



# **RUSSIAN LESSONS LEARNED IN SYRIA**

## **AN ASSESSMENT**

by Timothy Thomas

## Executive Summary

Russia's Chief of the General Staff, Valery Gerasimov, noted in his 2019 speech at the Academy of Military Science (AMS) that the Russian operation in Syria was new in that it enabled Russia to carry out "tasks to defend and advance national interests outside the borders of Russian territory." He noted that Russia's strategy in Syria was the "strategy of limited action," in that Aerospace Forces contributed the greatest share of missions to resolving assigned tasks. These aerospace centric operations included developing layered defenses against terrorist unmanned aerial vehicles and utilizing precision strikes against targets. Thus, Russian military experience in Syria has proven to be invaluable for invoking updated attack methods against terrorists in areas far from the motherland and for advancing Russian national interests.

The only first-hand commentary of the conflict has come from Russian and Syrian controlled media. As a result, Russia has had close to a free hand in deciding how it conducts operations. It has, however, had to learn to work closely with a set of actors that differ 180 degrees from their Warsaw Pact allies of the Cold War era. A local power (Syria), a more formidable regional power (Iran), a terrorist group (Hezbollah), and others had to be integrated into a working coalition, which had issues. Further, Russia was forced to work with the United States in regard to deconflicting air and special operations.

Several points merit special attention for Western observers, to include Russian preemption capabilities and new methods to deter (scare) adversaries with advanced weapon capabilities. Gerasimov's AMS address noted that Russia's overall "strategy of active defense" is a set of measures for the preemptive neutralization of threats to the state's security—that is, the desire to preempt when threatened and deter potential adversaries in the region, to include Lebanon and Israel.

The fighting in Syria has allowed Russia to test a range of new weapons and new concepts and has trained a number of leaders in contemporary warfare outside its borders, making it much different than the earlier, more localized fight in Chechnya. New methods of employing Spetsnaz forces and new ways of utilizing private military companies were explored. The Syrian experience has refocused Russia's military on urban warfare and the difficulty of extracting enemy fighters from buildings while trying simultaneously not to harm the local population and to find humanitarian corridors for their extraction from the combat zone.

Russia's use of robotics and unmanned vehicles in urban operations, learning ways to use radio-electronic equipment or information technologies to disorganize enemy signals, and defending bases from UAV attacks were other lessons learned. Finally, the Russian military is in the process of incorporating these lessons learned through conferences, round tables, and new manuals. Russia's military will undoubtedly be a stronger adversary after their Syrian experience than before it.



## Introduction

Ever since September 2015, Russia has been battling terrorists alongside Syria's armed forces. The effort has been consistent, with President Vladimir Putin never wavering in his steadfast support of Syrian President Bashar al-Assad. Four issues motivated Russia's support. First, Syrian forces were in jeopardy of losing control of the last vestiges of the nation when Russia decided to intervene. Russian estimates were that Syria controlled only 10 percent of its territory at that time. Failure to act appeared to promise an end to the Assad regime, which was a long-time supporter of Russia. Second, Russia has been involved in the Middle East for decades, has supported numerous autocratic figures there, and does not plan to give away the advantage and influence they have developed over the years. This includes not only the naval bases Russia has maintained in the Eastern Mediterranean but also access to Syria's numerous resources (phosphates, oil, etc.). Third, support to Assad helps balance what the Kremlin believes are Western attempts at power plays in the area. Russia's presence furthers its prestige in the world as well. Finally, and perhaps most importantly, Russia's leadership believes it is better to confront extremists on Syrian vice Russian soil. If not stopped in Syria, the terrorists may decide to strike along Russia's southern border. The Kremlin is aware that several thousand of its citizens and those of Central Asia have fought in Syria on the side of radical extremists and will return home. The latter's borders abut to Russia's southern and central military districts.

Support to Syria has rejuvenated Russia's military prowess, as new weaponry has been tested and new responses developed to terrorist tactics and their 21st century digital or standard warfare techniques. For Russian officers, nonstandard ways of thinking and the development of new means of military art to confront these changing situations are now the norm. For example, military art innovations such as the Syrian berm, tank carousel, free hunt, the inverted front, the strategy of limited actions, and the horseshoe method of patrolling are all

discussed below. As a result of participating in this conflict, Russia's Armed Forces are more capable of handling a variety of combat situations than they were prior to their involvement in Syria.

This paper will explain some of the military lessons that Russia has gained from its participation in the Syrian conflict. Topics covered include:

- Leader descriptions of how the experience has changed training;
- How Spetsnaz forces were used;
- How urban operations once again have taken center stage;
- How private military companies (PMCs) developed;
- How the region has served as a testbed for new weapons under a variety of climatic conditions;
- How new applications of military art developed;
- And how combat experiences have caused tactical changes as well as improvements in the capabilities of logistics, engineering, and topographic forces.

An entire study of lessons learned, not yet released, has been conducted in the General Staff, which may further reflect changes to equipment and military art in the coming months and years.

## Russian Senior Leader Comments

Defense Minister Sergey Shoygu, General Staff Chief Valery Gerasimov, and several of the leaders of military districts (Dvornikov, Lapin, Zhuravlev) who served in Syria have commented on lessons learned as a result of combat operations there. Lessons learned range from the initial deployment of forces to actual combat actions. However, it should be underscored that Western lessons learned in combat during operations in Afghanistan and Iraq are clearly comparable if they do not in fact exceed those learned by Russia.

Still, Russian operations are based on their different mindset and approach to problem-solving. This alone offers new ways of thinking for the West about the application of force and ways to defeat terrorists, not to mention new methods of fighting that the terrorists have developed in the past several years.

In 2017 Gerasimov stated that before moving into Syria in 2015, snap inspections were conducted that offered military rehearsals for the transfer of personnel and equipment over long distances. These early deployments allowed for the early establishment of logistics and airpower support to Khmeimim airfield (also translated as Hmeimim or Humaymim) in Syria, an operation carried out in secrecy. Russian air missions supported Syrian ground forces early in the operation, along with the organization of control centers. The creation of the National Defense Management Center (NDMC) in Moscow was a major achievement, as it offered real time communications and actual observation of events as they transpired on screens in real time. Gerasimov noted that the most difficult aspect of planning the operation was the “organization of collaboration with the government troops and with all the various groups.”<sup>1</sup>

Of interest in regard to the NDMC is that it has been stated to be Russia’s asymmetric answer to America’s network-centric warfare concept. The NDMC is a “computerized automated expert system for monitoring and analyzing the military-political, socioeconomic, and sociopolitical situation in Russia and the world.”<sup>2</sup> Numerous automated control systems of troops are combined into a unified system by the Akatsiya-M automated control system. The NDMC is thus a military analog of the Internet providing operational-strategic and operational command and control of the Russian Armed Forces.<sup>3</sup> Regarding tactical adjustments to confront terrorist operations, Gerasimov requested new responses to changes in the forms and methods of adversary operations. Responses were especially needed regarding suicide vehicle bombers. First there were 2-3 vehicles in an attack, but this soon expanded to the use of 7-8 of them in a single battle. For

example, when exiting Aleppo, terrorist vehicles blew up two Syrian roadblocks and formed a breach 500-700 meters wide. Each vehicle contains 300-400 kilograms of explosives or more. Terrorists use the civilian population to dig underground tunnels and communication trenches. Unmanned aerial vehicles (UAVs) became a most important asset in the fight against terrorists. Some 60-70 were in the sky every day. They created reconnaissance-strike and reconnaissance-fire loops, and were essential to artillerymen, scouts, and pilots as reconnaissance sources. In addition, several conferences designed to exchange combat experiences in Syria have transpired along with the publishing of a “whole series of manuals generalizing this experience.”<sup>4</sup>

Regarding Russian control over Syrian-force operations, Gerasimov stated that a Russian military “adviser apparatus” is in every battalion, brigade, regiment, or division. It includes an operations staff, a scout, artilleryman, engineer, interpreter, and other officials, who essentially plan combat operations. All Russian military district commanders have served in Syria and 90 percent of division directorates and over half of all regimental and brigade commanders and staffs have served there.<sup>5</sup>

At an open session of the Defense Ministry Collegium in November 2017 Gerasimov addressed the fact that Syria activated the need to master new forms of employing the Armed Forces and new methods of conducting combat operations. Above all this concerned the employment of precision-guided munitions. Their increased range and accuracy have changed approaches to deterring an opponent and have included the use of reconnaissance-strike and reconnaissance-fire loops at the tactical level. Fires were organized on a zonal principle. Long-range Kalibr sea-launched cruise missiles, air launched Kh-101 cruise missiles, and Tu-22M3 bombers were employed within a radius of 4,000 kilometers. Medium engagements up to 500 kilometers were supported by Su-24 bombers and Su-33 fighters carrying special computer subsystems. Near engagements used reconnaissance-strike loops, the

Strelets reconnaissance, command and control, and communication complex, and the Su-24M bomber. Specialized groupings (command and control entities, etc.) were established on strategic axes during annual strategic exercises, such as Zapad-2017.<sup>6</sup>

In Gerasimov's 2019 address to the Academy of Military Science, he made the following comment about Syria:

The Syrian experience has an important role for the development of strategy... carrying out tasks to defend and advance national interests outside the borders of Russian territory within the framework of the 'strategy of limited actions.' The principal implementation of this strategy is the creation of a self-sufficient grouping of troops (forces) based on one of the branches of the Armed Forces having a high degree of mobility and capable of making the greatest contribution to resolving assigned tasks. In Syria this role was given to Aerospace Forces formations.<sup>7</sup>

