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Russia's Conduct of War: How and with What Assets

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RUSSIA'S CONDUCT OF WAR:
HOW AND WITH WHAT ASSETS

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Introduction

This product is designed to offer analysts and leaders a summation of some of the most important concepts and theories influencing how and with what assets Russia might conduct war. It is divided into three sections as follows:

THE LEADER'S GUIDANCE: The analysis begins with a look at recent guidance from Russia's Chief of the General Staff, Valery Gerasimov.

RUSSIA'S MILITARY HERITAGE BROUGHT FORWARD: It then proceeds to examine how key elements of Russia's military heritage, to include the initial period of war, forecasting, disorganization, military art, and reconnaissance-fire and -strike issues, among others, have been affected by new weaponry and updated to continue to shape Russia's current views.

FUTURE DEVELOPMENTS FOR MILITARY ADVANTAGE: The analysis ends with a look at Russian hypersonic weaponry, space developments, robotics, artificial intelligence, quantum computing, and nonlethal innovations.

The 12 subsections represent something "new" in several ways. First both military and nonmilitary elements are current components of thought, according to General Staff Chief Valery Gerasimov, whose 2013 speech at the Academy of Military Science stated that nonmilitary issues will be conducted over military ones by a ratio of 4:1. In recent speeches he offered how strategy and operational art are to be deciphered in this new era of the conduct of military affairs.

Second, new weaponry offers new ways to implement some of the permanent vectors of Russian military thought, such as the conduct of the initial period of war with cyber capabilities, indicating that the nation striking first will gain the initiative in conflict; the forecasting of new future wars based on the extended use of space satellites to monitor and influence conflict; and the changing nature of military art brought about by new technologies that encourage new methods of warfare and enhance risk-taking, among other thought elements.

Third, there is a host of new Russian weaponry, first highlighted in Russian President Vladimir Putin's March 2018 speech, which has since been supplemented with even newer variants. Included are not only hypersonic, artificial intelligence, quantum, robotic, and space warfare developments but also those of the nonlethal kind.

Each subsection is limited to 3-4 pages to offer a summation of important Russian military conflict considerations. The paper is lengthy. Its division into thirteen subsections allows for the absorption of small sections one at a time. Only Russian sources are used in the analysis. Important concepts are highlighted in **bold**.

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THE LEADER'S GUIDANCE

General of the Army Valery Gerasimov (front), chief of the General Staff of the Russian Armed Forces and Russia's first deputy defense minister, and Nikolai Pankov (left), Russia's deputy defense minister, attend a reception 9 May 2015 marking the seventieth anniversary of the victory over Nazi Germany in the Great Patriotic War of 1941–1945 at the Kremlin in Moscow. (Photo by Alexei Nikolsky, Russian presidential press service/ TASS/Alamy Live News)

Russia's Forms and Methods of Military Operations

The Implementers of Concepts

Lt. Col. Timothy Thomas, U.S. Army, Retired

30 May-June 2018 MILITARY REVIEW

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[1] Image of Russian General Staff Chief Valery Gerasimov is from this author's article in *Military Review*, May-June 2018, p. 30.

RUSSIA'S NEW WAY OF WAR: PART ONE
WHAT DID GENERAL STAFF CHIEF GERASIMOV TELL US ABOUT STRATEGY?

In 2019, during a presentation at the Russian Academy of Military Science, General Staff Chief Valery Gerasimov summarized his presentation on strategy with the following statement:

> The main thing for military science today is the cutting-edge, continuous, goal-oriented research to determine the possible nature of military conflicts, develop a system of forms and methods of operation of both a military and nonmilitary nature, and determine trends for the development of weapons and military equipment systems.[2]

Six years ago, in a 2013 speech at the Academy of Military Science, Gerasimov had noted that nonmilitary measures are now being implemented over military ones by a ratio of 4:1. This and other basic elements of Russian military thought have been expressed over and over in military publications.

Gerasimov defined strategy as a "system of knowledge and actions on preventing, preparing for, and conducting war."[3] He offered some concrete expressions in his presentation as to how Russia might conduct war, but his focus was on preparing for it rather than preventing it. Military force is to be used when nonmilitary efforts fail, he noted, and there continues to be a search for efficient and effective strategies for waging war against new actors (gangs, private military companies, self-proclaimed 'quasi-states') that have changed how wars are being fought. In fact, Gerasimov notes, there are now new types of warfare (without naming them).[4] He does, however, site new spheres of confrontation, such as the comprehensive employment of political, economic, information, and other nonmilitary measures that are implemented with a reliance on military force.[5] He goes on to list two new strategies.

Russia has been developing conceptual approaches to confront actions of probable enemies. The basis of this response, a key part of Russia's new way of war, is what Gerasimov termed the "**strategy of active defense**," which "envisions the conduct of a set of measures for the **preemptive** neutralization of threats to the security of the state"[6] in order to stay one step ahead of an opponent. A bit later Gerasimov again used the term **preempt**, noting that it is necessary to preempt opponents with preventive measures, identify his vulnerable areas, and create threats that warn of unacceptable damage. This ensures seizure of the strategic initiative and its maintenance. Validating nuclear and nonnuclear deterrence measures is a task in strategy's development.[7] Also,

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[2] V. V. Gerasimov, "The Development of Military Strategy under Contemporary Conditions. Tasks for Military Science," *Vestnik Akademiy Voennykh Nauk (Journal of the Academy of Military Science)*, 2019, No. 2, p. 11. The author would like to thank Dr. Harold Orenstein for his translation of this presentation.
[3] Ibid., p. 6.
[4] Ibid.
[5] Ibid., p. 7.
[6] Ibid.
[7] Ibid., p. 8.

of note was Gerasimov's comment that the foremost thought in the Armed Forces employment is to enhance strategic deterrence.[8]

Russia's Syrian experience identified a new field in which to carry out tasks, that being to defend and advance national interests outside Russian borders using a "**strategy of limited actions"** where a self-sufficient grouping of forces with high mobility is created (Aerospace Force in Syria). The strategy is dependent on gaining information superiority, command, control, and logistic readiness, and the covert deployment of the grouping. Seven **trends** were identified for defending and advancing national interests outside Russia's borders. They were:

- Creating a **unified system of integrated** intelligence, destruction, and command and control forces and means on the basis of contemporary information and telecommunications technologies to detect and transmit target information for selective **strikes against critically important targets** (Strategic Operations to Destroy Infrastructure Targets or SODCIT?) in near-real time by strategic and operational-tactical nonnuclear weapons, with a goal of validating the **holistic destruction** of an opponent.
- The large-scale employment of **robotic complexes**, first and foremost UAVs. Air, ground, and maritime robotic employment is underway.
- The use of **radio-electronic warfare** forces to counter UAV employments and high-tech weaponry.[9]
- The need to **create a territorial defense system** to thwart attempts to destabilize domestic security with diversionary and sabotage actions. Especially urgent are actions for a comprehensive system for protecting critically important components of the state infrastructure during direct threats of aggression. The information sphere of confrontation is important since it has no clearly expressed national borders and can act against critically important information infrastructures and against the population.
- The study of issues to increase the combat might of the Armed Forces.[10] Troops can now move great distances and are able to reinforce groupings on strategic axes.
- Improving the ideological and moral-psychological stability of the population and its servicemen.
- The search for new approaches and ties between military strategy and the economy, able to answer questions such as for what kind of war should the economy be prepared and how can its structures be advantageously placed and protected? A system of input data for military planning for the next mid-range period (2021-2025) was prepared.[11]

[8] Ibid., p. 7.
[9] Ibid. p. 9.
[10] Ibid., p. 10.
[11] Ibid. p. 11.

With regard to forecasting the nature of future war, Gerasimov stated that it is the duty of military science to determine what future models of weapons and equipment are required and what research is needed to validate the forms and methods of their employment. These actions must be completed in peacetime.[12] For example, Russian scholars need to find new methods for employing future weapons and validate forms for countering military operations in and from space by probably enemies.[13]

Conclusion

The two new strategies Gerasimov listed indicate both a desire to be ready to preempt if war is unleashed against Russia (strategy of active defense) and a desire to work abroad with specific branches of service to protect national interests (strategy of limited actions). In effect, identifying these strategies is somewhat new in that they tend to stereotype how the Armed Forces could be used.

It was also clear that Russia fears for the elimination of what it terms to be critically important infrastructures (SODCIT), mentioning that issue twice regarding Russia and once in relation to a target abroad that Russia will seek to destroy. For example, Gerasimov specifically noted that Russian targets include foreign decision-making centers and cruise missile launchers aimed at Russian territory.[14] Associated with the Russian desire to protect state infrastructure was the development of the territorial defense concept, discussions of which are now beginning to appear in Russian military publications.

[12] Ibid., p. 11.
[13] Ibid., p. 9.
[14] Ibid., p. 9.

RUSSIA'S NEW WAY OF WAR: PART TWO
GENERAL GERASIMOV'S 2018 PRESENTATION ON OPERATIONAL ART AND TACTICS

In 2018, General Staff Chief Valery Gerasimov's presentation at the Academy of Military Science focused on the development and deployment of operational forces. He noted that Russia's determination regarding what kind of Armed Forces the nation requires is based on the quality of its forecasting capabilities to visualize how the world's military-political situation will develop. The current forecast indicates that there are more participants than in the past in conflict situations (military and nonmilitary), and that while the scale and dynamism of conflict are increasing, the temporal (time) parameters for a conflict's preparation and conduct are decreasing.[15]

Current issues regarding the employment and development of the Armed Forces involve increasing the authenticity of scenarios and studying what forms and methods of operations are needed based on the forecast. An "elaboration of the issue of the content of combat operations at the operational and tactical levels is important" as is a search for finding a balance between military and nonmilitary defense measures. It is also time to reexamine the increasing precision capabilities of weaponry and their contribution to an opponent's comprehensive destruction, a theoretical issue that has advanced to the foreground.[16]

However, Gerasimov went beyond just operational art and tactics and stressed several items of importance regarding the modernization of the Armed Forces and general preparations for conflict. Special importance was placed on the ability to command and control forces, since operational success depends on gaining command and control (C2) superiority. Further, he stated that future war will be distinguished by the following features:

- The extensive employment of precision weapons and other types of new weapons, including robot technology
- Economic targets and the enemy's system of state control will be subjected to priority destruction
- The information sphere and space will be dynamically involved
- Countering communications, reconnaissance, and navigation systems will play a special role.[17]

Russia apparently fears that conflict might occur simultaneously on various strategic axes (SA), since the military has created interservice force groupings in military districts astride such SA. The reinforcement of SA is realized in two ways: first using reserves and Air Assault Forces, with the latter described as the foundation of Russia's rapid reaction forces; and second the employment of cruise missile carriers on each SA, which are capable of providing deterrence in important strategic

[15] V. V. Gerasimov, "The Influence of the Contemporary Nature of Armed Struggle on the Focus of the Construction and Development of the Armed Forces of the Russian Federation. Priority Tasks of Military Science in Safeguarding the Country's Defense," *Vestnik Akademiy Voennyh Nauk (Journal of the Academy of Military Science)*, 2018, No. 2, pp. 17-18. The author would like to thank Dr. Harold Orenstein for his translation of this presentation.
[16] Ibid., pp. 20-21.
[17] Ibid., p. 18.

regions. Systems designed to counter an opponent's use of unmanned aerial vehicles (UAVs) are under development,[18] and mobile field command posts are now outfitted with mobile automated systems that increase both mobility and the stability of troop C2 when conducting operations. The activities of C2 organs are being supported by the National Defense Management Center's array of software and hardware.[19]

Special attention is also directed at developing a commander's skills for making nonstandard decisions. This includes the abilities to forecast the situation, to act decisively, and to take a justified risk. Issues of military art are being discussed at operational meetings so that combat experiences can be addressed and taken into consideration.[20]

Regarding the manning of the force, ground force formations, military units, naval infantry, and Air Assault Forces are to be manned according to the principle of two battalions of contract workers and one battalion of conscripts. Nuclear and nonnuclear deterrence forces have been maintained and updated. They include the addition of hypersonic, highly mobile underwater resources for the delivery of nuclear weapons and other strategic resource capabilities. These latter capabilities make it possible in the future to "shift the principal portion of strategic deterrence tasks from the nuclear to nonnuclear forces."[21]

Other ways to provide protection for the Russian homeland were addressed, which included the development of a radar field along the country's perimeter that can detect ballistic missiles; and an echeloned air defense system reequipped with new antiaircraft missile systems. Decisions have been made to create state mobilization reserves, territorial forces, and an organization for preparing organs of authority to function in wartime.[22]

Finally, Gerasimov noted that the borders of theaters of military operations are increasing (with targets of military and economic potential sometimes located outside of where military operations are being directly conducted) along with an increase in the effects of Russian weapons against opponents, indicating a shift "toward the comprehensive destruction of the enemy based on integrating the efforts of all strike and fire resources into a uniform system."[23]

Conclusions

Gerasimov's 2018 speech had two priorities: to discuss ongoing efforts to prepare the nation for the eventuality of numerous types of conflict; and to stress what those efforts entailed, with special emphasis placed on ensuring the readiness of command and control and on the stated desire to be able to comprehensively destroy potential targets. The latter were specified as economic and state control centers of an opponent.

Gerasimov stated that a special role will also be played by the information sphere and space as well as by countering communications, reconnaissance, and navigation systems of opponents. In

[18] Ibid., p. 19.
[19] Ibid., p. 20.
[20] Ibid.
[21] Ibid., p. 21.
[22] Ibid.
[23] Ibid., p. 18.

such cases he is implying that radio-electronic and other assets are of special importance for the Armed Forces with the aim of doing so. For that reason, reconnaissance-strike concepts of all types (UAVs, radio-electronic, information, navigation, etc.) need to be studied closely.

Western analysts need to take these priority directions of Russia's new way of war into consideration and develop appropriate counters of either the direct or asymmetric varieties. Russia is doing its best, as Gerasimov underscores, to prepare its structures, forces, and intellectual capabilities to respond early and effectively if conflict erupts. What is unknown is if Russia's forecasting gurus are indicating when and how to respond to or initiate events. Preparations for either eventuality are certainly underway.

RUSSIA'S MILITARY HERITAGE BROUGHT FORWARD

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[24] The first cover is the book *The Evolution of Military Art*; the second cover is the book *Forecasting in Military Affairs*.

