data counts 187 of these destroyed or captured while IISS data showed only 150 in front-line status, another indicator of equipment used from storage to compensate for combat losses.[17]

By comparing IISS data on front-line Russian equipment in 2022 with current Oryx data on losses in Ukraine, at a minimum Russia has lost approximately 64% of its prewar front-line MBT strength (T-72, T-80, and T-90 models of all types). This includes 35 T-90A and 20 T-90M tanks destroyed or captured out of an estimated total of 350 T-90A (10% loss rate) and 67 T-90M (30% loss rate) tanks, the most modern tanks in the Russian army's inventory.[18]

Losses for other major classes of ground combat equipment are equally devastating. As of May 31, 2023, at least 2,366 out of

A view shows a workshop of Obukhovsky plant, which is one of the production sites of the Russian missile manufacturer Almaz-Antey, during the visit of Russian President Vladimir Putin in Saint Petersburg, Russia, January 18, 2023. Sputnik/Ilya Pitalyov/Pool via REUTERS

5,180 IFVs have been destroyed, damaged, or captured (46%); as well as 405 SP artillery pieces out of 1,968 (21%) and 202 MRLs out of 1,056 (19%).[19] This is before whatever losses will be suffered in the summer and fall fighting season of 2023.

As IISS data indicates, the Russian military has immense reserves of equipment and has sent many replacement tanks, artillery pieces, and other combat vehicles to the front. However, these provide only a temporary fix and cannot regenerate prewar military capacity because of the age of the equipment (and therefore lower combat capability) and the limited number that can be refurbished for active service. Press reporting indicates that only one in ten Russian combat vehicles in storage may be usable, due to the theft of vital electronics, optics, range-finding equipment, and, in some cases, even entire engines.[20]

Russia's military-industrial complex can only replace a small percentage of these losses. Russia's primary tank production plant, UralVagonZavod, built in the 1930s, can reportedly produce only 20 tanks and refurbish another eight each month. Three other armored vehicle repair plants can each refurbish approximately 18 tanks a month. This means an output of possibly 90 new and refurbished tanks a month while Russia's army loses on average 150 per month in Ukraine.[21] An April 2023 FPRI report indicates that it is unlikely that tank production can be increased due to a shortage of skilled workers and engineers and because Russia's only tank engine plant is completely dependent on imported industrial equipment.[22] Furthermore, due to sanctions, the question remains whether these newly produced and refurbished armor vehicles have the modern range finders, electronics, main tank gun stabilizers, and other advanced equipment that provide a modern MBT with a battlefield advantage over its predecessors.

Russia's military-industrial complex can only replace a small percentage of these losses.

The Russian military's shortage of artillery ammunition is part and parcel of this same military-industrial dilemma. In fifteen months, Russia has gone through decades of artillery stockpiles, and its industrial base is not poised to quickly ramp up production. Investment and construction to do so will take years. Russian ammunition usage rates along the front have reportedly fallen from 20,000 rounds per day (600,000 shells a month of all calibers) to 5,000 per day (150,000 shells a month) due to artillery shell shortages.[23] Open-source information on Russia's ability to replenish artillery ammunition stocks is less illuminating than information on tank production. However, the April 2023 FPRI report that carefully observed Russian munition refurbishment and ammunition factory financial data estimated that iRussia produced 1.7 million artillery shells of all types in 2022.[24] This

Destroyed Russian military vehicles are seen at a compound of an agricultural farm, which was used by Russian troops as a military base during Russia's attack on Ukraine, in Kharkiv Region, Ukraine July 17, 2022. REUTERS/ Sofiia Gatilova

would allow its forces in Ukraine to fire 5,000 rounds a day for 340 days, in other words, just enough to maintain a stalemate once all earlier reserve stocks have been used up. It is certainly not enough to allow Russia to ever again reach the estimated millions of stockpiled artillery rounds that were the legacy of its Cold War arms production.

A parallel problem to the artillery shortage is the issue of barrel life for both artillery pieces and tanks. Most artillery pieces need new barrels after firing 5–7,000 rounds, and most tanks need new barrels after firing 1,000 rounds. This is complicated because, to change a barrel on a Russian tank, one must first remove the turret.[25] Therefore, an additional unknown number of Russian tanks and artillery pieces may be ineffective in combat until they receive new barrels. Unfortunately, ineffective tanks cannot be identified from satellite photos.