However, in order to implement the "strategy of limited actions," Gerasimov underscored the need to gain and maintain information superiority, prepare command and control and logistic systems, and prepare the covert deployment of the necessary groupings. Syria also introduced a new form for the employment of the Armed Forces, that being the humanitarian operation, carried out as part of post-conflict management procedures. The peaceful population was withdrawn from the conflict zone while simultaneously Russian forces were eliminating terrorists.<sup>8</sup>

In 2018, General-Colonel A. V. Dvornikov, Commander of the Southern Military District and a former commander of operations in Syria, offered several insights into the changing nature of military art. He singled out the use of "integrated" formations and the growing importance of information warfare as the most important issues he observed. He defined an integrated grouping in the following manner:

Integrated groupings are created on the basis of local resources on the principle of oppositional, national, and religious differences by means of organizing militias into irregular formations and detachments, capable of combining into larger formations with the support and guidance of special operations forces and private military companies of other states, with the employment of other state's armed forces, foreign air forces, navies, and other groupings, and civilian and nongovernmental organizations to accomplish tasks on strategic (operational) axes in a uniform information and intelligence domain.<sup>9</sup>

Using integrated groupings, an obedient government can be established in a chaotic nation where the control of resources is developed, and military bases deployed. Features that characterize integrated subunits included their integrated employment of military force; information and psychological effects; partisan methods of struggle along with classical forms of operations; the use of underground passages and tunnels; and the use of pick-up trucks to conduct raids.<sup>10</sup>

With regard to information warfare's importance, Dvornikov added that the results "from information effects can be compared to the results of a large-scale operation with the employment of troops and forces."<sup>11</sup> Information operations, in his opinion, played major roles in Russia's successes in Aleppo, Deir ez-Zor, and Ghouta. The practical importance of information confrontation, he stated, was verified.<sup>12</sup> Dvornikov stated that not only the boundaries between a state of war and a state of peace are being erased but, due to technological advancements, distinctions in missions at the strategic, operational, and tactical levels are being erased as well. Some strategic goals are now achievable at the tactical level in such cases.<sup>13</sup>

In conclusion, Dvornikov stated that “contemporary military art and the experience of conducting combat operations in local conflicts” has shown that creating and employing integrated groupings in new-type warfare is acquiring a greater urgency. Their deployment, employment, and command and control need detailed work.<sup>14</sup>

Lieutenant-General Aleksandr Lapin, Commander of the Central Military District (CMD), spoke on his Syrian experience to students at Ural Federal University in 2018. He noted that the CMD contains 49.4 percent of Russia’s area and has five time zones along with the country’s largest military industrial complex. Lapin did not address lessons learned directly. Rather, his talk was aimed at informing students of the inhumane essence of ISIS and at outlining the Russian response.

He noted how Russian forces helped peaceful residents escape from cities blockaded by guerrillas, noting the liberations of Aleppo and Deir ez-Zor. The former has been referred to as the “Syrian Stalingrad” and the latter related to the “defenders of Leningrad,” two historic World War II cities in Russia that were defended till the end against Hitler’s advancing army. The Syrian cities had been under siege for years. Of importance was the Syrian army’s efforts to restore control over the oil and gas fields, which ISIS had begun to control. Russian aircraft, Lapin stated, destroyed 396 illegal petroleum production locations and the plants for its processing along with 4,100 fuel tank trucks. Further, Lapin added that the military-political situation in the CMD appears to be worsening, since terrorist organizations are migrating to the countries of Central Asia, which border the CMD to the south. Thus, the district is focused on increasing and maintaining combat readiness, improving the state of weapons and military equipment, and increasing the reliability of command and control systems of units and subunits. Iskander-M operational-tactical missile complexes, Su-34 new generation aircraft, and other pieces of modern equipment have been added to the districts inventory.

In 2019 Western Military District Commander Colonel General Aleksandr Zhuravlev discussed the impact of Syrian operations on training. His observations are some of the best. He noted that, regarding military thought

When conducting tactical, special tactical, and command-staff exercises, we devote particular attention to unorthodox thinking, departing from established stereotypes, and using nonstandard methods when assignments are being tackled by generals and officers. To this end, they make active use of procedures such as turning movements, envelopment, infiltration, and covertly moving to the attack transition line.<sup>15</sup>

It is important to mislead the enemy and “force him to act in a way that is advantageous to us.”

<sup>16</sup> Such ideas are closely related to the definition of reflexive control, getting an opponent to do something for themselves they are actually doing for you. This thinking appears to mimic much of the input Gerasimov provided in 2017 when he noted the importance of developing

the ability of commanding generals and commanders to quickly estimate the situation; anticipate its development, make unconventional decisions, employ methods of operations and stratagem unexpected by the enemy, function actively and purposefully, achieve surprise, take a substantiated risk, and seize and hold the initiative.<sup>17</sup>

Zhuravlev stated that terrorist groups make short strikes on isolated facilities and then quickly withdraw. These strikes are effective due to their surprise and coordinated movements. Targets are usually of political or economic importance. Buildings are connected by tunnels which make it possible to covertly regroup. Lower stories of buildings are areas of long-term fire possibilities, and armor and artillery are placed close to hospitals, schools, and mosques so that Russian airstrikes can only be

carried out with great caution, if at all. Barricades and mines are employed at crossroads. Terrorists organize systems of defense using high densities of firepower and the rapid concentration of forces in urban areas. Population centers ensure that there is a lack of a clear line of contact with an opponent, where the contact line can extend both vertically and in depth. It is difficult to maneuver forces since the defender has superior knowledge of the locality and terrain. In the 2019 training period, attention focused on the use of “new, nonstandard forms and methods of operations involving integrated reconnaissance and strike and reconnaissance and fire systems, UAVs, and aviation.”<sup>18</sup>

Finally, Defense Minister Shoygu stated in 2019 that the satellite reconnaissance and navigation systems were playing a much larger role in terms of the country’s military security. Experiences in Syria showed that “for the effective employment of precision weapons detailed reconnaissance and cartographic information is essential,” which requires modern satellites that can film the Earth’s surface.<sup>19</sup>

## Spetsnaz, Urban, and Private Military Company Operations

### *Spetsnaz*

Syria is a land of deserts, mountains, and urban centers. Spetsnaz has focused its attention on the first two while motorized rifle units have developed assault teams to handle the latter. It is expected that for 21<sup>st</sup> century wars, this may become a pattern for the use of Spetsnaz. The Syrian experience has caused Russian forces to be more flexible and prepared for different types of armed conflicts in contrast to their preparation for conflict with NATO. The new battlefield environment is characterized by situations that now change quickly and must integrate numerous forces. In Syria, forces have included Russian, Iranian, Turkish, Hezbollah, Syrian, US, and others, not to mention Russia’s decision to utilize private military companies (PMCs) in Ukraine and Syria.

In the past Spetsnaz forces were used for long-range reconnaissance missions and for sabotage or assassinations. These missions remain, and based on past experiences in Afghanistan and Chechnya, considerable knowledge was accumulated as to how to operate with only a compass, a map, and a minimum of gear. But these operations have begun to recede into the background. In Syria, Spetsnaz forces operated without going past the frontline due to new reconnaissance and weapon systems, according to Russian reporting.

Spetsnaz operations are modeled for a specific situation. There are no templates or stereotyping, and officers have learned how to create new forms of combat operations. Transport vehicles, such as the Tigr armored motor vehicle, are now used to transport a team of four to the frontline and conduct a “small war there” using heavy weaponry, antitank guided missiles, and automatic grenade launchers. Using several Tigr or all-terrain vehicles simultaneously can soften a frontline and cause continuous stress in an enemy force. Team members usually consist of a reconnaissance specialist, a forward observer, and a sniper pair, and some have foreign language skills. The desert nature of Syria’s terrain also has diminished the need for ambush tactics in this conflict but increased the value of UAVs, that can fly deep into an enemy’s rear area, accelerating detection time and the guidance of strike weapons.<sup>20</sup>

### *Urban operations*

With Spetsnaz operating on the frontlines of deserts and mountains, urban operations took center stage as the principal area of armed conflict, since populated areas are where terrorists operate best. Ever since 2016, articles about urban warfare appeared about the fighting in Syria. Such conflict is complex and intense, as Russia’s earlier urban experiences in Grozny in 1994-1995 and 2000 demonstrated.