RUSSIA'S NEW WAY OF WAR: PART THREE
RUSSIAN VIEWS ON PREEMPTION AND THE INITIAL PERIOD OF WAR

Introduction

Russian analysts know that one of the most important and difficult tasks is to foresee not only the possible nature of future war but also to prepare for a multitude of potential attacks (nuclear, cyber, recon-strike, asymmetric, etc.). Underestimating these operations can result in severe consequences to the more passive side, since the speed of contemporary operations may not allow for recovery time if the initial assault is overwhelming.

British author Keir Giles, in a book titled *Moscow Rules*, noted that Russian President Vladimir Putin had stated "Fifty years ago, I learnt one rule in the streets of Leningrad: if a fight is unavoidable, you have to **hit first**."[25] In 2012, Putin noted that his nation "cannot afford a replay of the tragedy of 1941 when unreadiness of the state and army for war was paid for by enormous losses."[26] The implication is that the **initial period of war (IPW)** or the concept of **preemption** may occupy an important place in his thinking regarding if/when to use force. General of the Army (deceased) and Putin advisor Makhmut Gareyev wrote that "the role of the initial period of war will increase further and this may be the main and decisive period which largely predetermines the outcome of the entire war."[27] The advent of the information and digital age has most likely only reinforced this belief in the mind of Putin and other Russian military planners. These two concepts, the **IPW and preemption**, are explored below.

IPW

The **IPW** was defined in an article by S. G. Chekinov and S. A. Bogdanov, two highly respected Russian military officer theorists, as

> The time when the warring states conducted military operations involving groups of their armed forces deployed before the start of the war to achieve their short-range strategic objectives or to create favorable conditions for committing their main forces and continuing with more operations.[28]

Chekinov and Bogdanov wrote on the **IPW** in 2012, noting that each war is a special case under the effect of different circumstances. The **IPW** will now be the most critical phase of war, since the latest information technologies, electronic warfare capabilities, and automated command and control system will shape success in many ways, such as the forms and methods of operations. Outer space, cyberspace, and other domains (and weapons) also will impact the **IPW**. Economies may not have the time to adapt to the speed of future conflicts.[29] States will use peacetime or periods of threat to "disorganize government, military, and combat control systems" of countries it aims to attack. Further, the attacker will "seek to achieve the most tangible results that can be

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[25] Keir Giles, *Moscow Rules*, Brookings Institution Press/Chatham House, 2019, p. 54.
[26] S. G. Chekinov and S. A. Bogdanov, "Initial Periods of Wars and their Influence on a Country's Preparations for a Future War," *Voennaya Mysl' (Military Thought*), No. 11 2012, p. 15.
[27] M. A. Gareyev, *M. V. Frunze: Military Theorist*, Moscow: Military Publishing House, 1985, p. 237.
[28] Chekinov and Bogdanov, p. 16.
[29] Ibid., pp. 19-20.

decisive" in the shortest time possible and with a minimum loss of life.[30] In 2017, for example, Gareyev noted that if conflict is imminent, previously formulated scenarios and models of combat operations will have to be implemented due to the speed and mobility of contemporary operations.[31]

US intelligence agencies have paid attention to Russian attempts to establish information superiority and weaken US cyber defenses through the surreptitious insertion of viruses. A 2017 *Wall Street Journal* article noted that the Russian-made Kaspersky (a Russian cyber expert who works for the Russian Defense Ministry) anti-virus solution had been on a Defense Department watch list of potential problems since 2004, since the product was being sold in US stores. In 2013 the Defense Intelligence Agency issued a Pentagon-wide threat assessment about the company. US officials note that the firm's products were used as a tool for spying on systems in the US.[32] An 11 January 2018 *Wall Street Journal* article discussed Russian hacking successes against the U.S. power grid. Robert Silvers, former assistant secretary for cyber policy at Homeland Security, noted that "what Russia has done is prepare the battlefield without pulling the trigger."[33] There are hardly two better descriptions of Russian attempts to establish **IPW** superiority in the cyber age.

Preemption

As long ago as 1996, the Chief of the Main Operations Directorate of the Russian General Staff at the time, Colonel General Viktor Mikhaylovich Barynkin, noted that operational massing will be achieved through "overwhelming fire-delivery and electronic preponderance" on decisive axes with precision-weapons and other new weapons, to include the **use of preemption** and maneuver forms of warfare.[34] He also noted that when enough operational-strategic and operational-tactical reconnaissance-strike and fire complexes using precision guided weapons become available, a massive fire strike concept must be developed for use in the **IPW** and before first operations. Recently preemption has found several new supporters. In a December 2015 article, design concepts for remote-controlled cyber weapons (cruise warheads) were described. It was noted that this type of weaponry would be effective for deterrence, warning, and **preemption** and retribution purposes.[35] A 2016 *Moscow Times* article stated that Russia's policies will develop according to the situation and will react to or **preempt** moves by other players. This has become the "most important strategic driver of Russian foreign policy."[36] In 2017, Russia's Aerospace Forces conducted a command-staff exercise to **preempt** any aggressor missile attacks that year, the Russian Federation Ministry of Defense reported.[37] In 2018, Russian artillery specialist Colonel

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[30] Ibid., pp. 24-25.

[31] Gennadiy Miranovich interview with Makhmut Gareyev, "Knowledge and Skill. Reflections on What Qualities and Skills the Modern-Day Officer Should Possess," *Red Star Online*, 29 September 2017, at http://www.redstar.ru.

[32] Paul Sonne, "Russian Firm Was Long Seen as Threat," *The Wall Street Journal*, November 18-19, 2017, p. A2.

[33] Rebecca Smith and Rob Barry, "Russian Hack Exposes Weakness in U.S. Power Grid," *The Wall Street Journal*, 11 January 2018, pp. A1, A9.

[34] V. M. Barynkin, "The Effect of Precision Weapons on the Character of Combat Operations and the Development of Military Art," *VOORUZHENIYE, POLITICA, KONVERSIYA (ARMAMENTS, POLITICS, CONVERSION*), No. 3 1996, p. 20.

[35] Grigoriy Vokin, "Remote Custodian. Warheads with Artificial Intelligence Could Be Used for Reconnaissance, Guaranteed Destruction of Targets, and Human Rescue," *Voyenno-Promyshlennyy Kuryer Online (Military-Industrial Courier Online)*, 10 November 2015.

[36] Vladimir Frolov, no title provided, *The Moscow Times Online* (in English), 6 December 2016.

[37] Igor Morozov, Sergey Baushev, and Oleg Kaminskiy, "Space and the Character of Modern Military Activities," *Vozdushno-kosmicheskaya i Oborona (Air and Space Defense*), No. 4, 2009, pp. 48-56, downloaded from the Eastview web site.

V. Litvinenko stated that noncontact or reconnaissance-fire forms were playing a greater role in operations. He noted that **preemption** in fire engagements determines modern battles, based on artillery experiences in the Syrian Arab Republic.[38] In 2019, General Staff Chief Valery Gerasimov noted that Russia has been developing conceptual approaches to confront the actions of probable enemies, which he termed the "strategy of active defense," which "envisions the conduct of a set of measures for the **preemptive** neutralization of threats to the security of the state"[39] in order to stay one step ahead of an opponent. Gerasimov used the term later in the same presentation, noting that it is necessary to **preempt** opponents with preventive measures.[40]

Conclusions

Russian planners believe that the conflict participant whose side gains the initiative in the **IPW** based on the employment of preplanned scenarios will be more likely to attain initial successes. There are numerous ways to attain information superiority, which is crucial to **IPW** success. They include planting cyber viruses in important systems of an opponent's infrastructure, capturing the electronic warfare frequencies and equipment operating parameters of a potential opponents' equipment, scrambling global positioning system frequencies, or conducting reconnaissance on key underwater cables for espionage or destruction purposes, among other efforts. Information technology's use in the IPW could end a war before it begins if, for example, an opponent's information infrastructure or command and control nodes are completely put out of commission by a Russian hacker who plants in an opponent's systems the necessary malware, usually in peacetime.

The more recent use of the term **preemption** in conjunction with the **IPW** is troubling, as is Gerasimov's thoughts regarding the comprehensive destruction of opponents. **Preemption** can be designed simply to insure that one side can inflict the first surprise blow against a larger opponent; or it can occur against an opponent who may or may not be posturing for an attack, thus beginning a conflict that could have been benign in substance. **Preemption** indicates using a "strategy of active defense," which is similar to how China's military considers active defense. The latter has an offensive character as well as a defensive one.

[38] V. Litvinenko, "Organization of Coordination: Provisional Reconnaissance-Fire Complex (VROK), Mission, Composition, Combat Capabilities," *Armeyskiy Sbornik (Army Journal*), No. 8 2018, p. 24.
[39] V. V. Gerasimov, "The Development of Military Strategy under Contemporary Conditions. Tasks for Military Science," *Vestnik Akademiy Voennykh Nauk (Journal of the Academy of Military Science)*, 2019, No. 2, p. 7.
[40] Ibid.

RUSSA'S NEW WAY OF WAR: PART FOUR
RUSSIAN FORECASTING

Introduction

U.S. military planning is currently devoted to forecasting the character of future war and the character of land power out to the year 2035 and then, as a follow-on, from 2035-2050. Such forecasts at times coincide with Russia's forecasting estimates and timelines. The U.S. also conducts contemporary forecasts/adjustments to force posturing just to ensure that NATO is properly manned and equipped. Russia does the same on the other side of the border when posturing for advantage. Russia does, however, appear to entertain a larger number of forecasting categories than the U.S.. The purpose of this paper is to highlight what those forecasting differences are between the two nations, so that the U.S. is better prepared to confront future Russian scenarios.

A Quick Examination of Russian Forecasting

Soviet officers defined forecasting in **1975** as follows:

> The study of the military-political situation, the pattern of war in the future, the prospects of developing strategy, operational art, and tactics, the qualitative and quantitative composition of the means of armed conflict (one's own and the enemy's), the prospects for the development of the potential of the war economy in the future, and also the forecasting of the enemy's strategic and tactical plans.[41]

There appear to be several components to this definition: the military-political situation; the nature of future war; military art's prospects; the correlation of forces of both sides; the economic potential required to sustain fighting; and enemy plans. Beyond the definition, the authors added nine different types of forecasting, some of which were noted in the definition. They were:

1. Forecasting the political situation
2. Economic forecasting
3. Forecasting the development of science and technology
4. Military-strategic forecasting
5. Operational-tactical forecasting
6. Military-economic forecasting
7. Military-technical forecasting
8. Forecasting the enemy's situation
9. Military forecasting[42]

Numbers 1-3 appear to represent the overall political and research situation, numbers 4-7 are forecasts for the use of forces and their sustainment, number 8 is a consideration of the enemy

[41] Yu. V. Chuyev and Yu. B. Mikhaylov, *Forecasting in Military Affairs*, Moscow 1975, translated into English by the DGIS Multilingual Section, Secretary of State, Ottawa Canada, p. 14.
[42] Ibid., p. 18.

situation in general (much like elements [4-7] of the friendly situation), and number 9 represents the combination of an assessment of friendly and enemy considerations in general. U.S. military forecasting seldom takes all of these types into consideration.

Fast forward to **2016**, when Major General (Res.) V. V. Kruglov noted that forecasting prepares the state for the most unexpected vectors of development, predicts global changes for the next 20-30 years, and estimates threats to the country 30-50 years out. His estimate agrees with that of the U.S. in some cases and exceeds it in others. Kruglov noted that President Vladimir Putin has requested work on a new, qualitatively different "smart" system of military analysis and planning. Weapon types, the nature of warfare, and better predictions of developments in the military, political, and strategic situations are required.[43]

Kruglov added that the weapons, forms and methods of employing formations, the theater's specific characteristics, and other issues change often. As technological and intellectual standards change, there is a corresponding impact on the nature of war and future armed struggles.[44] He then recommended that forecasts and assessments be made **every three to six months**.[45] Such an assessment is not often found in U.S. forecasting estimates.

In **2017**, Kruglov and LTC V. I. Yakupov stated that the reason armed struggle is steadily getting more complex is due to several new elements, such as the synergy between military and nonmilitary confrontation means, the uneven progress of knowledge, and other factors. New spheres of military confrontation and new types of weapons are appearing along with new spheres of struggle that are not much in evidence or are only forecasted.[46] The authors added that surefire forecasts are now mandated, requiring a solid knowledge of forecasting theory and methodological skills.[47] With Nano and other technologies increasing by some 35 percent a year, it is difficult to forecast which countries will make what discoveries and what their impact will be on their military forces.[48]

In **2018** General Staff Chief Valery Gerasimov noted, regarding forecasting, the importance attached to the quality of, first, forecasting possible variants in the development of the military-political situation in the world and of, second, analyzing recent domestic and foreign experiences of employing their armed forces.[49] Skills for making nonstandard decisions are being developed in commanders as well as their abilities to forecast the situation, act decisively, and take justified risks. [50] Gerasimov added that this involves increasing the authenticity of scenarios being developed and the accuracy of long-range forecasts of the military-political and strategic situations.[51] Gerasimov noted the employment of precision and other types of new weaponry, such

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[43] V. V. Kruglov, "Military Forecasting: The State, Potential, and Realization of Results," *Voennaya Mysl'* (*Military Thought)*, No. 12 2016, p. 33.
[44] Ibid., pp. 34-35.
[45] Ibid., pp. 35, 38.
[46] V. V. Kruglov and V. I. Yakupov, "On the Methodology of Forecasting Armed Struggle," *Voennaya Mysl'* (*Military Thought)*, No. 4 2017, p. 5.
[47] Ibid., p. 6.
[48] Ibid., pp. 7-8.
[49] V. V. Gerasimov, "The Influence of the Contemporary Nature of Armed Struggle on the Focus of the Construction and Development of the Armed Forces of the Russian Federation. Priority Tasks of Military Science in Safeguarding the Country's Defense," *Vestnik Akademii voennyh nauk (Journal of the Academy of Military Sciences*), 2018 No. 2, p. 17.
[50] Ibid., p. 20.
[51] Ibid., p. 21

as robot technology, will be features of future wars. Priority destruction targets will include economic and state control systems, and the information sphere and space will be dynamically involved. A special role will be afforded to countering communications, reconnaissance, and navigation systems.[52] Precision means will shift the "principal portion" of strategic deterrence from the nuclear to the nonnuclear forces. Gerasimov added that such improvements will aide in the comprehensive destruction of opponents.[53] In **2019** Gerasimov implied that forecasting is conducted continuously, noting that strategy is the creation of a system for studying forecasted scenarios of the outbreak and conduct of military conflicts. Validated scenario forecasting serves as input data for developing the forms and methods of the Armed Forces employment.[54]

In late **2019** S. P. Belokon, who appears associated with the Main Operational Directorate of the General Staff, wrote on digital technologies in the *Journal of the Academy of Military Science*.[55] He described how to determine the tasks and requirements for the "power components" of a military organization. Scenarios are forecasted for three areas, he noted: the development of the military-political and strategic situations, and the possible nature of future military conflicts. Suitable response variants (weapon systems and mobilization resource needs) are developed according to the military-strategic potential and level of military security required to arm the power components with the capabilities to support military development. Any disparities are refined with corrections to the nation's strategic deterrence posture or the use of nonmilitary measures.[56]

Conclusions

There appear to be two differences between Russian and U.S. forecasting from this analysis. First is Russia's military need for quicker forecasting updates. Kruglov recommended, due to the changing technological situation, forecasts every three to six months instead of 15 years. Gerasimov implied such a requirement is needed as well, noting that validated scenario forecasting helps determine the forms and methods of force employment. Second, the Russian approach appears more segmented and holistic, as it considers a variety of forecasting contingencies (economic, military art, military-technical, etc.), with Belokon's "scenarios forecasted for three areas" the latest under examination. U.S. analysts should continue to follow Russian forecasting approaches, as they may be influential in how Russia's military plans for the initial period of war.