AIR FORCE

Russia's air force (VVS, a branch of the Russian Aerospace Forces, VKS) has not suffered the same level of attrition as its ground forces, but it faces similar issues of limited industrial capacity and access to advanced materials and avionics due to Western sanctions, which impede its capacity to replace losses. The VVS entered the war with 185 fighters, 427 multi-mission aircraft (fighter and attack), and 264 attack aircraft. Russia's naval aviation branch had 67 fighters, 44 multi-mission aircraft, and 46 attack aircraft. Since the war began, Russian aviation losses have included one fighter to combat and three fighters to noncombat incidents, 37 multi-mission aircraft, and

40 attack aircraft (Su-24 or Su-25) or approximately 8% of its overall combat air strength. Attack helicopter losses have been somewhat greater. Russia entered the war with 399 attack helicopters and as of May 31, 2023, had lost 62 or 15% of its inventory.[26]

Replacing even this limited amount of combat aircraft and attack helicopter losses will strain Russia's aviation industry. In March 2021, a lack of orders and other financial difficulties caused the famous Russian aviation design firms of MiG and Sukhoi to merge into the United Aircraft Corporation (UAC). Additional mergers followed, including the historic Tupolev and Ilyushin design firms along with the Irkut corporation. In 2022, UAC delivered 27 new multipurpose combat aircraft (four Su-30SM2s for the naval aviation branch, and ten Su-34Ms, seven Su-35Ss, and six Su-57s for VVS).[27]

The Su-57, Russia's attempt at a fifth generation (5G) aircraft, has had a troubled developmental history with one crash out of the eleven aircraft delivered since 2019. In 2019, UAC signed a contract to deliver 76 aircraft by 2027 but serial production has been limited with the six produced in 2022 as the largest delivery batch to date. None of the ten remaining aircraft have yet to be delivered to operational squadrons, and all are currently assigned to a VKS testing and training center although two aircraft served for a short period in Syria.[28]

Russian aircraft and helicopter production has been hampered by US sanctions specifically aimed at its military-industrial complex. US Treasury sanctions imposed in March 2022 targeted Russia's aviation industry including factories and companies specializing in avionics, radars, missiles, electronics, helicopter production, etc.[29] UAC has a contract to deliver 20 Su-34 aircraft between 2021–2024 in addition to the contract for 76 Su-57s. Its overall contract obligations are to deliver 150 aircraft of all types from 2021–2027 plus 30 Ka-52 attack helicopters between 2022–2023. It is unlikely that these production numbers can be increased, and with sanctions, it will be a challenge to meet current contracts.[30] Therefore, even if all contracts are fulfilled on time, Russia's aviation industry will replace only 30 of the 62 attack helicopters lost to date in Ukraine, and its 96 contracted Su-34 and Su-57 multipurpose aircraft will increase overall combat aviation strength by 15 planes after replacing the approximately 81 fighter, multipurpose, and attack aircraft lost so far in the war. This of course assumes no additional losses from combat or accidents.

Furthermore, half of Russia's aviation losses have been of its Su-24 and Su-25 attack aircraft, both of which are maximized for close air support. Since neither aircraft production lines are open, this means that either more advanced multipurpose aircraft will have to take on the high-risk, close air support missions or the VVS may have to decrease the amount of close air support it provides to the Russian army in Ukraine to avoid risking its remaining fleet of high-value jets.

REGENERATING RUSSIA'S LOST MILITARY CAPACITY: IMPLICATIONS

PERSONNEL

Russian manpower requirements for a 1.5-million-man military and a 1.5-million-man military/police/security complex can theoretically be met with enough incentives and coercion—though the latter has risks including societal unrest and impact on GDP. Those in the military become unavailable for the general workforce which impedes the regenerative capacity of Russia's military-industrial complex by increasing its labor shortage. Currently, a lack of skilled workers and engineers hinder tank production. These and other plants use convict labor—never a source of high-quality outputs—to make up for this shortage. This situation is prevalent in other parts of Russia's military-industrial complex and has the same hindering effect on regenerating military capacity.

GROUND FORCES

Due to the heavy losses of trained cadres and armored vehicles and the inability of the Russian military to train quickly newly mobilized forces in technical military specialties, the Russian army in Ukraine has transformed into primarily a foot infantry force. Armor and artillery capabilities remain, but many modern systems have been lost and are replaced by obsolete Soviet-era designs, lowering combat capability. Revolutionary designs touted before the war such as the Armata MBT and the Boomerang IFV have been failures and have not even shown up on the battlefield. Russian ground forces face the prospect of continued heavy losses of men and material in the second half of 2023. Replacing those losses will be inadequate due to manpower and industrial base constraints.

AIR FORCE

The Russian air force today will be the same in size and capability for the rest of the decade, and possibly beyond, due to the limited capacity of the aviation industry. As with the ground forces, Russian military aviation faces further attrition during 2023. With limited replacements to make up for these losses and replace older models, aircraft will continue to age and consist of 4G and 4.5G combat aircraft while competitors are equipped with 5G aircraft and introduce 6G models. Russia's aviation industry produced 27 aircraft in 2022, but Lockheed delivered 170 F-35 5G aircraft that year, and China reportedly has produced approximately 200 J-20 5G aircraft since 2017.[31] While others move ahead, Russia's air combat fleet can only regenerate barely enough capacity to stay in place.