In 2016 retired Colonel V. Kiselev, who, along with I. Vorobyev, writes often on tactics on the pages of *Voennaya Mysl’* (Military Thought) and *Armeyskiy Sbornik* (Army Digest), discussed urban warfare



experiences in Syria. He noted that cities form a kind of matrix, requiring the seizure of each matrix square in order to achieve victory. Terrorists use cities as a base for replacements, supplies, and communications, and a place to hide their artillery and air defense guns. Terrorists extend their perimeter defense 100-200 meters in front of buildings, establish strongpoints, mine terrain, and use urban cover to constantly rotate fighters. Such an elaborate set up requires attackers to rely on detailed reconnaissance of the city before an attack. Kiselev noted that terrorists' underground tunnels in Syria were constructed to a depth of 3-4 meters, which often exceeded the depth of a building's foundation. Syrian forces usually encircled the city but left open one sector from which terrorists could break out at the last moment. The "triple mission" of government forces was to liberate the city quickly, inflict the least damage as possible, and achieve the fewest human losses.<sup>21</sup>

To force terrorist forces out of their positions, maneuvering assault teams became the primary means of attack. Applying some criteria from World War II's lessons learned fighting under urban conditions to the Syrian experience, Kiselev noted that each team usually included seven assault riflemen, five combat engineers, three or four light and heavy machine crews, and two antitank riflemen. The engineer teams determined if minefields were present and disarmed them when possible. Artillery or direct fire was then opened against one corner of a building, then against another to create openings for assault teams. Engineers used explosives to expand the breach, with riflemen shooting at fleeing terrorists. Tanks were employed behind the advancing assault teams, but they were used sparingly, usually only when broad maneuver was allowed.<sup>22</sup>

In 2017 P. A. Dul'nev discussed urban operations in much greater detail, to include the use of robotics, in an article for the Journal of the Academy of Military Science. He pointed out several features of such conflict:

- It is conducted at close quarters on several levels simultaneously (streets and squares, different floors of buildings, on rooftops, and underground).
- There is a lack of a continuous front, with fighting turned into a series of isolated battles.
- Since the fighting is in small areas, advancing forces are more vulnerable and require more security.<sup>23</sup>

To capture urban structures, assault groups become an important asset. However, here is where the greatest loss of personnel occurs. One way of helping to prevent such loss is to use robotic-technical complexes (RTKs), which can resolve an entire list of combat and support tasks. Assault "detachments" are battalion sized, while assault "groups" are company sized. A detachment usually contains 2-3 assault groups, a reserve, a covering group, fire support group, and an obstacle-clearing group (on occasion a demolition group may be needed). Assault groups may include the following subgroups: penetration, fire support, ground reconnaissance-fire, air reconnaissance-fire, long-range air reconnaissance, command and control, logistics, and a reserve.<sup>24</sup>

The following types of RTKs need to be developed in Dul'nev's opinion:

- Heavy RTK platforms: with tank-type armor protection, it would destroy highly protected enemy objectives and with bulldozer attachments overcome mixed minefields.
- Medium RTK platforms: with BMP-type protection, it covers flanks and holds captured regions as well as providing fire support for heavy RTKs.
- Light RTK platform 1: with a weight up to 1000 kilograms, it has "anti-small arms" protection and can destroy enemy unarmored equipment and guard and defend command posts.



- Light RTK platform 2: with a weight up to 300 kilograms, with anti-shrapnel protection, it can conduct audio-video, operational, and artillery reconnaissance of the enemy and of terrain.
- RTK transport platform: with a weight up to 100 kilograms, it can support operations by assault subunits, to include explosive materials.
- Multi-copter and airplane-type reconnaissance and recce-strike UAVs: designed to conduct reconnaissance and destroy small targets.<sup>25</sup>
- Development of unified, jam-free communication channels and data transmission
- Integration into a unified system of tactical-level command and control, and outfitting RTKs with combat information control systems and “friend-foe” equipment
- Ability for information exchange among RTKs and stability against unsanctioned software effects from an enemy force
- Provision for electromagnetic compatibility of military RTKs with other radiating objects such as radio-electronic warfare resources.<sup>27</sup>

Dul'nev then described how an attack with RTKs might unfold. Initially, a fire support operation in support of an attack would include a recce-fire subgroup of light RTKs, an air recce-strike group to destroy fire resources of the enemy (mortars, heavy machine guns, etc.) that are detected, and a long-range reconnaissance group of UAVs to provide surveillance. Artillery fire would be used to cover the advance of a penetration subgroup of heavy RTKs, which would open direct fire against an opponent. RTKs would create passages through obstacles, and a fire support subgroup of medium and light RTKs would cover the penetration subgroup's actions. The fire support subgroup would also cover the advance of remote-controlled platforms advancing with explosives toward targets, after which the fire support subgroup would sweep the objective.<sup>26</sup>

Naturally there are many problems to work out and new technologies to develop. Reconnaissance RTKs, the light platform 2, multi-copter/airplane-types, and recce-strike UAVs, cannot detect underground lines of communication or identify in detail engineer obstacles, most importantly, mixed minefields. Cooperation among subgroups is still difficult since each RTK has a control system developed under a specific type of model. General requirements that still need work include the following:

- Maximum conformity, modularity, compatibility, and integration capability into existing and future structures

Dulnev's description and RTK employment recommendations were followed with more dramatic changes to field manuals. In 2018 three authors discussed changes that needed to be made to the Ground Troops Field Manual, Part II, because the description of how to prepare for the assault of a city was outdated. With the focus of terrorist actions centered on urban areas, such a change was warranted if not demanded. Assault “detachments” consist of a reinforced motorized rifle battalion (airborne or air assault battalions or a naval infantry battalion), whose immediate mission is to seize a strongpoint or 2-3 city blocks. Assault “teams” (which appear to be company sized, like Dul'nev's “group” above) are formed in the assault detachments. The authors stated that Article 230 of the field manual should be changed to reflect the following composition of an assault team:

- 3 motorized rifle (airborne, air assault) platoons
- 1 tank platoon
- 1 flamethrower squad (three flamethrower operators)
- 1 ZSU (self-propelled air defense mount, Shilka or Tunguska)
- 1 engineer obstacle-clearing vehicle
- 1 UR 77 (mine clearing vehicle)
- 1 combat engineer platoon
- 1 medical team (physician and corpsmen)
- 1 technical support squad<sup>28</sup>

Further, a National Guard platoon could be used as a mopping-up team. The 340,000 strong National Guard, it is to be remembered, once belonged to the Interior Ministry, who was used to conduct these types of operations in the past. The platoon can also clear adjoining terrain of fighters and serve as a prisoner escort team. It is usually appropriate to have artillery subunits and combat helicopters assigned in support of assault teams, which implies that a forward air controller and artillery fire spotter should be at the assault detachment command post with the commander. Helicopters utilize precision-guided weapons, which are more precise in urban combat than artillery. The use of preliminary fire assaults, whether through helicopters or artillery, always make it easier for assault teams to achieve success.<sup>29</sup>

Once underway, teams are told to avoid movements along streets, where only fighting vehicles should advance. Initial positions are taken up some 200 meters from a building that is to be taken, and robotic devices are used for reconnaissance, detection, and even the engagement of enemy forces. Once a building is taken, a perimeter defense is organized to ensure any counterattack would not work. Nighttime seizures of buildings are more difficult. It was stressed that the first objectives to be seized are those that might entail the disruption of the entire enemy defensive system.<sup>30</sup>

Also, in 2018, military expert Anton Lavrov, writing in *Izvestiya*, noted that small attacks from various sides of a city confuses terrorists as to just where the main attack would originate. Simultaneously precise reconnaissance-strike loops should be established against seats of resistance, C2 nodes, and ammunition dumps through the use of Special Operations Forces and UAVs (this was the one article that recommended using Spetsnaz in the city). This allows forces to break up large groups into smaller ones and deprives them of the will to resist. The combination of the impact of devastating firepower and information-psychological operations helped cause the defection of 7,000 guerillas in a former operation.<sup>31</sup>

In 2019, at a specialized area known as the urban combat range in the Western Military District, a training exercise was held. The exercise employed infantry fighting vehicles, tanks, mortars, and UAVs. Anti-tank and anti-landing ambushes were also practiced.<sup>32</sup> The Eastern Military District also conducted an urban combat exercise. Subunits rehearsed the movement of a column of vehicles while escorted by a reinforced armed subunit. Servicemen rehearsed various missions, the most important being the organization of communications using open, secure, and satellite communication channels while under an electronic warfare attack from the “enemy.” The main goal of the exercise was to accumulate experience in providing stable communications using the Redut multipurpose mobile communications complex, the R-439-MD2 satellite uplink vehicle, and the R-441-OV “Liven” mobile satellite stations.<sup>33</sup>

### ***Private military companies in Syria***

The first private military company (PMC) to operate in Syria, Russian media reports, was associated with the terrorists. It was called Malhama Tactical and was composed of fighters on the side of radical Islamist groups. The company developed into a skilled marketing operation whose goal was to earn money. The company posted videos on social media and YouTube. It appeared to begin operations in Syria in 2015 and did not take part in many actual skirmishes.<sup>34</sup>

In 2015 the first revelations and interviews appeared of Russian citizens fighting for a PMC in Syria. They also were doing so to earn money, which was in short supply in many areas of the nation outside of Moscow and Saint Petersburg. Agreements were signed to keep their participation in such operations secret. The first Russian PMC was the Slavyanskiy Korpus (Slav Corps), which no longer exists. Now only the Wagner PMC and the Turan PMC exist, the latter being a Muslim battalion, according to one PMC member who chose to speak out. Generally, the equipment in the PMCs is very old, which causes many fighters to buy their own weapons.

After expenses fighters make about \$2,500 dollars a month.<sup>35</sup> The fighter offering the interview did not state to which PMC he belonged or whether such pay was sufficient for the chances he was taking.

In August 2017 the news and media website Meduza published an interview with Denis Korotkov, a journalist for the Saint Petersburg publication Fontanka. Korotkov had reported earlier on operations in Syria run by the Wagner PMC. The latter organization is led by Dmitry Utkin and appears to have financial ties to Russian oligarch Yevgeniy Prigozhin, who is a close associate of President Vladimir Putin. Korotkov is concerned that Wagner, armed with tanks, artillery, and armored personnel carriers, is not carrying out guard or security details in Syria but is fighting terrorists or, as he wrote, “our oligarchy is waging war.”<sup>36</sup> Such a group is not constrained by the law, which a nation’s military force would be, which means its operations are illegal and ethically wrong. Yet members of Wagner have been photographed with Putin and some have received government medals, which provides more than an air of Kremlin recognition/acceptance of the role Wagner is playing. Most fighters serve with Wagner for the money, but others do it for the prestige of being a military commander instead, as Korotkov notes, of finding life only offers them a chance to be, for example, a storeroom clerk.<sup>37</sup> Perhaps Russia has decided it is better not to legalize PMC activities, since this enables their most useful feature—plausible deniability—to continue to work. Russia can simply deny knowledge of what Wagner does. Russia’s Defense Ministry seldom refers to PMCs, ignoring requests for information. And it is difficult to even consider Wagner as a PMC, since it is conducting combat operations. More likely, it is an illegal armed formation.