[52] Ibid., p. 18.
[53] Ibid., pp. 20-21.
[54] V. V. Gerasimov, "The Development of Military Strategy under Contemporary Conditions. Tasks for Military Science," *Vestnik Akademii voennyh nauk (Journal of the Academy of Military Sciences*), 2019, No. 2, p. 8..
[55] S. P. Belokon, "Digital Technologies as a Tool for Assessing the Level of Russia's Military Security," *Vestnik Akademiy Voennykh Nauk (Journal of the Academy of Military Science*), No. 4 2019, p. 6. The author would like to thank Dr. Harold Orenstein for the translation of this article.
[56] Ibid., pp. 9-10.

RUSSIA'S NEW WAY OF WAR 2020: PART FIVE
RUSSIA'S PLAN TO DISORGANIZE SYSTEMS:
CAUSE CHAOS/DESTROY INTEGRATION IN AN OPPONENTS C2/ EW ASSETS

Introduction

Russia's Armed Forces write often about its plans to **disorganize** an opponent's information, command and control, electronic warfare, and robotic systems. Such discussions, some of which are over 30 years old, aim to prohibit opponents from integrating operations and ensure chaos in the organization of an adversary's combat affairs. Russian opponents need to consider that the Kremlin may use the concept to disable not just land forces but space assets.

Goals and Purpose of Disorganization

In 2017, Major General Yuriy Lastochkin, who is in charge of the Defense Ministry's electronic warfare (REB) force, recommended (with three coauthors) to "construct a tree of combat employment methods at the head of which there should be methods of **disorganizing** adversary C2."[57] Fundamental **disorganization** methods include an information blockade of C2 bodies and the information blocking of complex electronic equipment. Physical methods of **disorganizing** an opponent include the use of destruction, distortion, and misinformation techniques, to include destroying circuitry with electromagnetic radiation or using special programs to impact software and databases.[58]

In 2018, Lastochkin stated that soon REB's men and equipment will "decide the fate of all military operations."[59] Lastochkin added that the **disorganization** of enemy troop and weapons C2 and the effective reduction of the conduct and employment of enemy reconnaissance and weapons "is the primary goal of the conduct of electronic warfare."[60] He added later that "It is impossible to achieve superiority over an enemy, which is achieved through the **disorganization** of his information management and telecommunication systems, without state-of-the-art electronic warfare systems."[61] A Russian source noted that the main planning documents for REB forces will now be the "Adversary C2 **Disorganization** Plan and the REB Forces and Assets Employment Plan in Operations."[62] LTC O. G. Nikitin noted that a model of an adversary's C2 system and its critical information areas are to be developed[63] along with ways to reduce an opponent's combat operational effectiveness in order for **disorganization** operations to be successful.[64] The **disorganization** concept may have been practiced most recently and vividly during exercise

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[57] Yu. I. Lastochkin, Yu. L. Koziratsky, Yu. Ye. Donskov, and A. L. Mororescu, "Combat Employment of Radio-Electronic Warfare Troops as a Basic Component of Ground Forces Operational Art," *Voennaya Mysl' (Military Thought)*, No. 9 2017, p. 25.
[58] Ibid.
[59] Aleksandr Stepanov interview with Yuriy Illarionovich Lastochkin, "They Have Deployed a Dome, Which Defends from Missiles, Over the Russian Bases in Syria. Unique Electronic Warfare Systems, Which Are Capable of 'Blinding' Any Precision-Guided Weapon, Provide It," *MK Online*, 15 April 2018.
[60] Ibid.
[61] Vladimir Mukhin, "'Krasukha' Prevented the Tomahawks from Reaching the Targets. Russian Electronic Warfare Systems Successfully Underwent Baptism by Fire in Syria," *Nezavisimaya Gazeta Online*, 18 April 2018.
[62] V. F. Lazukin, I. I. Korolyov, and V. N. Pavlov, "On Basic Elements of Electronic Warfare Forces Tactics," *Military Thought* (in English), No. 11 2017, p. 20.
[63] O. G. Nikitin, "Trends in Increasing the Effectiveness of the Organization of the Combat Employment of Radio-Electronic Warfare Troops in the Operations of Ground Forces Formations," *Voennaya Mysl' (Military Thought)*, No. 5 2017, p. 25.
[64] Ibid., p. 27.

Vostok (East)-2018, when a massive REB strike was practiced for the first time and on such a large scale, resulting in the jamming of the adversary on land, on sea, and in the air.[65]

Disorganizing military and state control and aerospace defense systems of opponents are important They help deceive opponents, create the desired public opinion, help organize antigovernment protests, and develop other issues to reduce an opponent's resolve to resist.[66] In 2017, in the *Journal of the Academy of Military Science*, author P. I. Antonovich supported this contention, noting that a principal task of strategic REB systems is "the comprehensive **disorganization** of the operations of a potential enemy's systems of state administration and military command and control in the integrated information domain."[67]

In 2019 Russian analysts proposed a methodology for the operational calculations that determine how to effectively **disorganize** an opponent's command and control under numerous destructive effects. First, the real strength of the enemy's army formation is computed. Second, the efficient **disorganization** of control over enemy troops requires the preparation and implementation of measures that disable an opponent's systems and rupture control over its troops, weapons, electronic warfare, and reconnaissance capabilities. Control **disorganization** efficiency reduces strength indices in three ways, when they are disrupted, upset, or utterly disabled.[68]

In 2020 Russian authors discussed ways to **disorganize** the control systems of robotic means in foreign armies. A model organization was developed for the preparation of REB specialists to **disorganize** such systems.[69] The authors listed the following fundamental principles as the template to follow when using radio-electronic strike (REU) or radio-electronic fire and strike (REOU) to **disorganize** opponents:[70]

- The target of the strike: the disruption of an information control system or line of enemy leadership, with a "given degree of effectiveness for the **disorganization** of C2."[71]

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[65] No author provided, "Deafening Success: EW System to Cover Europe from Near Kaliningrad," *Izvestiya Online*, 26 April 2019.

[66] S. G. Chekinov and S. A. Bogdanov, "The Influence of the Indirect Approach on the Character of Modern Warfare," *Voennaya Mysl' (Military Thought*), No. 6 2011, p. 6.

[67] P. I. Antonovich, "Radiofrequency Space and Some Problem Questions of Modern Strategic Electronic Warfare," *Vestnik Akademiy Voennykh Nauk (Journal of the Academy of Military Science*), No. 4 2017, p. 133. The author would like to thank Dr. Harold Orenstein for the translation of this article.

[68] V. A. Anokhin, G. D. Vystorobsky, D. V. Kholuyenko, and N. M. Gromyko, "Assessing Combat Capability of Army Formations in Terms of Disruption of Control," *Voennaya Mysl' (Military Thought*), No. 12 2019, pp. 48-56.

[69] S. V. Golubev, V. K. Kir'yanov, and M. V. Zhirnov, "A Model Organization for Military-Professional Training of Radio-Electronic Warfare Specialists for Missions to Disorganize Command and Control Systems of Robotic-Technical Means of Foreign Armies," *Voennaya Mysl' (Military Thought*), No. 2 2020, p. 150. The author would like to thank Dr. Harold Orenstein for his translation of this article.

[70] Based on these distinctions, the following REU and REOU definitions were offered: ***Radio-electronic strike*** (REU)– the comprehensive and mass employment of REB forces and means, coordinated with troops tasks, for the purpose of ensuring the required effectiveness for the disorganization of the enemy's information-control systems or the lines of enemy leadership. ***Radio-electronic-fire strike*** (REOU)–the totality of specially organized radio-electronic and fire strikes, coordinated and interconnected with respect to goals, tasks, place, and time, conducted by the forces and means of various services and special forces, according to a single concept and plan to execute tasks for the disorganization of enemy command and control of troops and weapons on given axes, in an established period of time and with the assigned effectiveness.

[71] Ibid., p. 23.

- The strike's effectiveness: the REOU goal is to **disorganize** the functioning of enemy C2 with a concentrated main effort. If capacity is limited, then **disorganize** the C2 of first-echelon brigades. If capacity is adequate, then **disorganize** C2 subsystems.[72]
- The place to insert the REU (REOU) in an operation: at the beginning of an operation, a REOU is delivered to **disorganize** C2 of first-echelon troops and an REU is delivered to **disorganize** the C2 of field artillery. As the operation develops, strikes aim to **disorganiz**e the C2 of an opponent's second echelon and reserves. **Disorganizing** C2 ensures the seizure of the operational initiative.[73]

The **disorganization** concept was also discussed in information-strike operations. The latter consists of three stages, the **disorganization** of an opponent's intelligence capability to increase surprise; delivering strikes to kill assets under cover of jamming,; and the **disorganization** of information support of all combat operations. Blocking the gathering, processing, and sharing of information, and the planting of disinformation at all stages of information support, is required.[74]

Conclusion

There are two main conclusions to draw. The first is that the **disorganization** of enemy troop and weapons command and control and the reduction of the effectiveness of the conduct of reconnaissance and weapons employment by them is the primary goal of Russian REB. The second conclusion is that if REB leaders have developed a **disorganization** plan, then that will be a focus of emphasis before or during operations. It includes modeling enemy C2 and the exposure of critical weaknesses. A potential third conclusion is that the **disorganization** effort may naturally not be confined to ground forces but, using cyber and other means, can be used to d**isorganize** even space assets. Thus, the **disorganization** concept is one for JADC2 theorists to study closely so that the proper protective means for US systems can be developed.

[72] Ibid., p. 24.
[73] Ibid., p. 25.
[74] I. N. Vorobyev, "Information-Strike Operations," *Voennaya Mysl' (Military Thought*), No. 6 2007, pp. 17-18. The author would like to thank Dr. Harold Orenstein for his translation of this article.

RUSSIA'S NEW WAY OF WAR 2020: PART SIX
RUSSIAN STRIKE CONCEPTS:
RECONNAISSANCE AND RADIO-ELECTRONIC VARIANTS

Introduction

During General Staff Chief Valery Gerasimov's 2018 presentation to the Academy of Military Science he stated the following:

> Work is being done on the creation of an automated interservice reconnaissance-strike system. The result of this should be a reduction of the temporal parameters of the decision cycle for a fire task—from reconnaissance to target destruction—by 2-2.5 times. That said, the precision of destruction will increase by 1.5-2 times, and the capabilities for guiding precision weapons will broaden.[75]

An increase in strike concepts has been a characteristic of Russian military innovation. The list of types has grown from simply reconnaissance to radio-electronic, information, and navigation variants. This report covers Russian definitions of two of these variants, the reconnaissance-strike (RUK) and radio-electronic-strike (REU) concepts.

Defining a RUK and REU

Russia's 2003 *Military Encyclopedia* defined a reconnaissance-strike complex as follows:

> **Reconnaissance-strike complex (**razvedyvatel'no-udarnyi kompleks/RUK) – an automated weapons complex intended for the timely detection and highly-effective fire destruction of the most important enemy land (water surface) targets by strike resources (rocket, aviation) quickly, as they are found.
>
> The following tasks can be assigned to RUKs:

- Destruction of resources for delivering tactical and operational-tactical nuclear weapons
- Destruction of a first echelon attacking or defending enemy
- Interdiction and destruction of second-echelon reserves, to thwart enemy build-up efforts in the defense or thwart offensive enemy counterattacks and counterstrikes)
- Struggle against groups of surface ships
- Disruption of command and control of troops, aviation, and means of destruction by incapacitating command posts
- Destruction of radio-electronic warfare resources

[75] V. V. Gerasimov, "The Influence of the Contemporary Nature of Armed Struggle on the Focus of the Construction and Development of the Armed Forces of the Russian Federation. Priority Tasks of Military Science in Safeguarding the Country's Defense," *Vestnik Akademiy Voennyh Nauk (Journal of the Academy of Military Science)*, 2018, No. 2, p. 19..

- Isolation of areas of combat operations by striking and incapacitating airfields, railroad transport centers, ports, bridges, crossings, and other infrastructure in a theater of military operations.