People carry a coffin out of a chapel before the funeral of Alexander Skobelev, junior sergeant of the Russian armed forces killed in the course of Russia-Ukraine conflict, in the town of Shlisselburg in the Leningrad region, Russia, June 8, 2023. REUTERS/Anton Vaganov

POLITICO-MILITARY

However, despite the deficiencies listed above that will have drastic consequences in any future war against a peer competitor, Russia still has the manpower and military-industrial capacity to keep fighting the war in Ukraine as a stalemate or "frozen conflict" for the foreseeable future unless it suffers a major defeat on the battlefield or experiences major social and political changes at home. It remains a threat to its neighbors due to its imperial intentions, size, huge stockpile of legacy (but still lethal) Soviet-era weapons, and a limited but functioning military-industrial complex to build modern weapons. Russia, with its nebulous population of 130–140 million still dwarfs its neighbors numbering only 1.3 million (Estonia), 1.8 million (Latvia), 2.8 million (Lithuania), 3.7 million (Georgia), 5.5 million (Finland), 9 million (Belarus), 10 million (Azerbaijan), or 19 million (Kazakhstan).

Russian soldiers are capable of incredible sacrifices just as they are capable of incredible brutality.

Its forces do not have the capacity "to reach the English Channel," but with time to rebuild, it could reach the Gulf of Riga. Russia's initial advances into Ukraine in February 2022 penetrated up to 75–125 miles in certain sectors, which, if applied to the topography of NATO's Baltic members, would bring Russian forces from its borders to the outskirts of Tallinn, Riga, and Lithuania's Baltic port of Klaipeda. Russian soldiers are capable of incredible sacrifices just as they are capable of incredible brutality. What has hobbled Russia in Ukraine in 2022–2023, besides the fighting spirit of the Ukrainian nation, is its inability to regenerate its combat capacity quickly after absorbing the initial shock of a major industrial-age war, from issues of manpower and industrial capacity. It is a lesson that the United States should heed as it prepares its own national defenses.

CONCLUSIONS

Critical vulnerabilities to Russia's military operations and systems, which have been revealed during the war in Ukraine, can be boiled down to problems of culture and problems of capacity.

Aspects of Russian military culture coupled with strong vestiges of Soviet military culture, which have proven to be critical vulnerabilities, include excessive secrecy and compartmentation, a lack of regard for the welfare of its soldiers, and flagrant dishonesty in the reporting of information both up and down the chain of command. An equally corrosive feature of Russian military culture has been its highly centralized decision-making process that in the war in Ukraine has given its military an inflexible command and control system while somehow not managing to provide it with unity of command.

Pre-existing deficiencies in precision-guided munitions and UAVs (both in quality and quantity); command, control, and communications systems; and intelligence, surveillance, and reconnaissance systems resulted in an ineffective recon-fires complex. What had seemed in Syria to be an effective system when pitted against a foe with few modern weapons in restricted desert or urban environments turned out to be inadequate for the demands put on it during a major conventional war against a foe well equipped with air defense and electronic warfare systems operating across an expansive battlefield measuring tens of thousands of square miles.

These ingrained vulnerabilities in Russia's military are unlikely to be solved soon due to the very military culture that has been instrumental in creating them. The overly top-down method of leadership is a significant factor in the Russian military's poor performance to date as a learning organization. The Russian military requires substantial reforms, but it is unclear if there will be the political will to implement them.

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Even if defeat provides the impetus for reform (as it often does for all militaries), critical vulnerabilities in national capacity, both demographic and industrial, may trump any future changes in culture. A strategic vulnerability revealed by this war is Russia's difficulty in regenerating combat power after heavy losses of men and machines and the high expenditure of ammunition due to

an atrophied industrial base, diminishing population, and Western sanctions that deprive its economy of steady access to high technology. In a little over a year, Putin's war has destroyed what took 20 years of his rule and the previous 20 years of Soviet and Russian Federation production to create. If sanctions remain in place, it will take a long time for Russia to regenerate the combat capacity it had on February 23, 2022.

If Moscow's foreign and security policies continue to emphasize imperial ambitions with a confrontational approach against the Western liberal democracies, this could have ominous implications for the future.

This vulnerability, however, could be tempered by the type of foes against whom Russia may decide to employ its post-Ukraine military, as depleted as it may be. Unless there is a major defeat of the Russian army in Ukraine causing it to lose most of its men and equipment on the battlefield, a post-war Russia may still have enough residual military capacity to continue a "frozen conflict" in Ukraine or overpower other neighbors with a mass of legacy Soviet-era equipment. What it will not be able to do is pose a serious conventional threat to competitors such as NATO or China in a long-term industrial war requiring large amounts of manpower and equipment. A caveat to this is that the Baltics will remain vulnerable due to their inherent characteristics of a small population and limited strategic depth. However, if an attack on the Baltic states would initiate an Article V NATO response, any Russian invasion would be a gross miscalculation by Moscow.

Russia's weakened conventional military capability and declining population and industrial bases mean that Moscow will have to almost exclusively rely on the threat of nuclear weapons to deter or repel threats from major powers to its east and west or tactics of subversion to undermine the societies of these major powers, be these threats real or perceived. If Moscow's foreign and security policies continue to emphasize imperial ambitions with a confrontational approach against the Western liberal democracies, this could have ominous implications for the future.

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An aerial view shows Red Square during the Victory Day Parade in Moscow, Russia, June 24, 2020. The military parade, marking the 75th anniversary of the victory over Nazi Germany in World War Two, was scheduled for May 9 but postponed due to the outbreak of the coronavirus disease (COVID-19). Host photo agency/Alexander Vilf via REUTERS

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