Further, Korotkov noted that he learned (he didn’t say how) about a contract on extracting oil from Syrian territory between Syrian authorities and the Russian firm EuroPolis. There is a link, he adds, between the latter and Prigozhin. So, in addition to supporting the state and the President, Prigozhin

may well be in this for oil profits too.<sup>38</sup> Another report noted that the original reason Wagner was hired for activity in Syria was to protect oil extraction facilities,<sup>39</sup> which some believe Assad had promised to transfer to Russian investors.

In an October 2017 article in Novaya Gazeta Online, Wagner’s organization was outlined. There were four reconnaissance and assault brigades listed, with three companies in each brigade. In addition, the organization included an artillery battalion having three batteries, a tank company, a sabotage and reconnaissance company, a signal company, and support personnel. There was a statement that Wagner has 2,000 people in Syria.<sup>40</sup> It is clear why the organization is considered a true military unit and not a simple security company.

The events of early February 2018 offer some rationale for the Defense Ministry keeping its distance from PMCs. On 7 February an oil refinery built in peaceful times by the American company Conoco appeared was the focus of an attack from Wagner. However, some US, British, and representatives from other nations were at the refinery. Wagner fired on the complex and it was met with a strong response from the refinery area that included US airpower. Nearly a hundred Wagner mercenaries perished. Russian authorities have remained silent and did not denounce the strikes, perhaps indicating that they had helped plan the operation that went terribly wrong.<sup>41</sup>

## Weapons Testing

Vice Premier (and former Deputy Defense Minister) Yuriy Borisov stated that the war in Syria has offered Russia a chance to test military hardware and, in turn, reveal problems with some systems. Among the many systems tested were new aircraft, rocket launchers, numerous vehicles, and other equipment that was examined under combat conditions.<sup>42</sup> President Vladimir Putin noted that 1,200 representatives from 57 defense enterprises helped eliminate 99 percent of all defects in military equipment.<sup>43</sup> Even robotics were tested for problems.

For example, one blogosphere report noted that a “high-technology” assault had utilized Russian robots along with Syrian infantry and Russian artillery under the control of an UAV and the Andromeda-D battlefield command and control system.<sup>44</sup>

The testing has been extensive, and now covers five plus years of action in the climatic conditions of Syria. Since over 600 pieces of equipment were tested, what follows are several representative samples of the testing in 2017 and 2018, listed according to the dates they were reported.

## 2017

- A third wave of modernization of the BRDM-2 armored reconnaissance vehicle is being tested in Syria, with the installation of a closed turret with a tank machine gun in which the gunner is protected against enemy projectiles. The vehicle has good off-road capability, with retractable wheels that can negotiate deep ditches and trenches.<sup>45</sup>
- One report noted that Tochka-U tactical missiles and Iskander missiles were fired into “opposition” positions in the city of Idlib. Russia denied the accusations.<sup>46</sup>
- Russia’s leadership in Syria appears to have been provided with new generation armored suits, as one officer appeared at a press outing in heavy-duty Kevlar, also known as aramid fiber, material. It is reportedly five times stronger than steel.<sup>47</sup>
- Spetsnaz forces were seen armed with the Ak-73M3 assault rifle, with the Picatinny rail for mounted daytime sights, the Krechet Collimator sight, and the Lun night-vision monocular.<sup>48</sup>
- Problems were discovered with the onboard electronic apparatus of the latest Russian Su-34 and Su-35 aircraft and their software, as well as the compatibility of the latest weaponry with the onboard systems of long-range aviation bombers. The reliability of defense systems to protect aircraft against man-portable air-defense missile systems was also a problem needing a fix.<sup>49</sup>
- Borisov noted that the weapons tested in Syria include the Su-35S and Su-30SM fighters, Su-34 fighter-bombers, Su-24M frontline bombers, Su-25SM attack aircraft, Tu-22MZ and Tu-95MS long-range aircraft, and Ka-52, Mi-24, Mi-35, and Mi-28 helicopters. While not specifying equipment types, he noted that the latest communications, reconnaissance, space weaponry, and electronic warfare systems along with the Ratnik individual soldier gear were tested.<sup>50</sup>
- Defense Minister Shoygu noted that the T-90 tank gave an excellent account of itself in combat against terrorists.<sup>51</sup>
- Russian engineer forces deployed the PP-2005M pontoon bridge for Syrian troops to cross the Euphrates. The bridge can be erected in roughly an hour and has a carrying capacity of 120 tons.<sup>52</sup>
- Shoygu noted that Iskander tactical mobile surface-to-surface missiles, Kalibr and Kh-101 cruise missiles, and Tochka-U missiles were all used in Syria.<sup>53</sup>
- It was noted that the Solntsepek TOS-1A heavy rocket launcher has been used in the Idlib Province and earlier in Hama Province.<sup>54</sup> The Solntsepek is a heavy flamethrower system packed with a thermobaric mixture which, when detonated, creates the effect of a fuel-air explosion. It is effective on mountain terrain or against urban structures.

## 2018

- Russia’s Kh-101 cruise missile was tested and then upgraded based on local climatic conditions. The “combat-mission sequences” for Syria were adjusted.<sup>55</sup>
- The Tor-M2 air defense system was observed at the Khmeimim airport in Syria. The system can detect, track, and destroy targets at a horizontal distance of 15 kilometers and vertical distance of 10 kilometers. The system can hit four targets simultaneously. It is thought that the system will help counter UAV attacks on the airport.<sup>56</sup>



- One article surmised that the 2Sm19M1 Msta howitzer or its most recent version the 2S19M2 has been deployed to Syria. The article noted that some equipment, such as the Verba and Tor rocket air defense systems and the Uran robot tanks, were announced as having been in Syria only after their return to Russia. A similar experience is being attributed to the newest Msta howitzer.<sup>57</sup>
- The Mi-8 helicopter with the Richag-AV device, a sonar and radar active jammer, has been noted to be in Syria.<sup>58</sup>
- The Mi-28N and Mi-35 helicopters were deployed due to their multirole capabilities and ability to carry out numerous missions. They conducted “free hunting” of terrorists over Syria and much flying was done at night. Night vision systems could spot a vehicle at a range of 15 kilometers with the Mi-28N and at 6-7 kilometers with the Mi-35.<sup>59</sup>
- Servicing and maintenance procedures under combat conditions have offered mechanics ways to improve urgent aircraft repair and offer better planned services and maintenance. Special attention was paid to electronic gear. Some 68 types of aviation technology underwent battle-testing in Syria according to the official account of the Russian Ministry of Defense. Some models were modified, some dropped altogether. For example, the Mi-28NE dropped the Ataka antitank guided missile and replaced it with Khrizantema-VM 9M123M. Further, the Mi-28NE can reportedly now interface with UAVs.<sup>60</sup>
- Terrorists are making UAVs both cheaply and quickly, according to the deputy chief of the state’s Unmanned Aerial Vehicle Center, Andrey Laykovskiy. Russia has had to develop systems to counter them. Russian UAVs, on the other hand, are experiencing unexpected resistance from electronic warfare systems. Thus, there is much work to be done in this area.<sup>61</sup>
- The Glaz [eye] individual reconnaissance system has been tested in Syria. It included a high-resolution camera that can view areas where an enemy is concealed in uneven terrain or behind buildings. The system is fired 300 meters into the air with a hand-held rocket

launcher. A parachute is deployed, and the camera transmits images to a soldier’s tablet. The maximum field of view is about one-half of a square kilometer.<sup>62</sup> The Skarabey is a small robotic platform on wheels with a high-resolution video camera, a microphone, and a heat sensor. It is used in tunnel searches, since it is only 15 centimeters high and with an electronic motor it is almost noiseless.<sup>63</sup>

- The SPG-9 Kopye was tested in Syria. It is an accurate antitank grenade launcher. Less expensive than antitank weapons, it has a high rate of fire (up to six rounds per minute), has a range of one kilometer, and will soon get a night sight and more powerful ammunition.<sup>64</sup>

## Military Art

Defense Minister Sergey Shoygu, in 2017, noted that considering the trends in the military-political and strategic environments, it is essential to upgrade the theory and practice of military art. This requires out-of-the-box thinking and a capacity for finding and executing new forms and methods for employing forces.<sup>65</sup> In a late 2018 speech to military attaches in Moscow, Gerasimov stated that with the development of new types of weapons, the practical experiences gained in Syria, and the current analysis of modern military conflicts, a new impetus has been provided for the development of the theory of military art. The latter implies the creative application of thought to how equipment or forces could be used under new technological and contextual conditions. This has resulted in numerous innovations by Russia’s military in Syria. Some new concepts, however, appear to have developed independently yet may be destined for use in Syria.

For example, some UAVs self-detonate after reaching their targets while others intercept adversary UAVs with a net-throwing device that captures them and lowers them to the ground with a parachute. Artillery shells can be outfitted with smart fuses that allow the munition to detonate at a certain time and create

a cloud of thousands of shrapnel balls to disable a drone or reconnaissance quadcopter. A tactical example was an observation that, in addition to classic static defense, operations in Syria have shown that the conduct of maneuver defense is important today. Troops are countering the enemy under “the conditions of a so-called inverted front or when the front is everywhere.”<sup>66</sup> That is, troops must be prepared to confront an attack from any direction at any time. With UAVs, troops must be trained to operate in a creative fashion.<sup>67</sup> That lesson was further certified after the January 2018 terrorist attack on Russia’s Khmeimim Air Base in Syria.