RUKs are subdivided into operational-strategic, operational, operational-tactical, and tactical with respect to their organizational structure and the nature of the tasks they are carrying out. RUKs consist of means of reconnaissance and guidance; automated command and control; destruction (precision weapons); radio-electronic suppression; navigation and timing support; special technical and rear support.[76]

In 2009, the Russian journal *Air and Space Defense*[77] discussed various types of fire and strike means. The article noted that the RUK (range up to 200 kilometers, in the "operational zone") is an automated weapons complex designed for the timely detection and fire destruction of important enemy ground-based targets that use strike systems.[78] **In 2015**, V. Litvinenko, a Russian artillery specialist, wrote on the integration of reconnaissance, control, and destruction systems under 21st century conditions, noting a change from platform-centric to network-centric warfare. The latter recognizes "the comprehensive integration of weapon systems and resources within the framework of a unified system of command and control (C2) of troops."[79] Information technologies allow combat systems to interact better, reduce the C2 time cycle, and help achieve information superiority over opponents through near real time collection, processing, modeling, decision-making support, and data transmission capabilities. When "creating such a C2 system, fire destruction resources are essentially a global reconnaissance-strike complex (RUK)."[80]

In 2017, Missile and Artillery Chief Lieutenant General Mikhail Matveyevsky offered his thoughts on the emerging forms and methods of the tactical employment of artillery.[81] He noted that improvements were needed in the response speed and accuracy of RUKs of all services and on improving maneuver and fire operations. The following maneuver and fire cycles are envisaged: artillery attack—maneuver—preparing the self-propelled artillery gun for the next attack—loading the ammunition compartment. This should reduce artillery losses by 23-37 percent. In offensive operations artillery can conduct fire for effect missions of 6-10 rounds per minute for a short duration span of 1-4 minutes.[82] Another **2017** article noted that for special operations reconnaissance-strike missions are a priority. The combat properties, combat capabilities, and basic tactical and technical characteristics of the recce-strike helicopter complex are greater than

[76] Ibid., pp. 145-146.
[77] Igor Morozov, Sergey Baushev, and Oleg Kaminskiy, "Space and the Character of Modern Military Activities," *Vozdushno-kosmicheskaya i Oborona (Air and Space Defense*), No. 4, 2009, pp. 48-56, downloaded from the Eastview web site.
[78] Ibid.
[79] V. Litvinenko, "The Comprehensive Integration of Reconnaissance, Control, and Destruction Systems under Conditions of 21st Century Military Concepts," *Armeyskiy Sbornik (Army Journal*), No. 8 2015, p. 33. The author would like to thank Dr. Harold Orenstein for the translation of this article.
[80] Ibid., pp. 33-34.
[81] Mikhail Matveyevsky, "The Missile Troops and Artillery: The Development of Forms and Methods of Combat Employment," *Armeysky Sbornik (Army Journal*), No. 4 2017, pp. 21-22.
[82] Ibid., pp. 23-24..

those of the main Aerospace Forces' Army Aviation combat helicopter.[83] Missions include the delivery of strikes (effects) against enemy troops (forces) and structures.[84]

A 2017 article in the journal *Military Thought* defined a radio-electronic strike as follows:

> ***Radio-electronic strike*** (radioelektronnyy udar/REU) – the comprehensive and mass employment of radio-electronic warfare forces and means, coordinated with troops tasks, for the purpose of ensuring the required effectiveness for the disorganization of the enemy's information-control systems (control systems) or the lines of enemy leadership.

The authors listed the following fundamental principles as the template to follow when using REU. First, the object of the strike is practically the entire range of REB resources of an opponent's information-control systems (ICS), with communications centers as the "single REB strike" for "radio-information blocking" of the unit and its entire C2 subunits (forward and rear command posts, etc.).[85] Second, the target of the strike is the disruption of the functioning of an ICS or line of enemy leadership, with a "given degree of effectiveness for the disorganization of C2" or "the functioning of information systems."[86] Third, REU is delivered to disorganize the C2 of an opponent's field artillery. Strikes aim to disorganize the C2 of an opponent's second echelon and reserves. Disorganizing C2 ensures the seizure of the operational initiative.[87]

Conclusions

The RUK is aimed at the destruction of resources for delivering tactical and operational-tactical nuclear weapons and first echelon attacking or defending enemy forces; the disruption of C2 of troops, aviation, and means of destruction by incapacitating command posts; the destruction of radio-electronic warfare resources; and the isolation of areas by striking and incapacitating infrastructure in a theater of military operations.

For REU, the objects, targets, and purpose (disorganization of opponents) were listed, with a focus on information-control systems and leadership. With RUK aimed at destruction or isolation, it appeared that REU had a more centralized focus of technological or physical disorganization. Both strike concepts are very important methods that Russia intends to use to gain technological superiority.

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[83] P. S. Fukalov, E. V. Vorontsov, and R. R. Gazizov, "Principal Tactical-Functional Requirements for A Recce-Strike Helicopter System to Support Troop (Force) Actions in Special Operations," *Vestnik Akademii voennykh nauk (Journal of the Academy of Military Science),* 2017, No. 4, p. 121. The author would like to thank Dr. Harold Orenstein for the translation of this article.

[84] Ibid., p. 119.

[85] D. V. Kholuenko, V. A. Anokhin, A. S. Korobeynikov, and L. A. Lakhin, "Radio-Electronic and Radio-Electronic-Fire Strikes—Basic Forms of Employing REB Unites and Subunits," *Voennaya Mysl' (Military Thought*), No. 11 2017, p. 22. The author would like to thank Dr. Harold Orenstein for the translation of this article..

[86] Ibid., p. 23.

[87] Ibid., p. 25.

RUSSIA'S NEW WAY OF WAR 2020: PART SEVEN
RUSSIAN MILITARY ART AND ADVANCED WEAPONRY

Introduction

Russian military art, until a few decades ago, was confined to the battlefield, where the strategies of politicians and military leaders, and the operational art and tactics of commanders were used to win conflicts. That has changed. Today, the capabilities of modern weaponry, especially their speed, range, and agility based on new technological achievements, have made operations capable of affecting a situation anywhere on the planet in minutes or seconds. Such dramatic change is likely to do one of two things. It might potentially add a new element, planetary, to military art's past triad of strategy, operational art, and tactics; or it might mandate the expanded thinking of the triad well beyond the battlefield and into the realm of global thought, where it is satellites that do the maneuvering instead of tanks and where cyber elements and not bullets do most of the damage.

In 2015 two Russian analysts, S. G. Chekinov and S. A. Bogdanov, two important Russian military officer theorists, indicated that advanced forms of combat (advanced information technologies, remote noncontact operations, etc.) are becoming the chief methods of combat operations. They ominously added that, "Under these conditions differences among strategic, operational, and tactical levels [that is, military art] will be obliterated, as will the difference between offensive and defensive activities."[88]

Military art is changing quickly due to the capabilities of new weapons. Contemporary weapons and concepts will impact how war may start, be conducted, and finish, and will impact the multi-domain operations concept.

Definitions of Russian Military Art

Much has been written over the years in the Soviet Union and Russia about military art. The term has been the topic of numerous articles in journals as well as entire books. General of the Army Makhmut Gareyev, President of the Academy of Military Science for over 20 years and a professional voice in Russian military affairs, defined military art in 2013 as follows:

> Military art is the sphere of practical activity, the ability to employ knowledge while taking into account the specific conditions of the situation where, besides knowledge, developed theoretical thinking and high organizational and volitional qualities are also needed, which are capable of ensuring the implementation of the decisions that have been made and achieve victory.[89]

In 2015 Chekinov and Bogdanov offered a definition of military art in an article devoted to systemology:

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[88] S. G. Chekinov and S. A. Bogdanov, "Military Art in the Initial Period of the 21st Century: Problems and Opinions," *Voennaya Mysl' (Military Thought*), No 1 2015, p. 39.

[89] Makhmut Gareyev, "On the System of Scientific Knowledge and the Scientific Level of Command," *Krasnaya Zvezda (Red Star) Online*, 30 May 2013.

> Military art is the theory and practice of preparing for and conducting military operations on land, at sea, and in near-earth space, encompassing the principles of the organization, conduct, and all-round support of combat operations and the command and control of these actions, and influencing the forms of employment of the armed forces and methods of their conduct of military operations, as well as using "nonmilitary" measures and "indirect" actions and other forms of struggle.[90]

To summarize, when most analysts are asked "what is military art?" they reply that it is the use of strategy, operational art, and tactics. This is true but, as the definitions of professional Russian officers above note, military art has other characteristics, to include: the ability to employ knowledge while taking into account the specific conditions of the situation; actions characterized as skillful, unconventional, unique, etc.; the chain of a continuous quest to perceive the nature of war, to establish rules to prepare and conduct war; the theory and practice of preparing for and conducting military operations on land, at sea, and in near-earth space; and, in addition to knowledge, military art is developed creative thinking that requires high organizational and strong character qualities.

Expert Discussions of Military Art: V. I. Slipchenko, S. G. Chekinov, and A. V. Serzhantov

Retired (deceased) General-Major Vladimir I. Slipchenko wrote often and with great fanfare in the late 1990s and early 2000s on Russian military issues. He noted that the principles of military art would be filled with new content and new meaning. He then listed the following:

- There will be compressed simultaneous operations of reconnaissance-strike combat systems created especially for destroying the enemy's economy, wars in which variously based high-precision weapons will become the principal means of destruction in a noncontact fashion.
- The influence of nuclear weapons on attaining strategic and political goals will diminish sharply and perhaps will disappear entirely.
- Groupings of ground troops, forces, and assets and battlefield weapons will cease to be necessary in connection with the noncontact nature of wars.
- There will be operations of strategic nonnuclear strikes and strategic defensive forces and assets.
- Of the three elements of the battle and engagement familiar in the past (fourth) generation of wars—fire, strike, and maneuver—only the strike by high precision forces and assets will be preserved.[91]

In 2010, S. G. Chekinov forecasted the evolution of military art at the start of the 21st century on the pages of *Military Thought*.[92] He offered a host of US lessons learned from the war in Iraq which, he noted, demonstrated the following trends in warfare:

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[90] S. G. Chekinov and S. A. Bogdanov, "The Development of Modern Military Art from the Vantage Point of Systemology," *Voennaya Mysl' (Military Thought*), No. 11 2015, p. 24.
[91] V. I. Slipchenko, *Noncontact Wars*, Moscow Gran-Press, 2001, pp. 108-109.
[92] S. G. Chekinov, "Predicting Trends in Military Art in the Initial Period of the 21st Century," *Voennaya Mysl' (Military Thought*), No. 7 2010, p. 21.

- Quickly introducing new weaponry has created a new time factor in military art and information warfare will become an independent form of struggle.
- The technological superiority of one side can easily offset a quantitative superiority of the other side.
- There was a clear absence of lines of contact between warring sides.
- Space technology supported combat at all levels of military art.
- Reconnaissance, fire, electronic, and information warfare facilities were integrated into a single spatially dispersed reconnaissance-strike system.
- Military space may include the use of orbiting weapons that can hit targets at any point on the planet, offering a global dimension to armed struggle.
- Greater weight will be given to long-range fires delivered by high-precision weapons.
- Electronic warfare has become a key element in disorganizing an opponent.
- The nature of future war will involve a war of surprises in the full sense of the term, using unknown weapons and new methods of military operations.
- Remote operations will prevail over contact operations.[93]

Finally, in 2019 Alexander V. Serzhantov, the Deputy Chief of the Military Academy of the General Staff for Scientific Work and Chief of the Center for Military Strategic Research, discussed military art. Ten years earlier he was the deputy chief of the Military Art Chair at the same Military Academy.[94] Serzhantov stated that the following changes in military art are deserving of the closest attention of researchers:

- The concentration of men and equipment on the decisive axis will be determined by the massive employment of weapons, not troop maneuvers.
- Strategic weapons can be used in support of missions at the operational and tactical levels.
- Offensive and defensive operations will converge with the combination of fire and electronic strikes in the future.
- New methods are needed for transforming operations from contactless war into contact war.
- The disablement of an opponent's political and economic management infrastructure facilities, communications, and electronic warfare systems is acquiring special significance.
- Air defense systems will have to be hardened and jam-proofed and become echeloned and multilevel.
- The need for ground troops continues.
- Fire destruction of an opponent prior to the moment of close contact will ensure the continuity of the offensive, surprise, and the momentum of strikes.

[93] Ibid., pp. 23-28.
[94] A. G. Sokolov interview with Aleksandr Vladimirovich Serzhantov, "The Development Trends of Military Art. Doctor of Military Sciences Aleksandr Serzhantov on the Developments of the Center for Military-Strategic Research. Candidate of Military Sciences A. G. Sokolov Conducted the Interview," *Nezavisimaya Gazeta Online (Independent Paper Online)*, 4 October 2019.

- The fight for air supremacy will be an important characteristic of engagements.[95]

Serzhantov's analysis closely follows what General Staff Chief Valery Gerasimov discussed in his recent presentations at the Academy of Military Science, to include Gerasimov's statement that it is now necessary to wage wars and armed conflicts using classical and asymmetric methods of operations. Serzhantov noted that based on the strategy for achieving goals, operations can be classic (the strategy of the destruction and attrition of the enemy) or asymmetric (the strategy of indirect operations).

Conclusions

When Western analysts of Russian military affairs are asked "what is military art?" they usually reply that it is the use of strategy, operational art, and tactics. This is true but, as the discussion above has demonstrated, it is not only much more but is also continually adaptable to changes. Military art includes the employment of knowledge that has benefited from combat experiences and technological advances in equipment and weaponry. It is the creative employment of knowledge applied against specific conditions or the development of decisions to fit situations at hand. Some decisions are unconventional and unique, while others may be based more decisively on older principles of military art or combat experience used in a new fashion. The focal point of Russia's principles of military art is recommendations for action based on a commander's creative ability and knowledge accumulated over time. These recommendations are apt to change regularly along with the development of new capabilities or ways to use them. These principles will always be in some slow or fast state of flux and cannot be stereotyped. Of equal importance is whether military art will add "planetary" or "global" to its context of strategy, operational art, and tactics. As has been noted before, technology determines strategy today with its reach and speed. Likewise, technology enables global operations. It will be of interest to follow this discussion when it evolves.

Further, the discussion underscores the fact that military theorists are considering the use of actions against an opponent's economic structure, strikes that could win a war before it starts. These could be caused by cyber strikes on not only critical infrastructure but also components such as the banking sector. The SolarWinds attack could be much more than mere espionage. It could be reconnaissance for finding vulnerabilities that will enable Russian superiority in an initial period of war. Or the attack could be a test run of a way Russia intends to use nonnuclear strategic weaponry.

[95] Ibid.

FUTURE DEVELOPMENTS FOR MILITARY ADVANTAGE

[96] Image is by Hommy Rosado. It first appeared in the Foreign Military Studies Office book *Russian Military Strategy*, 2015, p. 127.

RUSSIA'S NEW WAY OF WAR 2020: PART EIGHT
RUSSIAN HYPERSONIC WEAPONRY: LAND, SEA, AND AIR VARIANTS

Work is planned for the creation of the "Tsirkon" sea-based hypersonic missile. There is no doubt that we are leaders in this field in comparison with the world's technologically developed countries. Thus, recently a decision was made on conducting scientific and design work on the development of ground complexes of mid- and lower-range hypersonic missiles. (General Staff Chief Valery Gerasimov, 2019 Presentation at the Academy of Military Science)

Introduction

Russia has invested heavily in the development of hypersonic weapons. Kremlin leaders understand their importance as deterrents to other nations. The speed of hypersonic weapons provides opponents with minimal reaction time to either actuate their intercept capabilities (if possible) or decide to retaliate, expanding the room for errors as well. Perhaps for that reason Russian Deputy Foreign Minister Sergey Ryabkov stated in April 2020 that Russia believes the Avangard hypersonic glide vehicle and Sarmat heavy intercontinental ballistic missile (ICBM) (which, according to one source, is the Avangard's future launch vehicle) could be counted under a new START treaty along with Russia's nuclear weapons.[97] As a deterrent under treaty specifications, it could help strengthen strategic stability.