During the past few years, several advances in military art in Syria have been recorded. The following examples are representative of some of these advances:

1. In Syria a “shock-resistant ball robot” was tested. It can withstand being thrown or dropped from a height of 5 meters, after which it adjusts itself to vertical. With four video cameras and a light-emitting diode (LED), a microphone, and transmitter, it can transmit images from a 360-degree view.<sup>68</sup> The ball is known as the Sfera intelligence-gathering suite (referred to as the roly-poly in the army) and is used to reconnoiter tunnels.<sup>69</sup>
2. New Syrian-based tactics included the “Syrian berm.” It is a barrier of sand or earth behind which an assault subunit takes cover. A tank group delivers fire through gaps in the obstacles, where the primary target is enemy artillery positions. Another report stated that the berm would be pushed forward by armor-plated bulldozers, allowing the attackers to slowly approach a target. If the berm was of sand, it can deflect lasers and infrared targeting systems.<sup>70</sup>
3. A Russian urban warfare tactic was to encircle and blockade a town, preventing supplies or reinforcements. Then a series of offensives were launched against the city from several directions at once. With the defense then spread thin, pockets of resistance were hammered by artillery and air strikes, sapping further any ability to resist. Swift strikes then cut the contested area into isolated pieces to break the will to resist.<sup>71</sup>
4. An interesting development that the military has discussed for two years is known as the tank carousel method. It employs tanks moving in a circle, which take turns engaging the enemy from the same firing position. As one source noted, servicemen practice “continuous fire with tanks taking turns to change firing position until the pop-up and moving targets at ranges of between 500 meters and 2500 meters are completely destroyed.”<sup>72</sup> A 2018 article noted that tanks can “conduct fire from behind a so-called ‘Syrian berm’ and execute fire according to the ‘tank carousel’ method” from subunit to full tank company strength.<sup>73</sup> In a 2017 description of the method, it was stated that while the first tank crew delivered fire in place, “the crew of the second loaded the ammunition. When the first tank rolled out for flanking fire, the second took up a position for fire from the halt.”<sup>74</sup>
5. Over the course of the next three years the Kh-25MP tactical anti-radiation missile will be converted to a Kh-25ML model. The latter will be an upgraded precision munition with a laser homing sensor and a modified control unit. It will be able to strike surface-to-air missile complexes and other ground targets such as radars and bridges. Launched from fighters, bombers, or ground attack bombers, the missile has a launch range of about 20 kilometers and a speed of 850 meters a second. The Kh-25ML missile was purportedly tested in Syria.<sup>109</sup>
6. Engineering reconnaissance missions have used the “horseshoe method” to detect explosive objects. Engineers move along both shoulders of a route with electronic warfare assets preventing radio-controlled detonations. Dogs are employed in the reconnaissance effort along with Korshun mine detectors.<sup>75</sup>

7. The Zavet control vehicle with artificial intelligence elements determines in real time areas hazardous to tanks via its automated control system, which scans the terrain and determines where problems exist. Targets are classified in terms of their immediate threat, and the system then composes a plan for destroying identified adversary equipment, with the coordinates of enemy vehicles sent to crews of antitank weapons.<sup>76</sup>

A. V. Vdovin, writing in *Voennaya Mysl'* (Military Thought) in early 2018, provided one other example of a change in military art based on experience gained in Syria. He stated that illegal armed formations (IAF) had forced four such developments, which he pointed out:

1. The method of using assets in a critical sector has changed. It no longer is about concentrating troops, but about maneuvering by fire and strikes to destroy enemy assets.
2. Capabilities at the tactical level have allowed for strategic destruction assets and highly mobile combat capabilities to shift efforts to rout an adversary to include the entire depth of the confrontation.
3. The range and precision of the fire fight are important features of contemporary tactical actions.
4. As the number of adversary assets increases, there is a growing uncertainty as to how a situation will develop. This requires that commanders respond promptly with their mobile elements to changing situations.<sup>77</sup>

Numerous projects and equipment being tested in Syria are hidden from view. However, one that Russia has discussed openly is the testing of lasers. They have been tested during cool times in the morning when a heat haze rises from the ground and then later during the day, when the air is more heated. These conditions cannot be adequately tested in Russia. This has allowed scientists to make corrections to their equipment and adapt a laser's use to different environmental conditions.<sup>78</sup> Other open source projects involving Syria discussed robots,

which included the Uran-9, a reconnaissance robot, tank-killer and mobile fire support asset; Uran-6, a mine-clearing robot; the Nerekhta, which can be produced as an artillery reconnaissance module or transport module; and the Soratnik, an unmanned armored vehicle used as a fire support or mobile relay robot or for mine-clearing terrain or evacuating wounded.<sup>79</sup> In late 2016, six Platforma-M's and four Argos robots were purportedly mobilized in Latakia, where the robots' attack was "supported by Akatsiya self-propelled guns and by Syrian soldiers."<sup>80</sup> Robots approached to within 100 meters of enemy fortifications and opened fire. Terrorists responded, exposing their positions. The self-propelled guns fired at them, their fire coordinated by Andromeda-D automated troop command and control system vehicles.<sup>81</sup>

## Tactical Changes Due to Combat Experiences

There were two articles that mentioned "tactics" in the title. The first noted that Syrian combat experiences were incorporated in the Zapad-2017 and Vostok-2018 exercises and maneuvers. At the early stages of the Syrian operation, a problem was coordinating the operations of all the elements involved (Syrian, Russian, Iranian, etc.). An integrated grouping was established thanks to an automated command and control system and communications facilities. General Dvornikov, ex-commander of the Russian grouping in Syria, stated that the following detachments collaborated: The Desert Hawks volunteer formation, the Islamic Revolution Guards Corps Militias, the Syrian Army's 5th Assault Corps, and Hezbollah and Fatimid detachments. Russia's leaders divided Syria into zones of responsibility with up to five officers responsible for coordination along tactical sectors. Air defense forces and C2 specialists were in the command group. The C2 specialists were from the reconnaissance-strike operations and planning sectors. It was noted that a "separate group handled coordination with the armed forces of the Western states, Israel, and Turkey."<sup>82</sup>

The report noted that so far 63,000 Russian military personnel, to include 434 generals, took part in operations. Further, it was stated that All personnel in command of military districts, combined-arms armies, and air and air defense armies, divisional commanders, and 95 percent of combined-arms brigade and regimental commanders served in the troop grouping in the Syrian Arab Republic along with their staffs and headquarters teams.<sup>83</sup>

This indicates that combat experience has proliferated throughout the force. Aerospace forces were stated to have made the leading contribution to the terrorists routing. Precision weaponry utilized the SVP-24 Gefest bombing and navigation system, which, when placed on outdated Su-24s, offered a “suitable platform.” Strikes were made based on information from different sources or from the use of the so-called “free hunt.” Aircraft hit targets and terrorist groupings in the outer defense, while missile troops and artillery used their assets against targets in the cities.<sup>84</sup>

Tactics include the “three-shift offensive” that allowed attacking day and night. Outstanding tactical use of “outflanking detachments” (no further description offered) was made in mountainous terrain, while armor plated bulldozers used the tactic of the “Syrian berm” in ground operations. Experience was also gained in the use of all-terrain vehicles, counter-tunnel warfare, and other methods and means of waging armed warfare.<sup>85</sup>

Other tactical lessons learned included the “mountain forest hunt” tactic, which involved sniper pairs bypassing guard posts and “eliminating” commanders of a hostile subunit. New forms and methods of warfare, and new ways of organizing battle and the interaction among artillery, aviation, and UAV subunits were explored to improve combat missions. Grenadiers are trained to engage “jihad mobiles,” those transport vehicles loaded with explosives, with RPG-7Vs or AGS-17s. Regarding humanitarian operations, military police subunits were used to seal off a populated

area, UAVs are used to find and then inform local residents of the location of escape corridors, and screening stations with sniffer dogs and teams of doctors and nurses were made available.<sup>86</sup>

Exercises are now taking advantage of various experiences the force has faced in Syria. Commanders are put in conditions that require them to analyze large amounts of information related to the activities of illegal formations. Some situations are designed to make leaders take quick, non-standard decisions and adopt the initiative, manage resources, and efficiently utilize aircraft, artillery, and other assets that are attached.<sup>87</sup> Some decisions seem odd yet have a definite purpose behind them. For example, Russian Lieutenant-General Yuri Kuznetsov issued an order to jam 2G and 3G cellular networks on the Khmeimim air base and Tartus naval base since UAVs could be guided by a signal from a specific phone number to these military facilities. One other expert noted that the decision could have been made as well to prevent information leaks.<sup>88</sup>

## Logistics, Engineer, and Topographic Support

At an assembly of the Academy of Military Science, Deputy Defense Minister D. V. Bulgakov stated that the logistic support for Russian troops in Syria was “proactive,” that is, it was deployed together with the air grouping ahead of troops. The support aided both Russian and Syrian forces. By the time combat aviation arrived on 30 September 2015, both field infrastructure (storage, living spaces, etc.) and 12,000 tons of material already had been delivered. The support system included command and control organs, and storage, industrial, and repair bases on both Russian and Syrian territory.<sup>89</sup>