Hypersonic weapons are divided into hypersonic cruise missiles (HCMs) and hypersonic glide vehicles (HGVs). The former fly between 70,000 to 100,000 feet altitude while the latter rests atop an ICBM, separates from it at a specific altitude (above 100,000 feet), and glides at the top of the atmosphere at hypersonic speeds (Mach[98] 5 or better). Both HCMs and HGVs are highly maneuverable and can, through their kinetic energy from speed alone, cause significant (but far less than nuclear) damage to a target even without a warhead.[99]

The short analysis that follows lists the characteristics of two Russian hypersonic vehicles, the Tsirkon cruise missile and Avangard hypersonic glide vehicle. It also addresses other hypersonic weapons supposedly under development in Russia.

Russian Hypersonic Weapons

Recently, the Pentagon was authorized the development of Space Forces. Russia believes this will exacerbate the military-political situation and create new threats. In response, Russia announced it will develop asymmetric measures to improve its deterrent capabilities. However, President Vladimir Putin had announced the development of new weapons before the US Space Force announcement, doing so in March 2018. He named the Avangard, Sarmat, Peresvet, and Kinzhal weapons, among others, as without analogs elsewhere in the world.

The Kinzhal was highlighted in December 2020. It was noted that MiG-31 fighters could be armed with the weapon to project power in the Arctic. Gerasimov noted that a series of airfields are being developed to expand the geography for using the Kinzhal. It is designed for strategic missions of nonnuclear deterrence

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[97] No author provided, "Russia Shows Willingness to Include New Nuke, Hypersonic Weapon in Arms Control Pact," *The Associated Press*, 17 April 2020, downloaded 2 September 2020 at www.defensenews.com/smr/nuclear-arsenal.

[98] Mach is the speed of sound, 1,220 kilometers per hour or 767 miles per hour.

[99] Ben Brimelow, "Hypersonic Weapons Can Make Virtually All Missile Defenses Useless—And Destabilize the World Order," *Business Insider UK*, 4 March 2018, downloaded on 10 September 2020 at https://uk.news.yahoo.com/hypersonic-weapons.

in the prenuclear phase of a major conflict, with targets to include military infrastructure and state command and control hubs. It can deliver strikes up to 2,000 kilometers away.[100]

A United Nations source noted that the Avangard was referred to earlier as the Yu-71. Its estimated range is 10,000 kilometers. The source speculated that the Avangard could be launched atop the RS-28 Sarmat ICBM, expected to enter service in 2021.[101] President Putin stated that the Avangard missile system was comparable to Sputnik (the world's first satellite) in terms of security and would enter the inventory in the near future (supposedly it went into series production in December 2018). The super-weapon is designed to overcome any modern ballistic missile defense system. Initially there were to be two Avangard complexes as part of a regiment, but this number will eventually increase to six according to one report. The winged Avangard can fly to intercontinental ranges at speeds exceeding Mach 20. Its carrier at the moment will be the liquid-fueled UR-100N (or US classification the SS-19 Stiletto).[102] Konstantin Sivkov, Deputy President for Information Policy of the Russian Academy of Missile and Artillery Science, noted that Avangard follows a "grazing trajectory" and it maneuvers in flight. The winged reentry vehicle can fly in dense layers of the atmosphere at hypersonic speed and change course and altitude to defeat any ballistic missile defense system.[103]

In October 2020, the Latvian news site *Meduza* conducted an exclusive interview with the designer of the Avangard, Gerbert Yefremov. For many years he has worked on hypersonic weapons, and it was in 1985 that he first proposed to create what is now called the Avangard. Yefremov noted that no one really knows how Avangard will maneuver in course or altitude, as algorithms and programs imbedded in the weapon do the programming independently. Trajectories are calculated by the software before launch and so it produces surprises for everyone. Flying at speeds 27 times the speed of sound makes it immune to air and antimissile defense. The weapon glides along the edge of the atmosphere after entering it thousands of kilometers from the object to be destroyed. Yefremov stated that hypersonic weapons became a priority because the U.S. was always scaring Russia with its antimissile defense, and the Avangard was designed to deter aggressors.[104]

Regarding the Tsirkon anti-ship hypersonic cruise missile (3M22), State Duma Defense Committee head Vladimir Shamanov stated in early 2019 that a Tsirkon, designed to be fired from a ship, will be commissioned within the next few years. President Putin a few days earlier had said the missile could strike ground and surface marine targets at ranges of 1,000 kilometers flying at Mach 9. Designed by the Reutov-based NPO Mashinostroyeniya association, an affiliate of Tactical Missiles Corporation, Tsirkon will arm Yasen-M and Khaski nuclear submarines and surface vessels.[105] The ability of Tsirkon to make anti-missile maneuvers ensures its survival against nearly all defenses. One source noted that with the launch of 4-8

[100] Anton Lavrov and Roman Kretsul, "Cold Kinzhal. Norther Fleet to Receive Hypersonic Weapon. Naval Aviation to Have Hypersonic Missiles. Maritime Aviation to be Equipped with Hypersonic Missile System for Nonnuclear Deterrence," *Izvestiya Online*, 15 December 2020.
[101] No author provided, "Hypersonic Weapons, A Challenge and Opportunity for Strategic Arms Control," United Nations Office for Disarmament Affairs, United National Institute for Disarmament Research, 2019, pp. 10-11.
[102] Oleg Koryakin, "Russia Begins Series Production of Hypersonic Avangard," *Rossiyskaya Gazeta Online*, 5 December 2018.
[103] Konstantin Sivkov, "Main Advantage of the Avangard Complex Cited," *Zvezda TV Online*, 12 December 2018.
[104] Liliya Yapparova interview with Gerbert Yefremov, "*Meduza* Interviewed Gerbrt Yefremov, Designer of Russian Hypersonic Weapons. His Name Was Kept Secret until September 2020," Riga *Meduza*, 7 October 2020.
[105] No author or title provided, *Interfax* (in English), 21 February 2019.

Tsirkon missiles, targets such as an aircraft carrier could be destroyed. It is estimated that there will be several hundred Tsirkon units in the naval fleet in the future.[106]

Many factors of the Tsirkon argument were laid to rest on 6 October 2020, when Russia offered a YouTube video of the missile's launch from a "universal launcher." General Staff Chief Valery Gerasimov reported to President Putin that the missile attained a "flight range of 450 kilometers, altitude up to 28 kilometers, time 4.5 minutes, and speed Mach 8."[107] That is, the missile enters the stratosphere after launch and conducts a flight in it to the target location area and later, in a dive, carries out the destruction of the designated enemy target.[108] It is planned to have Project 885 Yasen nuclear submarines provide the targeting for the Project 22350 Gorshkov series of frigates carrying the Tsirkon missiles.[109]

Training Mockups

For training purposes, Russia has developed the Favorit-RM target missile, a missile that can briefly reach a hypersonic speed of 7,000 kilometers per hour. Also included in the Favorit-RM system are a command-and-control post as well as S-300 launchers with four missiles. The latter are used to bring down the hypersonic target missiles. The high speeds and broad range of flight altitudes of the modernized "hypersonic" target missiles test an operator's ability to track and destroy them. The missiles can be launched at a high rate of speed and each can be fitted with an individual flight program. The target missile's operator can issue radio commands to adjust a trajectory or maneuver, which complicates the work of combat crews.[110]

Other Hypersonic Issues

In 2017, Boris Obnosov, CEO of the Tactical Missile Weapons Corporation, said his firm is working on developing hypersonic drones. This will happen in the 2020s, he stated.[111] In March 2018, Major Aleksandr Nemov, deputy chief of a department of the Russian Federation's Air Force Scientific Research Institute, told the TV program *Military Acceptance* about a unique UAV. Nemov noted that "At the present time developments of a long-range unmanned complex are underway that will be capable of performing automatic low-altitude supersonic flight and engaging both fixed as well as mobile targets in the operational and strategic depth."[112] The complex can employ both guided and free-flight air-delivered weapons.[113]

In 2019, firearms designer Vladislav Lobayev stated that a special round for sniper rifles has been developed that can fly at hypersonic speed. It has an initial velocity of 2,000 meters per second and can hit targets up

[106] Dmitriy Kornev, "Missile Ranges: Military Expert Dmitriy Kornev—On How the 'Tsirkon' Is Changing the World's Political Landscape," *Izvestiya Online,* 21 February 2019.
[107] Dmitriy Boltenkov and Roman Kretsul, "A 21st Century Dreadnaught: What the 'Tsirkon' Successful Test Launch Signifies," *Izvestia Online*, 10 October 2020.
[108] Ibid.
[109] Roman Kretsul and Aleksey Ramm, "All Yasen Submarines will Provide Target Designation of an Enemy for Tsirkon Missiles," *Izvestiya Online*, 17 December 2020.
[110] Aleksey Ramm and Aleksey Kozachenko, "At a Stroke: Air Defense Troops to Be Trained to Shoot Down Hypersonic Targets. Unique Target Missiles Capable of Simulating Missiles of the Future," *Izvestiya Online*, 19 February 2019.
[111] No author or title provided, *Interfax* (in English), 20 July 2017.
[112] Aleksey Yegorov, "The Air Force Central Scientific Research Institute Told about Unique Defense Ministry Unmanned Aviation Developments," *Zvezda TV Online*, 29 March 2018
[113] Ibid.

to six kilometers away. Lobayev founded the Tsar-Pushka company and the LOBAEV Arms brand, thus he is a private-sector precision weapon maker.[114]

Defense Minister Sergey Shoygu noted in 2019 that he is interested in starting work on a hypersonic ground-based intermediate-range missile. His suggestions came shortly after the US withdrew from the Intermediate-Range Nuclear Forces (INF) Treaty.[115] The ground-based, medium-range hypersonic missile will be based on the 3M22 Tsirkon missile.[116] Thus there are many hypersonic weapons planned in Russia's future, from bullets to UAVs to ground-based cruise missiles.

Conclusions

There is little doubt that hypersonic weapons are of great interest to Russia. The Defense Ministry is constantly looking for new uses of the technology, as the focus on bullets, drones, and ground-based intermediate systems indicates. There are also focused attempts to find ways to counter the current capabilities of other nations. An article in the *Journal of the Academy of Military Science*, for example, was titled "The Substantiation of the Relevance of Developing Methods of Using Forces and Means to Combat Enemy Hypersonic Aircraft." The article noted that Russia, for now, lacks specialized means to combat such a capability and thus must integrate and coordinate ways to use available forces and means to combat hypersonic weapons under different circumstances. It will be worthwhile to keep Russia's hypersonic quest in view. It would be a mistake to underestimate the importance and focus of scientific research that is being conducted for Russia's military.

[114] No author listed, "Hypersound in the Barrel. Russia Develops Hypersonic Bullet for Ultrapowerful Rifles," *Rossiyskaya Gazeta Online*, 12 March 2019.
[115] No author or title provided, *Interfax* (in English), 4 February 2019.
[116] Ivan Safronov, "Russia Will Respond to the Withdrawal of the United States from the INF Treaty with the Development of New Missiles: According to *Kommersant,* Data Ground-Based Versions of the Kalibr and Tsirkon Will be Created," *Kommersant Online*, 2 February 2019.

RUSSIA'S NEW WAY OF WAR 2020: PART NINE
OPERATIONAL ART/OPERATIONAL MANEUVER GROUPS IN SPACE

Introduction

Today, circling high above Earth, are over 2,000 satellites. Some are of commercial origin and some military. In the latter's case, they are responsible for watching military equipment and troop movements in other nations, coordinating command and control activities, and helping weapons and forces navigate their way across the globe, among other issues. Their importance to the way nations plan to deter or conduct modern warfare is hard to overestimate.

Russia's military is and has been deeply embedded in the study and use of such space activities, from the launch of Sputnik in 1957 to today's rockets that send astronauts to the International Space Station. In addition, Russian military thinkers are probing deeper into finding ways to use space for military advantage. This domain continues to escalate in importance. In 2015, Russian Defense Minister Sergey Shoygu conceded that aerospace is now the center of gravity (COG) of future wars.[117] Another 2018 article on modern methods of aerospace and air defense practices noted that "operational art in terms of its inherent purpose remains the theory and practice of resolutely changing the situation in aerospace in one's favor…".[118]

The thoughts of such Russian experts and leaders make it appear imperative for the West to study and conceptualize how operational art might be applied to the aerospace domain. Now, theorists must take into consideration technological advancements affecting the theory's content and reach, which can extend to the heavens (satellites) or under the oceans (cables, submarines, etc.). Maneuver, deep operations, and breakthroughs are traits that have long characterized operational art's ground operations. They work in space as well. Satellites maneuver and conduct operations such as extended reconnaissance, inspection, navigation, and other activities. An operational group, it must be remembered, is a temporary large strategic formation that consists of front forces operating on a separate operational direction or sector of the front,[119] which in this proposed case would be a space axis. Thus, while the focus is often on Russian maneuver brigades creating an optimal fighting force on the ground, Russian planners may simultaneously be creating an optimal fighting force in space.

Discussion

Operational art is defined in the Soviet Union's 1986 *Military Encyclopedic Dictionary* as "Encompassing the theory and practice of preparing for and conducting combined-arms, joint, and independent operations (combat actions) by large strategic formations of the armed forces by various branches."[120] Some of its tasks include an investigation of the forms of the operational employment of large strategic formations; an elaboration of the operational requirements for organizing and arming large strategic formations; the development of recommendations for the

[117] *Interfax* (in English), 3 August 2015.
[118] A. P. Korabelnikov, "Modern Methods of Aerospace and Air Defense of Facilities and Prospective Development Trends," *Military Thought* (in English), Volume 1 2019, EastView Publications, p. 34.
[119] S. F. Akromeev, main editor, *Military Encyclopedic Dictionary*, Second Edition, Moscow: Military Publishing House, 1986, p. 513.
[120] S. F. Akromeev, main editor, *Military Encyclopedic Dictionary*, Second Edition, Moscow: Military Publishing House, 1986, p. 513.

operational equipping of theaters of military operations; and the study of the views of potential adversaries for the conduct of military actions on an operational scale.[121]

In 1999, writing in *Voennaya Mysl* (*Military Thought)*, Major-General (retired) E. G. Korotchenko described where operational art was heading. He noted that the "growing potentials of air and space warfare are increasingly influencing the theory and practice of operational art."[122] In 2011, General of the Army Makhmut Gareyev, writing in the *Journal of the Academy of Military Science*, noted that aerospace defense missions include the implementation of an antisatellite struggle; and defense against strikes from space that confronts both strategic and nonstrategic attacks.[123] Gareyev noted that a probable adversary's command and control system, to include aerospace attack means, is usually located in space and becomes a primary target, where it is necessary to bring down an opponent's entire space communications and command and control system.[124] Such a system requires the creation of an operational group of specialists from the Main Air Force Staff, the Space Force Command, and other command and control organs in the General Staff Military Academy for the assessment of the actual conditions of forces and means.[125] In 2012, Gareyev noted that operational maneuver groups (OMGs) although liquidated with the fall of the Soviet Union, will "obviously be used in some form or another" in the future. The main priority in the entire system of military development remains the operational-strategic vector.[126] Thus, it is possible that OMGs could be developed for space operations in "some form or another."

Russian Space Developments

In November 2017 Russia announced it was developing two advanced anti-satellite weapons: Rudolf, a mobile anti-satellite strike system and the Tirada-2S, a mobile anti-communication satellite electronic warfare system.[127] The Tirada-2S conducts the radio-electronic suppression of satellite communications, even from Earth.[128] Journalists reported in 2017 on the use of Russia's Space troops to test a "maneuvering" military inspection satellite. The satellite undocked from a Kosmos-2519 space platform and it began an autonomous flight. It first changed its orbit, then returned to the Kosmos platform and inspected it. Such a capability can allow for determining the functional purpose of a foreign satellite and, when required, turn into a space interceptor that can deploy missiles.[129]

In 2018 a *Wired* magazine article discussed the threat of a war high above the earth among satellites and Russian deception. The article noted that in 2014 the US military observed how a piece of Russian space junk, Object 2014-28E, began to act strangely, coming alive to perform complicated maneuvers. It sided up to American commercial communication satellites. The Object has been

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[121] Ibid.
[122] E. G. Korotchenko, "Operational Art Today: Where It Goes," *Voennaya Mysl* (*Military Thought)*, No. 1, 1999 (in English), p. 13.
[123] M. A. Gareyev, "On the Organization of the Russian Federation's Aerospace Defense*," Vestnik Akademiy Voennykh Nauk (Journal of the Academy of Military Science)*, No. 2 2011, p. 40. The author would like to thank Dr. Harold Orenstein for translating this article.
[124] Ibid., p. 42.
[125] Ibid.
[126] Ibid.
[127] No author or title provided, *Interfax*, 30 November 2017.
[128] No author or title provided, *Interfax* (in English), 9 January 2019.
[129] S. Valchenko, N. Surov, and A. Ramm, "Russia Sends Inspector into Orbit: Military Test Operations of Maneuvering Identification and Intercept Satellite," *Izvestiya* Online, 26 October 2017.

joined in years since by "similar space objects of Russian provenance."[130] Also in 2018 a MiG-31 appeared on the Internet with a mockup of a new type (not identified further) of anti-satellite missile under the fuselage.[131] Further, the Peresvet combat laser system was advertised as capable of fighting satellites in orbit according to the Russian Defense Ministry, and it has been supplied to the Space Forces.[132]

A final 2018 report noted that space force formations in peacetime are designed to carry out the following missions: conducting continuous reconnaissance of regions for the launch of ballistic missiles; detecting space objects and cataloging them; controlling space ships in orbital flight and safeguarding the deployment of orbital space ship groupings while maintaining them in a combat-ready condition; and developing operational-tactical requirements for new and modernized complexes and systems.[133] Thus operational issues are under continuous reevaluation.

In 2019, Russian analysts offered a brief description of the Nudol missile defense system. It is designed to repulse a nuclear strike at distant approaches to Russia, and it is being deployed on the ground and in space. From there it can strike at satellites and missiles.[134] Nudol can eliminate both reconnaissance and target designation satellites of an opponent. Moscow's layered ballistic missile defense system would thus include satellite groupings, a network of ground-based, long-range radar detections stations, and Nudol, thus becoming an aerospace defense system covering air and space.[135]

Finally, President Putin stated in 2019 that nearly 80 percent of Russia's military and dual-use satellites had been replaced.[136] Defense Minister Shoygu stated that the throughput of communication channels for Russia's military satellite grouping will increase 2.5 times by 2025 and will raise their jamming resistance.[137] Thus, the improvement in space systems is a clear indication of its growing importance. With these concepts as background, a truncated potential lineup of equipment that Russian theorists might consider as components of a space OMG that can maneuver and conduct deep/planetary operations in near or deep space include the following, based on the articles used above:

- Inspector satellites, such as the Kosmos 2521
- Killer satellites
- Tirada-2s, to thwart communications
- Rudolf, anti-satellite strike system
- Nudol, anti-satellite and missile system
- Peresvet combat laser
- Ground stations that can jam objects in space
- MiG-31armed with anti-satellite missiles
- Space junk that comes alive

[130] Garrett M. Graff, "The Outer Limits of War," *Wired Magazine*, July 2018, pp. 48-49.
[131] Anton Valagin, "Photos: MiG-31 Tests 'Satellite Killer,'" *Rossiyskaya Gazeta Online*, 30 September 2018.
[132] No author or title provided, *Interfax* (in English), 5 December 2018.
[133] Kasakhov and Isaev, pp. 30-35.
[134] Viktor Sokirko, "Intelligence Late to Report: US 'Pinpoints' Killer of its Satellites Three Years after the Event. Bad News for the Pentagon: Russia Successfully Testing Nudol System," *Svobodnaya Pressa*, 20 January 2019.
[135] Dmitriy Popov, "The Killer Satellite with a Nice Name: The United States Has Nothing to Counter the Latest Nudol System," *Armeyskiy Standart*, 25 January 2019.
[136] No author or title provided, *Interfax,* 16 May 2019.
[137] No author or title provided, *Interfax* (in English), 3 June 2019.

- Reconnaissance-strike complexes and information-strike system
- Ground based hackers who attempt to take control of satellites, such as theoretically occurred in 1998.[138]

Conclusions

Western analysts should consider whether the deep operations of operational art normally associated with ground forces are now finding new life in a deep space dimension of Russian planning; and whether the theory is further buttressed by Russia's SODCIT (special operations for the destruction of critical infrastructure targets) concept that aims to take out another nation's economic base or links to space operations in the initial period of war (IPW). Perhaps Russia has even developed a space OMG, the potential components of which were listed for consideration. What is apparent from just these three points (SODCIT, IPW, OMG) is that Russia's military has different focal points of thought than does the West, and they must be considered when developing Western responses to Russian threat indicators in space.

Ever since the 1920s, Soviet and now Russian military theorists have adjusted operational art to new discoveries in weaponry. Operational art's past characteristics of maneuver, breakthroughs, and deep operations are all applicable to space. These developments are taking place at a time and place (space) that has an unfolding environmental context. There are no rules of space warfare that would be equivalent to the rules of land warfare (although many believe space in the interim should abide by land warfare rules until space rules are developed). To date there is only the Outer Space Treaty of 1967 and not a rule of law. The treaty appears to leave much room for interpretation and was, naturally, unable to envision two things: the current space environment that includes commercial and private spacecraft in addition to government developed ones; and its high-technology equipment (lasers, antisatellite missiles, etc.) that is able to do things (inspect other equipment in space, for example) never before considered.

The last section of the article, on the use of operational art in space, noted that being in a superior position during the initial period of war is the primary element that clears the way for the use of operational art in space and helps ensure success. Putting the proper equipment in space during peacetime prepares Russia's military for the initial period of war. Large-strategic formations would be composed of equipment that includes lasers, satellites, anti-satellite missiles, counter communication, and other pieces of equipment instead of tanks, artillery, and aviation units. Numerous similarities in the characteristics surrounding the use of operational art in ground operations (weaknesses on flanks, etc.) are present in space, which provide further rational for Russia conceptualizing the use of operational art or even perhaps OMGs in that domain.

Today, equipment orbits above us and cables wrap the globe together under the seas. Space objects, suspended in orbit, are equipped with capabilities that offer the opportunity to form OMGs in space in a suspended status, awaiting further orders for their activation or integration much like a computer virus. As was noted above by one Russian author, "operational art in terms of its inherent purpose remains a theory and practice of resolutely changing the situation in aerospace in one's favor…".[139]

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[138] No author provided, "Using the Force," *The Economist*, 20 July 2019, p. 19.

[139] A. P. Korabelnikov, "Modern Methods of Aerospace and Air Defense of Facilities and Prospective Development Trends," *Military Thought* (in English), Volume 1 2019, EastView Publications, p. 34.

RUSSIA'S NEW WAY OF WAR 2020: PART TEN
RUSSIAN ROBOTICS

Introduction

There are numerous organizations in Russia researching and constructing robotic means for use in battle. Ground forces, artillery, engineers, and other branches of service are involved in acquiring such means. The development of Russian military robotic systems is expressed in several documents, such as the targeted program "Creation of Advanced Military Robotics up to 2025" and the *Concept for the Employment of Military Robotic Complexes for the Period up to 2030*.[140]

Numerous organizations and conferences have studied the use of robotics. For example, a Defense Ministry conference on 21 February 2018 was hosted by the Main Scientific Research Test Center for Robotic Equipment. The Ministry's Third Central Scientific Research Institute and the STANKOMASH Limited Liability Company, which works with the Military Logistical Support Academy's Scientific Research Institute, participated. The handbook used was "Military and Dual-Purpose Robot Systems" from the Test Center for Robot Equipment. Systems that were discussed included the Pelets 300-RK, the SRX 3, the Platform-M and Argo.[141]

Vitaliy Davydov, Deputy General Director and Chairman of the Fund for Advanced Research (FPI), noted in late 2018 that the National Center for the Development of Technologies and Basic Elements of Robotics has been developed at FPI's center.[142] Vitaliy Lopota was identified as the leader of the Sector for Programs on Robotics Engineering of the ERA Technopolis at Anapa.[143] It is thus clear that research on military robotics is increasing.

This section is limited to a discussion of robotic use in urban operations and in the fighting in Syria.

Robotics in cities

In 2017 P. A. Dul'nev discussed urban operations and robotics in detail in an article for the *Journal of the Academy of Military Science*. Urban operations, he pointed out, are conducted at close quarters on several levels (streets and squares, different floors of buildings, on rooftops, and underground) simultaneously; lack a continuous front, with fighting turned into a series of isolated battles; and due to fighting in small areas, advancing forces are more vulnerable and require more security.[144]

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[140] Andrey Petrochinin, interview with Sergey Anatolyevich Popov, "We Are Working on Military Robotics to Unique Russian Standards," *Oriyentir Online*, 1 April-30 April 2017, pp. 16-20.
[141] V. Sergeyev, A. Zhernakov, and A. Alekseyev, "Second-Echelon Robots. Military Ground Robotic Systems for Logistical Support Needs in the Russian Federation Armed Forces," *Armeyskiy Sbornik (Army Journal*), May 2018.
[142] RIA Novosti Interview with Vitaliy Davydov, *RIA Novosti*, 12 December 2018.
[143] Yuriy Avdeyev interview with Vitaliy Lopota, "ERA Multi-copter Pilotless Vehicles: The Defense Ministry is Actively Participating in a Program for Advanced Development of unmanned Aviation Vehicles," *Krasnaya Zvezda (Red Star*), 29 March 2019.
[144] 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. The author would like to thank Dr. Harold Orenstein for translating this article.

To capture urban structures, assault groups become an important asset. Here is where the greatest loss of personnel occurs and where robotic-technical complexes (RTKs) can be of help. 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 (and on occasion a demolition group). 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.[145] As a result, the following types of RTKs need to be developed in Dul'nev's opinion:

- Heavy RTK platforms: with tank-type armor protection to destroy highly protected enemy objectives and with bulldozer attachments to overcome mixed minefields.
- Medium RTK platforms: with BMP-type protection to cover flanks and hold 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 to destroy unarmored equipment and defend command posts.
- Light RTK platform 2: with a weight up to 300 kilograms anti-shrapnel protection, it can conduct audio-video reconnaissance of the enemy and terrain.
- RTK transport platforms: 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: designated to conduct reconnaissance and destroy small targets.[146]

An RTK-assisted attack would unfold with a recce-fire support subgroup of light RTKs, an air recce-strike group to destroy enemy fire resources (mortars, heavy machine guns, etc.), and a long-range reconnaissance group of UAVs for surveillance. Artillery fire would cover the advance of a penetration subgroup of heavy RTKs that conduct direct fire against opponents. RTKs would create passages through obstacles, and a fire support subgroup of medium and light RTKs would perform three missions: cover the penetration subgroup's actions; cover the advance of remote-controlled platforms advancing toward targets with explosives; and sweep the objective.[147]

Problems remain. 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

[145] Ibid., pp. 29-30.
[146] Ibid., p. 31.
[147] Ibid., p. 30.

- 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
- Information exchange capabilities among RTKs and maintaining stability against unsanctioned software effects from an enemy force
- Provisions for electromagnetic compatibility of military RTKs with other radiating objects such as radio-electronic warfare resources.[148]

Another source noted that, once underway, teams are told to avoid movements along streets, where only fighting vehicles should advance. 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 *Ground Field Manual Part II* 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[149]

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.[150]

Robotics in Syria

The use of robotic systems has been tested often to include under combat conditions in Syria. 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

[148] Ibid., pp. 31-32.
[149] V. Podgorodetskiy, V. Litvinenko, and P. Sergeyev, "The Assault Team: Features of Combat Operations of Assault Teams in Urbanized Areas," *Armeyskiy Sbornik (Army Digest)*, November 2018, pp. 19-25.
[150] Ibid.

Andromeda-D battlefield command and control system.[151] Another system tested was the Skarabey, 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.[152] Other open source reports of robotic use in Syria, among others, included the Uran-9, which is 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.[153]

Conclusion

The robotization of combat operations has become a dominant way to improve weapon systems, execute missions never considered, and minimize end strength losses. A small collection of capabilities Russia has developed include the following: combat vehicle fire systems; multiple-launch rocket systems; radiological reconnaissance; logistic transport; use in space; crewless ships, submarines, and underwater UAVs; engineer use (mine clearing, exoskeletons, surveillance balls [Sfera], etc.); use of autonomous UAVs; and robotic swarms and group interactions, among many others. Robotic complexes include control means, communication and navigation assets, and video surveillance, photography (thermal imaging), support, and other related equipment.[154]

[151] Nikita Volchenko, "Syria Has Become a Test Range for Testing the Latest Developments of Russia's Defense Industrial Complex," *Vzglyad Online*, 3 February 2017.
[152] Yuriy Gavrilov, "The Robot Does Not Fear War: Many Unmanned Combat Assets Have Undergone Battle-Hardening in Syria," *Rossiyskaya Gazeta Online*, 20 August 2018.
[153] Ibid..
[154] V. Lukyanchik, O. Bunin, and D. Koryakin, "Air Controller with Artificial Intelligence: Forward Air Controller Ground Robotic Complex for Controlling Army and Ground Attack Aviation," *Armeyskiy Sbornik*, July 2018.