Tents were not used for living arrangements, as the Afghan experience witnessed too many instances of group illnesses, such as jaundice, dysentery, and other infectious problems. Block modules were used



instead. Due to Syria's epidemiological situation, where plague and cholera occur episodically, control over soldier's food supplies was strict.<sup>90</sup> Further, Russian cooks, not Syrian employees, were used to eliminate any chances of sabotage or the poisoning of Armed Forces personnel. Special clothing for hot climates was introduced and, for the first time under combat operations, "Voentorg" (PX) facilities were used. At the port in Baniyas, which stores jet fuel reserves, three reservoirs with "an overall capacity of 45,000 cubic meters" were in service. At the basing points of Khmeimim and Tartus, warehouses for rocket-artillery weapons and aviation means were outfitted along with weapon and ammunition storage facilities.<sup>91</sup> A cargo reception and a transshipment department were established. Naturally a main task was to maintain weapons and military equipment, with more than 130 repair specialists on hand. Separate evacuation teams were established, and more than 8,500 storage batteries were serviced. Bulgakov noted that active military-technical assistance had begun in Syria in 2012, to include mid-size and capital repair of equipment.<sup>92</sup>

With regard to engineering efforts, as of February 2018, Russian engineer troops in Syria had reportedly cleared mines from 6,500 hectares of territory, 1,500 kilometers of road, and more than 17,000 buildings and destroyed 105,000 explosive devices. The Uran-6 multifunctional mine clearing robotic system, the Skarabey platform that is sent into tunnels, the OKO-2 ground-penetrating radars, radio-controlled device blockers, and the Listva remote-controlled mine clearing vehicle, fitted with a broadband electromagnetic pulse generator, are equipment that is replacing sappers who in the past inspected patrol routes. Russia has organized a mine clearing center in Syria with eight Russian instructors who have graduated 600 Syrian sappers.<sup>93</sup>

The journal *Armeyskiy Sbornik* (Army Digest) noted that Syria contained special features for engineer support. Many areas were isolated, some were inaccessible, and others contained poorly developed

road networks. Even the simplest structures utilized filled gabions, as the terrain was often rocky or contained areas which were inaccessible to earth-moving equipment. An important task was to create passages within mine fields. The detachment also included a canine subunit and Uran-6 mobile robotic mine-clearing complex. Once mines were destroyed or neutralized subunits restored infrastructure, electric power, and water supplies where they had been disrupted.<sup>94</sup>

Finally, with regard to topographic support, electronic maps of major cities were provided and special maps and photographic documents of Syrian terrain and territory were "updated, issued, and transferred to the Group of Forces."<sup>95</sup> A new technology was

developed to ensure that work on topographic maps included reductions in the time required to get the information to the troops. The accuracy of geospatial information has increased the planning and employment of weapons systems in Syria.<sup>96</sup>

## A Russian Military Commentator's October 2019 Assessment

Aleksei Ramm is a military commentator for the Russian paper *Izvestia*. His commentary on various elements of the Russian Armed Forces has been noteworthy for its comprehensive nature and clear explanations of new developments. He recently wrote an interesting paper on Russia's Army for the Center for Naval Analysis, which contained several highlights of Russian military activities in Syria. These key points are listed in bullet form below:

- The Syrian campaign [author's comment: the word campaign was used on numerous occasions] was influential in developing Russia's Command, Control, Communications, Computer, Intelligence, and Satellites (C3-C4IS) and Unmanned Aerial System (UAS) concepts.<sup>97</sup>

- Successful leadership in Syria has led to the promotions of Colonel-General Sergey Surovikin to be the Commander-in-Chief of the Aerospace Forces and there has been word that Lieutenant-General Oleg Makarevich may be appointed Commander-in-Chief of the Navy, making this a time of “Army occupation” in key posts due to the Syrian experiences of Army leaders, according to Ramm.<sup>98</sup>
- Russia’s Syrian contingent was a joint team comprised of Aerospace Force and Navy elements, combined arms and electronic warfare formations, the marines, airborne troops, and so on, with the team being either operational or strategic at different stages of the campaign.<sup>99</sup>
- The Command Brigade in Syria provided C4I and combat service support to the army staff, and included seven battalions (radio-relay, satellite, and other communications) and three independent companies (which used high-bandwidth wireless data networks).<sup>100</sup>
- Ramm offered, from his perspective, how the Syrian experience has affected the organization of a Combined Arms Army. He believes it now includes the following components: Artillery Brigade; Rocket Brigade; Antiaircraft Brigade; Recon Brigade; Signal Brigade; Mechanized Rifle Brigade; Special Forces Company; Chemical Regiment; ECM Battalion, and an Engineering Regiment.<sup>101</sup>
- The Nuclear, Biological, and Chemical Defense (NBC) Regiment now has a battery of TOS-1A Soltzenek heavy flamethrowers which reinforce advancing troops as part of maneuver formations.<sup>102</sup> This has upgraded the combat capabilities of units in Syria and provides forces with thermobaric capabilities.
- The Engineer Regiment has deactivated battalions using heavy engineering and road-building equipment and replaced them with assault engineer companies that assault fortified enemy positions buildings and man-made facilities.<sup>103</sup> There was also an increase in the number of personnel involved in demining and mine clearance in Syria.<sup>104</sup> This reinforces the focus on urban operations mentioned in other parts of the discussion above, indicating the forces ability to shift requirements according to the needs of troops on the ground.
- The Electronic Warfare Battalions and the Independent Military Intelligence Brigade are both classified units that have been used in Syria. The latter appears tasked with reconnaissance of the enemy rear while Special Operation Troops appear more likely to be involved in assault operations.<sup>105</sup>
- The Syrian campaign has been a real testbed for the ESU TZ, a modernized tactical-level C4 which was integrated with the C4s of other services and reportedly helped establish effective interaction between the Army and Aerospace Force. Campaign videos also show soldiers operating Strelets terminals for forward air control. The system is supposedly used in conjunction with the ESU TZ.<sup>106</sup> The Syrian campaign revealed that the UASs and Strelets have become the key target information providers.<sup>107</sup> The Strelets even interacts with the Tu-22M3 weapon-aiming pod known as the Gefest.<sup>108</sup>
- A limited number of Akveduk communication systems were deployed in Syria along with the Azart-P system.<sup>109</sup> The R-168 Akveduk is a fifth-generation tactical radio system and is the primary tactical radio for the Ground Forces and Airborne units. It provides digital data transmission and resilience against jamming. The Azart-P is a sixth-generation tactical radio and has digital data transmission encryption and electronic warfare resilience capabilities. It has a range of 4 kilometers.<sup>110</sup>
- Syrian lessons learned have included transitioning communication brigades and battalions to a modular organization. First tested in the Zapad-2017 exercise, the modules are probably company sized detachments that use satellite, radio relay, and other communication equipment.<sup>111</sup> The Defense Ministry tested in Syria a move toward the so-called “single information space,” where command posts are united into a single network controlling battlefield developments while allowing users instant access to data streams.<sup>112</sup> \

Near the end of Ramm's paper he wrote a section titled "Lessons Learned in Syria in the Army Evolution." He noted that Defense Minister Sergey Shoygu has called for integrating Syrian experiences into combat training. Now, when exercises are discussed in journals, they are often stating that the exercise is using some of the lessons learned in Syria. New tactical techniques include close quarter combat, single-tank combat employment, and anti-tank guided missile (ATGM) counteractions, which were integrated into Army field manuals at the end of 2017. However, Ramm notes, the Defense Ministry has not published official data on the Army's involvement in the campaign other than to mention that a few artillery batteries (122-mm D-30 and 152-mm MSTA-B) have been involved. A detachment of BTR-82s and T-90A tanks have been noted in photos, probably serving as protection for artillery. Ramm noted that combined arms units are known to operate as task forces, but that was the extent of his comments on Army forces.<sup>113</sup> He also stated that the prime campaign result was the experience that battalion, regiment (brigade), and division army officers gained in the distributed command system. A reconnaissance and fire contour (RFC) concept was tested and "warfare was conducted by mission-tailored task forces and combat teams, not the formation of strict military hierarchy."<sup>114</sup> This application of task forces conforms to the concept in Russian military thought that there should be no stereotyping.

The method of promoting officers to the position of Military District Commander apparently has changed as a result of the Syrian experience. It was based on a nominee's appointment to specific positions in the General Staff and other places, Ramm notes. Now, however, promotions were granted on experience attained in Syria and success in the command of combined and joint teams. This concept applies to all current district commanders<sup>115</sup> except the Northern Fleet. Finally, Ramm noted that combined arms firepower has improved. Divisions have long-range antiaircraft and artillery systems, and pocket-sized Iskanders can engage targets up to 100 kilometers away. Targets

within 500 kilometers, due to the capabilities of the ESU TZ, Strelets, and UASs, can be defeated in real time with precision strikes. The all-around layered air defense can engage targets at a distance of over 70 kilometers.<sup>116</sup> Kornet and Kornet-D ATGMs, tank-guided missiles, and the Khризantema long-range missile defense system can eliminate vehicles at a distance of up to 5 kilometers.<sup>117</sup>

## Conclusions

Russian military assistance has enabled Syria to turn the tide of defeat into first a stalemate and then in the direction of success. While a final result has yet to be completely attained, Russia, along with its compatriots from Syria, Iran, Hezbollah, and elsewhere, is close to achieving that goal. The Economist noted the following positives and negatives of Russian operations thus far:

Russia is elated by the outcome of its intervention. It saved Mr. Assad at relatively small cost to itself, became the kingmaker in Syria, and returned as a powerbroker in the Middle East for the first time since the dissolution of the Soviet Union.<sup>118</sup>

Russia is ensnared by its local ally. Mr. Assad is strong enough to resist Russian entreaties to make political concessions, but too weak to be threatened without risking his collapse. Then there are more catastrophic risks: a confrontation with Turkey over Idlib, say, or a Turkish invasion to push back Syrian Kurds, or even a war between Israel and Iran. A surprising number of Russian experts worry about the venture 'collapsing like a house of cards.'<sup>119</sup>

For Russia, this experience has proven to be invaluable. The battlefield provided Russia with much latitude (and secrecy) in choosing how to conduct operations, since the only first-hand commentary of the conflict came from Russian and Syrian controlled media. As a result, Russia has had close

to a free hand in deciding the tempo and context of operations. It has, however, had to learn to work closely with a set of friends that differ 180 degrees from their Warsaw Pact allies of the Cold War era. A local power (Syria), a more formidable regional power (Iran), a terrorist group (Hezbollah), and others had to be integrated into a working coalition, which had issues. Further, it has been forced to work with the United States in regard to air and special operations.