RUSSIA'S NEW WAY OF WAR 2020: PART ELEVEN
RUSSIAN MILITARY USE OF ARTIFICIAL INTELLIGENCE AND QUANTUM ISSUES

Introduction

Russia's Artificial Intelligence (AI) Strategy was released in October 2019. Described as a decree from President Vladimir Putin, it is designed to protect national interests and implement strategic national priorities.[155] AI was defined as follows:

> A set of technological solutions that makes it possible to simulate human cognitive functions (including self-learning and seeking solutions without a predetermined algorithm), as well as to obtain results during the performance of specific tasks that are at least comparable to the results of human intellectual activity. This set of technological solutions shall consist of information and communications infrastructure, software (including that in which machine learning techniques are employed), and data-handling procedures and services.[156]

Two fields singled out in the Strategy are economics and the use of self-contained robotic and intelligent logistic systems.[157]

The Military and AI

In September 2018, the "ERA Technopolis" specialized military scientific-research center was unveiled in Anapa on the Black Sea. The Technopolis consists of more than 40 laboratories (with 18 laboratories in one building alone), innovation programming and data processing centers, centers for defense-industrial complex enterprises, a manufacturing base for prototype models, and several building for administration, housing, and physical health (ice arena, gymnasium, hospital, etc.). While at the present time there are eight scientific-technical fields (robotics; information security; information-telecommunication systems; power supply technologies, equipment, and life-support machines; artificial vision and pattern recognition; informatics and computer equipment; biotechnical systems and technologies; and nanotechnologies and nano-materials), an additional six were planned (small space vehicles; weapons based on new physical principles; military geo-information platforms; hydroacoustic object detection systems; hydro-meteorological and geophysical support; and artificial intelligence technologies). The latter lies at the heart of many of these capabilities. Nine Defense Ministry sub-departmental organizations, 35 civilian enterprises (the Kalashnikov Concern, the PAO "Sukhoy", etc.), and 20 scientific organizations of the Russian Academy of Sciences and higher education institutions have become ERA residents.[158]

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[155] Vladimir Putin, *Decree of the President of the Russian Federation: On the Development of Artificial Intelligence in the Russian Federation*, No. 490, 10 October 2019, pp. 1-2.
[156] Ibid., p. 2.
[157] Ibid., pp. 9-10.
[158] No author provided, "What is the 'ERA' Military Innovations Technopolis in Anapa?" *Abakan AIS,* 24 February 2019.

In 2019, four Russian authors (to include Major General O. V. Maslennikov, Head of the Information Systems Department of the Defense Ministry) discussed the importance of the Armed Forces transformation to digital technologies.[159] Digitizing the Armed Forces improves their quantitative and qualitative indices through the introduction of information and telecommunication technologies (ITT). The authors noted that countries mastering advanced means (control systems, precision-guided weapons, robotechnology, cyber security) of ITT gain an advantage over adversaries. Decision-making and -forming are the prerogatives of machines or AI systems.[160] Finally, another 2019 article noted the following"

> We [Russia] need to create more effective and less expensive means to confront looming challenges…Direct and asymmetric measures should be combined and used against our opponents, creating our own means of military-specific technologies… we need to concentrate on the creation of domestic…systems equipped with AI, [and] continue studies in the realm of optical and quantum computers. Special attention must be diverted to AI. Its development opens unlimited prospects in perfecting the methods of military confrontation.[161]

In 2020 Maslennikov, quoted in an August *Armeyskiy Sbornik (Army Journal*) article, stated that the innovative nature of computer technologies allows for reducing time periods of scientific research and generates opportunities for preemptive scientific exploration. Another analyst, V. Sosnitskiy, added in the article that six new research directions have been specified since the beginning of the year: small spacecraft, weapons based on new physical principles, geoinformation platforms, hydrometeorological and geophysical support, a maritime direction, and technologies for developing artificial intelligence in the interests of developing arms and military and special equipment.[162]

Another 2020 article noted that a compact multifunctional software-supported radar station is under development. It will be installed on UAVs and land-based robotic systems to expand their reconnaissance capabilities. The Fazotron-NIIR Corporation, part of the Radio-electronic Technologies Concern JSC (DKRET), is one of the products developers.[163] Finally, as reported on April Fool's Day in the US, research has begun on the "Kashtan" (Chestnut) project, which involves the creation of an "experimental model of a system for the development, training, and

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[159] O. V. Maslennikov, V. P. Kurochkin, F. K. Aliyev, and O. M. Tlyashev, "Informatization in the Armed Forces of the Russian Federation," *Voennaya Mysl' (Military Thought*), No. 12 2019, p. 58. Informatization was defined as "a process of inculcating in ergative systems at various state levels modern information technologies based on computers, means of data exchange, and methodologies of developing and rationally using new information technologies meant for attaining the main objectives of activity."
[160] Ibid., pp. 59-60.
[161] Sukhankin.
[162] V. Sosnitskiy, "ERA of Advanced Defense Technologies," *Armeyskiy Sbornik (Army Journal*), Electronic Edition, 31 August 2020.
[163] Vladimir Ivanovskiy, no title provided, *RT Online*, 5 March 2020.

implementation of deep neural networks for a new generation of military systems with artificial intelligence."[164]

There was only one article in contemporary military journals that included the term "artificial intelligence" in the title. It was related to forecasting. It listed the merits and faults of predictive estimation methods and proposed the use of intelligence means of forecasting instead. The latter reduces the time for data processing and tends to improve performance. Artificial neural networks (ANN) are used since they can process data quickly and construct complicated models. They can provide solutions to problems with data not encountered in machine learning.[165]

An Interesting Nonmilitary AI Article

In early 2019, the journal *Russia in Global Affairs* carried an interesting AI article by two Russian authors. While not directly related to military issues, the article's discussion of psychological warfare and international psychological security has specific implications for the military's information-psychological aspect of information warfare. The authors discussed the "malicious use of AI," or MUAI, and how it is acquiring importance in the psychological destabilization of political systems and systems of international relations. Among the numerous MUAI psychological security threats mentioned, the following stood out:

- Prognostic weapons, or predictive analytics based on big data and AI that "correct the future from the present in one's own interests and contrary to the objective interests of the target." This could apply to civil unrest, disease outbreaks, election outcomes and other socially significant events.[166]
- Autonomous operations of attacks from AI users removed in time and space, such as nuclear devices set off simultaneously from different countries without direct human participation.
- The reorientation of commercial AI systems, such as deploying autonomous vehicles to deliver explosives or cause crashes.[167]
- Use of 'deepfakes' to cause financial panic or hot wars. For example, videos of Israeli security personnel talking of plans to take over Jerusalem's Temple Mount.
- Deep learning algorithms generating portraits of non-existent people, such as illegitimate children of celebrities with perfect family resemblance.
- Artificially promoting content to manipulate agenda setting for people, in that the more they see certain content the more they think it is important.

[164] No author provided, "Ministry of Defense to Spend 390 Million Rubles on Artificial Intelligence," *Vesti Online*, 1 April 2020.
[165] Ye. O. Bukharov and V. R. Polyakov, "Artificial Intelligence as a Promising Basic Method for Formalized Forecasting," *Voennaya Mysl' (Military Thought*), No. 4 2019, pp. 81, 83.
[166] Darya Yu. Bazarkina and Yevgeny N. Pashentsev, "Artificial Intelligence and New Threats to International Psychological Security," *Russia in Global Affairs*, No. 1 January-March 2019, pp. 154-156.
[167] Ibid., pp. 153-154.

- Use of computational linguistics to identify emotionally loaded words that reveal an author's opinion of a topic.
- Synthetic information products that contain software modules driving large numbers of people into depression. Appealing to psychophysiology encourages people to "perform strictly defined actions."[168]

MUAI threats are to transition, the authors note, from Narrow AI to General AI and then to ASI, which appears to be "super AI." In time, humans will integrate into the singularity (the merging of humans and computers) through "cyborgization and genetic engineering," thereby increasing human intellectual capabilities. Since human consciousness is behind the objective reality of technology, "It is particularly important to systematically use advanced technologies—big data analysis, AI, machine learning, new communication possibilities, etc.—to develop analytical mechanisms that could warn society about possible threats…[169]

Quantum and the Military

In 2019, Maslennikov and other theorists wrote an extended article on quantum issues for the *Journal of the Academy of Military Science*. The title was more nondescript, cited as "Issues of Information Security at the Facilities of Information Infrastructures of the Armed Forces of the Russian Federation in Modern Conditions."[170] The benefits from the possible implementation of quantum computing in the military field are obvious, the authors note. The first and most obvious consequence of one country creating an operating quantum computer is the almost instantaneous breakdown of an enemy's military and infrastructure coding systems which, in case of a military conflict, provides an enormous advantage. It is assumed that quantum computers can be used in designing new types of weapons, new materials, and new structures, and even in developing new strategies for waging war.[171]

The authors pointed out that the most reliable resources for protecting information are considered to be those whose structure is based on cryptology methods and procedures—the scientific and practical field of secret communications.[172] Cryptography is the component of cryptology that is the totality of procedures and methods that ensure the protection of information against unsanctioned access during transmission and storage by changing the form in which information is presented.[173] It is assumed that post-quantum cryptography systems will be resistant to attacks that use a quantum computer.[174] Maslennikov noted that contemporary information technology trends such as cloud technologies, "the internet of things," "artificial intelligence," "big data," et

[168] Ibid., p. 157.
[169] Ibid., p. 164.
[170] O. V. Maslennikov, V. P. Kurochkin, A. G. Karmanov, and S. S. Orlov, "Issues of Information Security at the Facilities of Information Infrastructures of the Armed Forces of the Russian Federation in Modern Conditions," *Vestnik Akademiy Voennykh Nauk (Journal of the Academy of Military Science)*, No. 1 2019, p. 57. The author would like to thank Dr. Harold Orenstein for his translation of this article.
[171] Ibid., p. 65.
[172] Ibid., p. 61..
[173] Ibid.
[174] Ibid., p. 59.

al. are not alien to the information infrastructure of the Russian Armed Forces. New information technologies are being studied and analyzed. However, a substantial part of contemporary systems used for safeguarding information security, the structure of which is based on classical approaches, is under threat of its own levelling in connection with the possibility of the appearance in the near- or midterm-future of quantum computers whose computer resource is assumed to be incomparably higher than that of classical computers.[175]

Conclusions

The ERA Technopolis research center's focus on robotics; information security; information-telecommunication systems; power supply technologies, equipment, and life-support machines; artificial vision and pattern recognition; informatics and computer equipment; biotechnical systems and technologies; and nanotechnologies and nano-materials; and the planned additions of small space vehicles; weapons based on new physical principles; military geo-information platforms; hydroacoustic object detection systems; hydro-meteorological and geophysical support; and artificial intelligence technologies indicate Russia's serious commitment to developing a world-class military capable of competing with any other nation.

Two areas of current focus are AI and quantum computing. As one Russian theorist noted, special attention must be diverted to AI. Its development opens unlimited prospects in perfecting the methods of military confrontation. Such attention is warranted based on President Putin's statement in September 2017 that "Artificial intelligence is the future, not only for Russia, but for all humankind. It comes with colossal opportunities, but also threats that are difficult to predict. Whoever becomes the leader in this sphere will become the ruler of the world."[176] Likewise, quantum computing is of equal importance. As Maslennikov noted, the consequence of one country creating an operating quantum computer is the almost instantaneous breakdown of an enemy's military and infrastructure coding systems. Further, quantum computers can be used in designing new types of weapons, new materials, and new structures, and even in developing new strategies for waging war.

How and when Russia's military intends to use the capabilities they develop in these areas over the next ten years are worthy of any nation's attention.

[175] Ibid., p. 58.
[176] Alexi Druzhinin, "Whoever Leads in AI Will Rule the World: Putin to Children on Knowledge Day," *Russia Today on Sputnik,* 1 September 2017.

RUSSIA'S NEW WAY OF WAR 2020: PART TWELVE
NONLETHAL WEAPONS

Introduction

For several years now Russian military authors have discussed the definition and potential use of nonlethal weapons (NLW). NLWs are thought to be a crowd control mechanism or a more humane way to conduct armed conflict. Regarding the latter, they are a way to capture or immobilize people hiding in buildings or behind barricades instead of killing them. What is difficult to ascertain is how advanced Russian efforts are in the production of NLWs since most of these experiments are conducted in secret laboratories. Since Russia believes that the US is developing NLW incapacitants (and they discuss US regulations and purported capabilities in some detail in their writings), they are likely to use such accusations to verify their own developments. One NLW analysis demonstrated why Russian authority fears so-called color revolutions:

> Analysis of today's conflict situations shows that political events in such countries as Iraq, Libya, Syria, and Ukraine develop according to similar scenarios. In some cases, it is worth noting the use of incapacitants to stir up panic, various kinds of provocation, and the inadequate behavior by some groups of the public aimed at discrediting the authorities or individual political leaders.[177]

Russian military authors clearly indicate that NLWs are under development. NLWs are used in exercises. One article noted that laser blinding devices, which cause temporary loss of vision without harmful consequences, can be fitted to drones and delivered up to three kilometers. Loudspeakers, sirens, video cameras, and other devices can be fitted to the drone.[178] The capabilities of the Filin blinding weapon, purportedly capable of temporarily blinding an opponent up to two kilometers away, are being increased along with its emitter power and angle of exposure.[179]

This article covers specific incapacitants and their most likely utility. First, a definition of NLWs is offered. Second, explanations of when and how NLWs are used for internal and external situations are examined along with tactical innovations. Finally, Russia's cupboard of physical, chemical, biological, and radiological NLWs are examined. While not a game changer, NLWs are set to become an interesting addition to Russian capabilities on both the modern battlefield and, more likely, in domestic crowd control operations.

A Definition

Often described to "humanize" armed violence, Russia's NLW concept has morphed in meaning over the years from a focus on personnel and equipment to a more focused approach on personnel. The ability of NLWs to disable equipment, however, is still mentioned, so the change appears to be only one of emphasis. In 2018 it was stated that a NLW is meant to impact only living beings.