Over the course of the conflict's four-year history Russia has tested a host of new weapons and new concepts and has trained a number of leaders in contemporary warfare outside its borders. New methods of employing Spetsnaz forces and new ways of utilizing private military companies were explored. The Syrian experience has demonstrated to Russian officers that terrorists will be utilizing urban centers as their main base. It is a very difficult proposition to extract extremists from such shelters while trying simultaneously not to harm the local population. The use of robotics during urban operations and learning ways to use radio-electronic equipment or information technologies to disorganize enemy signals was another area of learning, as was the security and defense of airfields due to the UAV attacks that terrorists carried out against them. The simultaneous requirements of conducting such combat operations while preparing emergency evacuation routes and humanitarian assistance for locals stretched the military thin.

Russia is in the process of inculcating these lessons learned into the force through conferences, round tables, and new manuals. The experiences gained in Syria are not the only lessons learned, however. Russian testing has taken into consideration how new weaponry might confront not only terrorist but also Western equipment as well. This includes ways to counter Western uses of UAVs and ways to disorganize Western reliance on global positioning services. Russia plans to have 67 percent of its military equipment modernized by the end of 2019. None of the world's other armies are capable of reaching this figure, according to Defense Minister Shoygu.<sup>120</sup> Russia is developing new weapons and

systems as well. For example, under development are a unique aerial bomb known as Drel' that can destroy objects of varying degrees of protection. The Pantsir surface-to-air missile system is being modified to hit low-speed maneuvering targets.<sup>121</sup>

Overall, Russia's Armed Forces displayed a much higher degree of competency than they did during their incursion into Georgia and they have not faced the sanctions that resulted from their operations in Ukraine and Crimea. They are again a force with which to be reckoned.



## Author

**Timothy Thomas** is MITRE's EUCOM Information Operations Domain Specialist. He works with Fort Eustis and the Army's Future's Command as well on Russian and Chinese military issues, such as military thought, future war capabilities, and the information weapons that each country is developing. He is a former LTC in the US Army and is the author of eight books on Russian and Chinese military affairs.

## About the Center for Technology & National Security

MITRE launched the [Center for Technology and National Security](#) (CTNS) to provide national security leaders with the data-driven analysis and technologically informed insights needed to succeed in today's hyper-competitive strategic environment. The Center aims to help policymakers better navigate a dynamic, rapidly evolving technology landscape in order to advance U.S. interests and strengthen national security. As a part of the not-for-profit, non-partisan MITRE Corporation, CTNS is built on the experience and expertise of thousands of our nation's most respected scientific and engineering minds. The Center brings together experts and leading authorities from government, academia, industry, media, and policy institutes to drive informed discussion in this era of unprecedented technological change.

MITRE's mission-driven teams are dedicated to solving problems for a safer world. Through our federally funded R&D centers and public-private partnerships, we work across government to tackle challenges to the safety, stability, and well-being of our nation.

© 2020 The MITRE Corporation. All Rights Reserved.  
Approved for Public Release; Distribution Unlimited. #19-3483

Sponsor: USEUCOM  
Contract No.: W56KGU-17-C-0010

The views, opinions and/or findings contained in this report are those of The MITRE Corporation and should not be construed as an official government position, policy, or decision, unless designated by other documentation.

This technical data was produced for the U.S. Government under Contract No. W56KGU- 16-C-0010, and is subject to the Rights in Technical Data-Noncommercial Items clause at DFARS 252.227-7013 (NOV 1995).

## Footnotes

- 1 Viktor Baranets, interview with Valery Gerasimov, “Russian Armed Forces Chief of the General Staff Army General Valery Gerasimov: ‘We Broke the Backbone of Terrorism’s Shock Forces,’” Komsomolskaya Pravda Online, 27 December 2017.
- 2 Aleksey Leonov, “Our Asymmetric Response to America’s Netcentric Warfare,” Yezhenedelnik Zvezda, 16 October 2018.
- 3 Ibid.
- 4 Ibid.
- 5 Baranets.
- 6 No author provided, “Speech by General of the Army Valery Gerasimov...at an open session of the Russian Federation Defense Ministry Collegium,” Ministry of Defense of the Russian Federation, 7 November 2017.
- 7 V. V. Gerasimov, “The Development of Military Strategy under Contemporary Conditions. Tasks for Military Science,” Vestnik Akademii Voennykh Nauk (Journal of the Academy of Military Science), No. 2 2019, p. 9.
- 8 Ibid.
- 9 A. V. Dvornikov, “Forms of the Combat Employment and Organization of the Command and Control of Integrated Armed Force Groupings on a Theater of Military Operations,” Vestnik Akademii Voennykh Nauk (Journal of the Academy of Military Science), No. 2 2018, p. 38.
- 10 Ibid., pp. 38-39.
- 11 Ibid., p. 40.
- 12 Ibid.
- 13 Ibid., p. 38.
- 14 Ibid., p. 41.
- 15 Oleg Pochinok, interview with Aleksandr Zhuravlev, “Taking Account of Syrian Experience in Upcoming Summer Training Period, Maximum Use Will Be Made of It During Training of Troops,” Krasnaya Zvezda Online (Red Star Online), 27 May 2019.
- 16 Ibid.
- 17 No author provided, “Speech by General of the Army Valery Gerasimov...at an open session of the Russian Federation Defense Ministry Collegium,” Ministry of Defense of the Russian Federation, 7 November 2017.
- 18 Pochinok.
- 19 No author provided, “Russian Defense Minister Holds Conference Call with Ranking Personnel of the Armed Forces,” Ministry of Defense of the Russian Federation (in English), 5 February 2019.
- 20 Roman Kretsul and Aleksey Ramm, “Combat Obstacles: How the Syrian Campaign Changed Reconnaissance. The Hunt for Snipers, the ‘Small War,’ and Other Missions, which Russian Special Subunits Are Accomplishing in the Syrian Arab Republic,” Izvestiya Online, 24 October 2018.
- 21 V. Kiselev, “War for Cities in Fighting Terrorists,” Armeyskiy Sbornik (Army Digest), December 2016, pp. 5-13.
- 22 Ibid.

- 23 P. A. Dul'nev, "The Employment of Robotic Complexes During the Assault of a Town (Fortified Area)," *Vestnik Akademii Voennykh Nauk (Journal of the Academy of Military Science)*, No. 3 2017, p. 27.
- 24 *Ibid.*, pp. 29-30.
- 25 *Ibid.*, p. 31.
- 26 *Ibid.*, p. 30.
- 27 *Ibid.*, pp. 31-32.
- 28 V. Podgorodetskiy, V. Litvinenko, and P. Sergeev, "The Assault Team: Features of Combat Operations of Assault Teams in Urbanized Areas," *Armeyskiy Sbornik (Army Digest)*, November 2018, pp. 19-25.
- 29 *Ibid.*
- 30 *Ibid.*
- 31 Anton Lavrov, "A Polite Combat Assault: On the Advantages of Russian Warfare Tactics, Which Were Developed in Syria," *Izvestiya Online*, 3 August 2018.
- 32 No author provided, "Servicemen of the Western Military District Guards Tank Army Rehearse Holding Population Centers with Fighting within the Framework of a Muster with Battalion Commanders," Ministry of Defense of the Russian Federation, 21 February 2019.
- 33 No author provided, "Eastern Military District Signals Personnel in Buryatia Repelled an Attack of Notional Saboteurs against a Vehicle Column in Urban Conditions," Ministry of Defense of the Russian Federation, 20 April 2019.
- 34 Aleksandr Atasuntsev, "How 'Russian Mercenaries' Sold Syrian Jihad; Story of the First Russian-Speaking Private Military Company Operating for Terrorists in Syria," *Gazeta.ru*, 12 March 2017.
- 35 Yekaterina Sazhneva interview with a member of a Russian PMC, "Revelation of a Fighter in a Private Military Company in Syria: 'The Weapons Situation Is a Disaster.' Blood and Money in the 'Sandpit'," *Moscow MK Online*, 10 October 2017.
- 36 Yevgeniy Berg interview with Denis Korotkov, "People Think It Doesn't Affect Them. But It Affects Everyone," *Meduza (in English)*, 30 August 2017.
- 37 *Ibid.*
- 38 *Ibid.*
- 39 Irek Murtazin, "Islamists Defeated for the Elections. Why Military Units and Private Military Companies' Combatants So Far Do Not Intend to Leave Syria," *Novaya Gazeta Online*, 7 December 2017.
- 40 Irek Murtazin, "The Syrian Campaign of the Mysterious 'Wagner Private Military Company': Numerical Strength and Weaponry and Key Operations and Conflict in Defense Ministry Top Echelons," *Novaya Gazeta Online*, 9 October 2017.
- 41 Pavel Felgengauer, "Rout," *Novaya Gazeta Online*, 21 February 2018.
- 42 No author provided, "Syrian Proving Ground: How the War Helped to Break in Russian Weapons. Yuriy Borisov Talks About the Employment of Russian Military Hardware in Syria," *Gazeta.Ru*, 17 December 2018.
- 43 No author or title provided, *Interfax (in English)*, 30 January 2018.
- 44 Nikita Volchenko, "Syria Has Become a Test Range for Testing the Latest Developments of Russia's Defense Industrial Complex," *Vzglyad Online*, 3 February 2017.

- 45 Dmitriy Grigoryev, “Russian Armored Recon Vehicles Have Appeared in Syria,” Rossiyskaya Gazeta Online, 3 February 2017.
- 46 No author or title provided, Interfax-AVN Online, 9 February 2017.
- 47 Oleg Koryakin, “Russian Officers in Syria Wear Super-Armor,” Rossiyskaya Gazeta Online, 6 March 2017.
- 48 No author or title provided, Interfax (in English), 9 March 2017.
- 49 No author or title provided, Vedomosti Online, 24 May 2017.
- 50 No author or title provided, Interfax (in English), 24 May 2017.
- 51 Yuriy Gavrilov, “Shoygu Assembled the Generals. The Military is Collating the Syrian Experience,” Rossiyskaya Gazeta Online, 18 July 2017.
- 52 Pavel Ivanov, “Negotiating Rivers. NATO Armies Losing the ‘War of the Bridges’,” Voyenno-Promyshlennyy Kuryer (Military-Industrial Courier), 11 October 2017, p. 1.
- 53 No author or title provided, Interfax, 22 December 2017.
- 54 No author or title provided, Lenta.ru, 30 December 2017.
- 55 No author provided, “Kh-101 Air-Based Cruise Missile Improved after Syria Campaign—Designer,” Interfax (in English), 24 January 2018.
- 56 No author provided, “Cameras Detect New Air Defense System in Syria,” Sputnik, 27 April 2018.
- 57 No author provided, “Syrian Mystery: Msta Howitzer Present or Absent,” Sputnik, 10 May 2018.
- 58 No author provided, “Secret Syrian Helicopters Capable of ‘Frying Enemy Electronics,’” Sputnik, 25 July 2018.
- 59 Nikolay Grishchenko, “Pilot Discusses Mi-28’s ‘Free Hunting’ of Fighters in Syria,” Rossiyskaya Gazeta Online, 17 August 2018.
- 60 Dmitriy Yurov, “Okhotnik Ultimatum: The Capabilities of the New Mi-28NE Attack Helicopter,” Zvezda TV Online, 24 August 2018.
- 61 Roman Kretsul and Aleksey Ramm, interview with Andrey Laykovskiy, “Lieutenant-Colonel Andrey Laykovskiy, on the Use of UAVs in Syria, the Features of Operator Training, and New Equipment for the Armed Forces,” Izvestiya Online, 12 October 2018.
- 62 Aleksey Ivanov, “Russian Soldiers to be Equipped with Rocket ‘Eye,’” Rossiyskaya Gazeta Online, 28 January 2019.
- 63 Yuriy Gavrilov, “The Robot Does Not Fear War: Many Unmanned Combat Assets Have Undergone Battle-Hardening in Syria,” Rossiyskaya Gazeta Online, 20 August 2018.
- 64 Nikolay Surkov and Aleksey Ramm, “‘Polite People’ Will Be Armed with Kopye; Special Units Will Get Long-Range Antitank Grenade Launchers,” Izvestiya Online, 8 February 2018.
- 65 Yuriy Gavrilov, “Shoygu Assembled the Generals. The Military is Collating the Syrian Experience,” Rossiyskaya Gazeta Online, 18 July 2017.
- 66 Taras Rusyk, “The Combat Priorities of the Siberian Brigades,” Krasnaya Zvezda Online (Red Star Online), 15 May 2019.
- 67 Ibid.



- 68 Nikolay Grishchenko, "Russia to Develop Spy Grenades with Video Surveillance," Rossiyskaya Gazeta Online, 6 February 2018.
- 69 Aleksandr Khoklov, "Tactical Innovations: Why the 'Tank Carousel' Behind the 'Syrian Parapet' is So Scary for the Enemy," Yezhenedelnik Zvezda, 14 December 2018.
- 70 Ibid.
- 71 Anton Lavrov, "Outcomes of the Russian Military Campaign in Syria," Moscow Defense Brief, No. 3 2018, p. 14.
- 72 Website of the Ministry of Defense of the Russian Federation (in English), 30 January 2019.
- 73 Andrey Sergeevich Ivanayev, interviewed by Viktor Siryk, "Whoever Is Given More Has More Responsibility," Zvezda TV Online, 24 July 2018.
- 74 Website of the Ministry of Defense of the Russian Federation, 15 September 2017.
- 75 No author provided, "Combat Engineers from South Ossetia Military Base Perform Engineering Reconnaissance Using the 'Horseshoe' Method," Ministry of Defense of the Russian Federation, 7 August 2018.
- 76 Aleksandr Kruglov and Aleksey Ramm, "Defense Ministry Has Adopted the Zavet; Combat Control Vehicle Will Amalgamate Antitank Missile Systems into a Single Fist," Izvestiya Online, 6 February 2018.
- 77 A. V. Vdovin, "Adaptive Approach to the Use of Forces and Means for the Fight with Terrorists Based on the Experience of Armed Conflict Outside Russia," Voennaya Mysl' (Military Thought), No. 5 2018, pp. 35-36.
- 78 Ivan Safronov interview with Boris Viktorovich Obnosov, "The Experience of Actual Combat Operations is Simply Invaluable," Kommersant Online, 26 September 2016.
- 79 Gavrilov.
- 80 Vladimir Tuchkov, "Russian Robots in Syria: Argo and Platforma-M Strike, Akatsiya Finishes Off. Kalashnikov's Developments Will Soon Strengthen the Combat Might of 'Smart Iron,'" Svobodnaya Pressa, 14 May 2017.
- 81 Ibid.
- 82 Aleksey Abaturov, "'Syrian Berm' and 'Free Hunt': Combat Experience We Have Gained in Syria," Yezhenedelnik Zvezda, 2 October 2018.
- 83 Ibid.
- 84 Ibid.
- 85 Ibid.
- 86 Aleksandr Khokhlov, "Tactical Innovations: Why the 'Tank Carousel' Behind the 'Syrian Parapet' Is So Scary for the Enemy," Yezhenedelnik Zvezda, 14 December 2018.
- 87 Yuriy Borodin, "The Syrian Experience Helps in Both Attack and Defense," Krasnaya Zvezda Online (Red Star Online), 24 August 2018.
- 88 No author or title provided, RosBiznesKonsalting, 20 February 2018.
- 89 D. V. Bulgakov, "Features of the Logistics Support of the Russian Grouping of Troops (Forces) in the Syrian Arab Republic," Vestnik Akademii Voennykh Nauk (Journal of the Academy of Military Science), No. 2 2018, pp. 31-32.
- 90 Ibid., p. 33.
- 91 Ibid., pp. 34-35.

- 92 Ibid., p. 35.
- 93 Aleksey Abaturov, “Skarabey, Listva, and Sfera. What Brand-New Technical Systems Are Being Utilized by Russian Sappers,” Zvezda TV Online, 21 February 2018.
- 94 M. Konyshv and O. Kosteneva, “Syria Specifics of the Use of Gabions,” Armeyskiy Sbornik Online (Army Digest), 31 May 2019.
- 95 Aleksandr Aleksandrov, “Military Topography ‘Digitized’: On 8 February It Will Be 205 Years from the Day the Russian Federation Armed Forces Topographic Service Was Formed,” Ministry of Defense of the Russian Federation, 8 February 2017.
- 96 Ibid.
- 97 Aleksei Ramm, “The Russian Army: Organization and Modernization,” CNA Analysis and Solutions, October 2019, p. 2.
- 98 Ibid.
- 99 Ibid., p. 7. The joint team is either temporary or permanent, and is a larger formation activated on the basis of a combined arms army. It leverages army assets and those of the other branches. It usually has several squadrons of attack and transport helicopters and tactical aviation (p. 5). Assets included the reintroduction of heavy artillery batteries (240-mm 2S4 Tulpan mortars and the 2S7 Pion/Malka self-propelled cannons and a UAV company) (p. 14).
- 100 Ibid., p. 13.
- 101 Ibid.
- 102 Ibid., p. 15.
- 103 Ibid., p. 16.
- 104 Ibid., p. 17.
- 105 Ibid.
- 106 Ibid., pp. 30-31.
- 107 Ibid., p. 41.
- 108 Ibid., p. 43.
- 109 Ibid., p. 33.
- 110 See Operational Environment Watch (OE Watch), February 2018, pp. 2-3 at <https://community.apan.org/wg/tradoc-g2/fmso/m/oe-watch-past-issues/266059/download>
- 111 Aleksei Ramm, “The Russian Army: Organization and Modernization,” p. 35.
- 112 Ibid., p. 36.
- 113 Ibid., p. 45-46.
- 114 Ibid., p. 46.
- 115 Ibid., p. 47.
- 116 Ibid., pp. 48-49.
- 117 Ibid., p. 50.

118 No author provided, "Putin's Road to Damascus," *The Economist*, 18 May 2019, p. 40.

119 *Ibid.*, p. 42.

120 No author or title provided, *Interfax* (in English), 24 December 2018.

121 No author or title provided, *RIA Novosti*, 26 December 2018.

**MITRE**

MITRE Center for Technology and National Security