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[177] L. N. Ilyin and V. V. Rylin, "Several Aspects of the Use of Nonlethal Toxic Agents," *Voennaya Mysl' (Military Thought)*, No. 12 2018, p. 90.
[178] No author or title provided, *Interfax (*in English), 15 May 2019.
[179] No author provided, "Russian Blinding Weapon Becomes More Powerful," *News.ru*, 17 March 2019.

The NLW term was defined as "weapons intended for the temporary disablement of adversary manpower with a minimum of lasting health disorders and fatalities."[180] The authors also defined two other terms. First, a nonlethal injury was defined as a NLW that impacts man where "the result of the factual use of NLWs by the adversary implies loss of combativity or incapacitation of the impact target for the duration of time **equal to or exceeding** the time needed to carry out the combat (special) task…."[181] Second, the term "nonlethal suppression" was defined as "the result of the factual use of NLWs by the adversary implying loss of combativity (incapacitation) of the target for the time **less than that needed** to carry out the combat (special) task for which the said NLW was used."[182]

An article in *Armeyskiy Sbornik (Army Journal*) in January 2019 noted that warfare will be waged with the objective of disorganizing enemy efforts in the political and military spheres, with the goal being to coerce a side to accept proposed terms. This will require NLW effects, the author noted. More importantly, the journal is planning on publishing a series of articles on NLWs.[183] This makes it clear that the concept is drawing additional attention in the Russian military at the moment, indicating that it has become another military priority in Russia to monitor in the near future.

Using NLWs Internally and Externally

There are several internal and external circumstances under which NLWs could be used. Internal armed conflicts (IAC) are those (1) between various illegal armed formations or (2) between illegal formations and state law enforcement agencies. Settling these types of conflicts early can prevent a transition to war.[184] NLWs employed in police operations generally fall in line with the use of acoustic and electromagnetic radiation weapons and are one option available to reduce fatalities. It is important to develop various NLW systems, including those using electric current and radiation, to help power entities solve such special problems. When protecting major facilities, electroshock mines can be laid, since they help block unauthorized access to important areas.[185]

In regard to the external use of NLWs, they are being tested during exercises, with priority given to the Collective Security Treaty Organization (CSTO) due to the challenges these forces are facing in regard to terrorism, drugs, weapons, and ammunition trafficking along their borders.[186] In the three examples below, a special operations brigade of Kyrgyzstan's Armed Forces conducted the first example. Russian troop tactical exercises conducted the examples in bullets two and three:

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[180] D. Yu. Soskov, D. V. Zaitsev, and S. V. Kholod, "Developing a Conceptual Apparatus for Issues of Nonlethal Weapon Actions," *Voennaya Mysl' (Military Thought)*, No. 8 2018, p. 75.
[181] Ibid., p. 76.
[182] Ibid., p. 77.
[183] N. Poroskov, "In Search of a 'Humane' Weapon," *Armeyskiy Sbornik Online (Army Journal Online)*, January 2019, pp. 74-81.
[184] D. Yu. Soskov, S. F. Sergeyev, and D. V. Zaitsev, "Using Nonlethal Weapons in Internal Armed Conflicts," *Voennaya Mysl' (Military Thought)*, No. 4 2018, pp. 56-58.
[185] Ibid., pp. 58-59.
[186] A. A. Nogovitsyn, A. V. Grudzinsky, and A. I. Sporykhin, "Nonlethal Weapons and the Outlook for their Use by the Forces of the Collective Security Treaty Organization," *Voennaya Mysl' (Military Thought)*, No. 3 2011, p. 55.
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- To seize a population center captured by militants, smoke screens were deployed from 70 meters to obscure the vision of a sniper hiding in a building. This would be followed, when buildings were stormed, by thermobaric hand and under-barrel grenades. Sound-and-light cluster hand grenades were also used on fighters in rooms. The Osa complex, with target acquisition and terrain illumination capabilities (signal and flare cartridges), was potentially utilized in this exercise.
- To fight off adversary ambushes, incapacitating agents were used, such as thermobaric hand grenades, which are 2.5 times more effective than conventional ammunition since they can hit adversaries concealed behind cover and in shelters. (Western sources would hardly classify thermobaric as nonlethal)
- To clear corridors for military convoys on roads blocked by the population, a combination of sound-and-light, smoke, and irritant-charged hand grenades were used that explode without scattering splinters and produce only a psychological effect on crowds.[187]

When constructing a plan for the use of NLWs, it must be stated precisely how conventional and NLWs are to be employed together and under what time limits, since NLWs effects only last for a certain period. Using NLWs against staffs and control centers will produce the greatest disorganization in an opponent's control cycle.[188] NLWs can achieve surprise, inhibit countermeasures, and destabilize an opponent psychologically. Once enemy troops are incapacitated and are unable to put up a real fight, they must be handled with resolve. In the offense they are most effective on an adversary's troops hiding in buildings, reducing freedom of maneuver and helping to disorganize his control, reconnaissance, and information gathering.[189]

Physical, Chemical, Biological, and Radiological NLWs

Physical-based NLWs include lasers that can incapacitate manpower and optoelectronic surveillance devices; microwave weapons that disable weapons and equipment by knocking out electronic components; high-frequency weapons that raise body temperatures; and acoustic weapons that cause dizziness, psychoneurotic breakdowns, and loss of hearing and sight. The range of these weapons is thought to be a few hundred meters to two or three kilometers.[190]

Chemical NLWs are those that can cause drowsiness and behavioral dysfunctions; that use adhesive (blocking) properties or alter the quality of fuels and lubricants; that increase the brittleness of metals; and that stall engines or block up ventilation systems. Many are offered in any caliber for NLW ammunition.[191] Advantages include the following: incapacitating targets for specific time periods; the ability to selectively affect targets and penetrate various types of shelter;

[187] Ibid., pp. 56-58.
[188] V. M. Moiseyev and V. I. Orlyansky, "Nonlethal Weapons: Tactical Principles," *Voennaya Mysl' (Military Thought)*, No. 6 2011, p. 33.
[189] Ibid., pp. 31-32.
[190] Ibid., p. 27.
[191] Ibid.

the use of "damage control" operations that suit the situation; and the ability to integrate with and complement standard armaments. Chemical NLWs lower the chances of casualties among civilians and friendly units and can be used in operations such as peacekeeping, de-escalating armed conflicts, hostage rescues, and humanitarian support operations, where traditional warfare capabilities are less useful.[192]

Biological NLWs carry microorganisms that can harm humans, animals, and plants or disable weapons and other such items. Bacteria can decompose lubricants and block fuel flow passages, or it can cause swelling in artillery and firearm barrels.[193]

Radiation weaponry was the focus of another set of authors.[194] Electromagnetic radiation is broken into frequency ranges, to include optical and radio. Optical NLWs include laser radiation blinding devices used against snipers, observers, and fighting vehicle drivers due to its long range, straight propagation, and little divergence. Radio frequency NLWs use extremely high frequencies (EHF) that have effects at a range of 15-700 meters. Most missions only require 250 meters. Acoustic radiation offers good utility in water and in the dispersal of large crowds of rioters at a range of around 60 meters but have a wide divergence angle and thus low selectivity. On the positive side, they can be used in any weather or season.[195] It was noted that no single incapacitating agent is suitable for all operations. A way must be found to develop "nonlethal weapons using several incapacitating agents in combination, the effect of which is yet to be studied."[196]

One article described information weapons as NLWs. The development of the mass media creates the prerequisites for the use of an inflation NLW in the opinion of some writers. Of interest is that psychological NLWs were also considered but have not yet been scientifically confirmed. These type of NLWs included telepathy, telekinesis, clairvoyance, and other psychological means.[197]

Conclusions

NLWs can keep crisis escalation in check and give leaders time to resolve a conflict before it passes a point of no return. NLWs advantages include high efficiency of use, the ability to neutralize an adversary's fighting capabilities, control and selective effect capability, choice of time to take effect, and compatibility and potential integration with existing types of weapons.

Russia's division of NLW use into internal and external areas is of interest. The former implies that Russia's National Guard will undoubtedly utilize NLWs. Externally Russia will use NLWs against terrorists first and then perhaps against a more traditional opponent. Russian NLWs are not described in the Western press at nearly the same rate as other developments, such as hybrid or asymmetric warfare. They deserve more attention. Perhaps NLWs are part of President Vladimir Putin's asymmetric approach to conflict. It is the types of NLWs that should concern the West,

[192] V. B. Antipov and S. V. Novichkov, "On the Question of the Development and Use of Nonlethal Chemical Weapons," *Voennaya Mysl' (Military Thought)*, No. 9 2009, p. 54.
[193] V. M. Moiseyev and V. I. Orlyansky, "Nonlethal Weapons: Tactical Principles," pp. 27-28.
[194] D. V. Zaitsev, D. Yu. Soskov, and A. V. Foteyev, "Weapons of Nonlethal Action…", p. 33.
[195] Ibid., pp. 34-35.
[196] Ibid.
[197] Vitaliy Tsygichko and Vladimir Dyachenko, "Non-Lethal Weapons," *Yadernyy Kontrol (Nuclear Control)*, 18 September 2002, pp. 58-67.

since they are not just physical and information but chemical, biological, and radiological. All can affect a situation and cause unforeseen consequences, to include serious psychological effects.

RUSSIA'S NEW WAY OF WAR 2020: PART THIRTEEN
CONCLUSIONS

This report has highlighted several important indicators of how Russia might conduct a future conflict, and the indicators are worthy of Western concern. First, General Staff Chief Valery Gerasimov's claims contain particularly important considerations. In 2019 he listed two strategies of importance, the **strategy of active defense** which "envisions the conduct of a set of measures for the **preemptive** neutralization of threats to the security of the state"; and using a **strategy of limited actions,** which was identified during Russia's Syrian experience, to defend and advance national interests outside Russian borders. In 2018 he noted that two military priorities were to ensure the readiness of the command and control of Russian forces; and to obtain the ability to **comprehensively** destroy potential targets, specified as economic and state control centers of an opponent. There is thus a shift "toward the **comprehensive destruction of the enemy** based on integrating the efforts of all strike and fire resources into a uniform system."

Second, Russian sources state that underestimating cyber, recon-strike, asymmetric, and similar operations can cause severe consequences for a passive side, since the speed of contemporary operations may not allow for recovery time if the initial assault is overwhelming. Consequently, Russian focus on the **initial period of war** and potential use of **preemption** has increased. Gareyev noted that if conflict is imminent, previously formulated scenarios and models of combat operations will have to be implemented due to the speed and mobility of contemporary operations. Gerasimov noted, regarding **forecasting,** the importance of watching possible variants in the world's **military-political situation** and of analyzing recent domestic and foreign experiences of employing their armed forces. One analyst recommended, due to the changing technological situation, new forecasts every three to six months. A special role will be afforded to countering communications, reconnaissance, and navigation systems. Precision means will shift the "principal portion" of strategic deterrence from the nuclear to the nonnuclear forces.

Third, the disorganization concept deserves special recognition. States will use peacetime or periods of threat to "**disorganize** government, military, and combat control systems" of countries it aims to attack according to some analysts. In 2018, REB chief Major General Yuriy Lastochkin stated that the **disorganization** of enemy troop and weapons C2 "is the primary goal of the conduct of electronic warfare." Superiority over an enemy is achieved through the **disorganization** of his information management and telecommunication systems. Another Russian source noted that planning documents for REB forces now include the "Adversary C2 **Disorganization** Plan" and that modeling enemy C2 and the exposure of critical weaknesses is important. The **disorganization** effort may naturally not be confined to ground forces but, using cyber and other means, can be used to d**isorganize** even space assets. Strike targets include the disruption of the functioning of an ICS or line of enemy leadership, with a "given degree of effectiveness for the **disorganization** of C2" or "the functioning of information systems." REU is delivered to **disorganize** the C2 of an opponent's field artillery. Strikes aim to **disorganize** the C2 of an opponent's second echelon and reserves. To do so, Gerasimov noted that Russia is creating an **automated interservice reconnaissance-strike system** which will reduce the temporal

parameters of the decision cycle for a fire task—from reconnaissance to target destruction—by 2-2.5 times and the precision of destruction will increase by 1.5-2 times. A **radio-electronic strike's** object is the REB resources of an opponent's information-control system, with communications centers as the "single REB strike" for "radio-information blocking" of the unit and its entire C2 subunits (forward and rear command posts, etc.). Of importance is **whether military art will add "planetary" or "global" to its context of strategy, operational art, and tactics.** Today **satellites do the maneuvering** instead of tanks, and cyber elements can do as much damage (and more quickly) as missiles. As has been noted before, technology determines strategy today with its reach and speed. Likewise, technology enables global operations.

Finally, Russia is developing several new weapons. Gerbert Yefremov, the designer of the **Avangard** hypersonic missile, noted that no one really knows how **Avangard will maneuver in course or altitude**, as algorithms and programs imbedded in the weapon do the programming independently. The **Tsirkon hypersonic missile** enters the stratosphere after launch and conducts a flight to the target location area and later, **in a dive, carries out the destruction of the designated enemy target**. Gareyev noted that a probable **adversary's command and control system**, to include aerospace attack means, **is usually located in space and becomes a primary target,** where it is necessary to bring down an opponent's entire space communications and command and control system. In 2012, Gareyev noted that operational maneuver groups (OMGs), although liquidated with the fall of the Soviet Union, will "obviously be used in some form or another" in the future. Thus, it is **possible that OMGs could be developed for space** operations in "some form or another," for example, as armed satellites. Robotic applications are developed for use in **underwater, space, or ground operations,** to include their use with logistic transport or robotic UAV swarms. Robotic complexes include control means, communication and navigation assets, video surveillance, and other related equipment. Russia's new military innovation center, ERA Technopolis, has developed eight scientific-technical fields of study. Robotics, numerous information-related topics, artificial vision and pattern recognition, biotechnical systems, nanotechnologies, small space vehicles, weapons based on new physical principles, **artificial intelligence technologies**, and others are among them. Regarding **quantum computers**, they enable the almost instantaneous breakdown of an enemy's military and infrastructure coding systems and, Russian sources note, can be used in designing new types of weapons, new materials, and new structures, and even in developing new strategies for waging war. Nonlethal weapons (NLW) are thought to be a **crowd control mechanism** or a more **humane way to conduct armed conflict**. Regarding the latter, they are a way to capture or immobilize people hiding in buildings or behind barricades instead of killing them. When constructing a plan for the use of NLWs, conventional and NLWs are to be employed together and with time limits, since **NLWs effects only last for a certain period**.

Thus, there are several aspects to Russia's potential conduct of conflict. It is important for Western analysts to be familiar with all of them in case the unimaginable happens. Today's preparation can deter tomorrow's confrontation.