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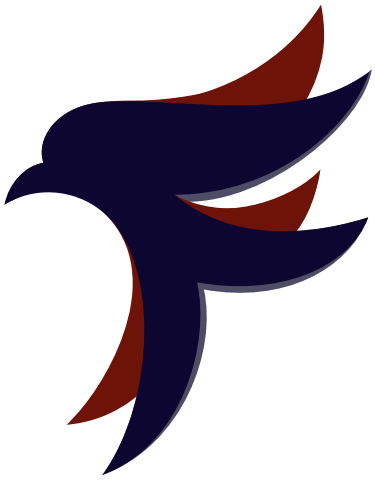
RUSSIAN PERCEPTIONS OF MILITARY AI, AUTOMATION, AND AUTONOMY

ANNA NADIBAIDZE



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A nation must think before it acts

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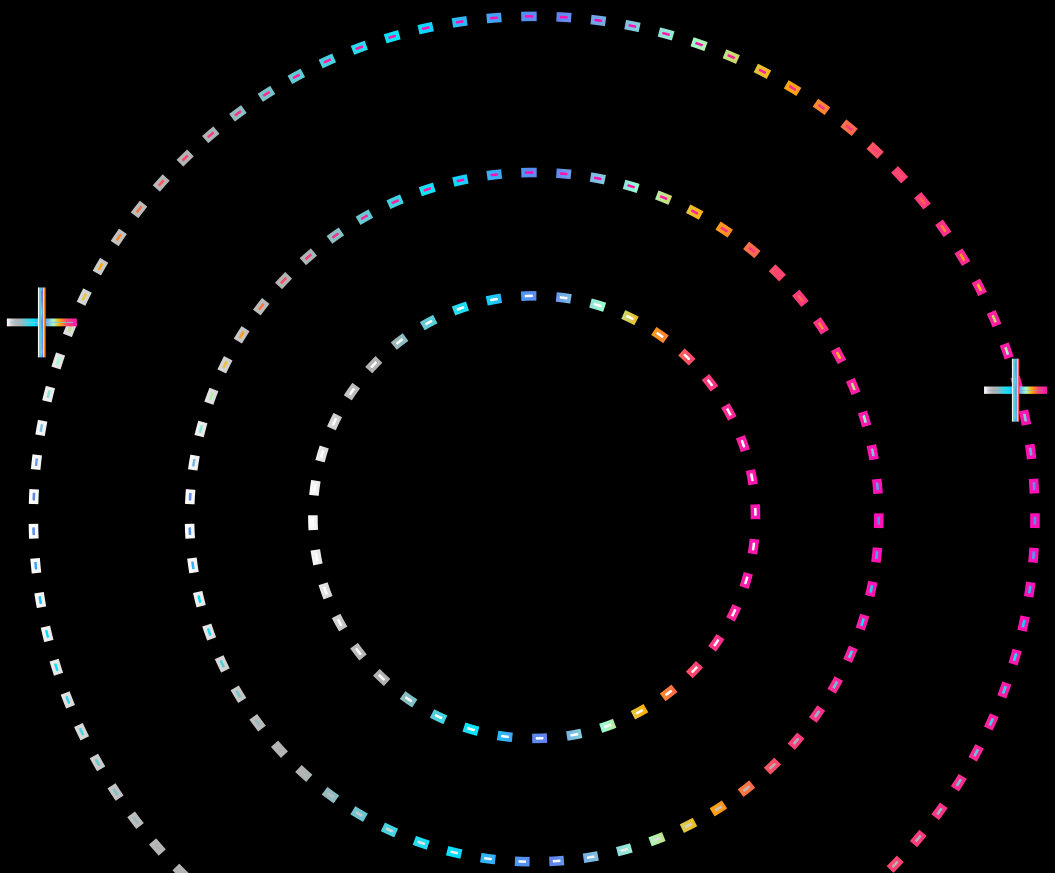

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INTRODUCTION

President Vladimir Putin declared 2021 to be the Year of Science and Technology in Russia, with November named as the month of artificial intelligence (AI), signaling Russian leadership's strong interest in this umbrella term.[1] The Russian defense sector is particularly captivated by the opportunities associated with AI-based technologies. In recent years, AI, robotics, as well as the further integration of automation and autonomy into weapons systems and military decision-making have all been highlighted as priorities for modernizing the Russian armed forces.

In 2017, Putin famously said that "artificial intelligence is the future, not only for Russia, but for all humankind … Whoever becomes the leader in this sphere will become the ruler of the world."[2] Quoting these words, analysts often attribute Russia's development, testing, and use of weaponized AI to the necessity of competing in the so-called global AI race or the global tech race with the current leading AI developers: the United States and China.[3]

While the perceived need to compete and catch up is part of Russia's motivations, its interest in military AI should not only be attributed to a quest for relative power. Understanding the depth and complexity of the debates surrounding AI, autonomy, and automation in Russia requires an examination of discussions about its strategic implications for the Russian army, the perceived benefits and risks of autonomy, and, more broadly, the importance of technological modernization and innovation for Russia's place in the world.

This report aims to provide an overview of the different conceptions and motivations, both oriented towards domestic and international audiences, that have been and are guiding Russian political and military leaderships in their ambitions to pursue weaponized AI. First, it outlines the various factors, both external and internal, behind the quest for pursuing AI, autonomy, and automation in the Russian military. Second, it presents some of the Russian plans in this area, what is known about their capabilities, and the challenges to strengthening them. Third, it dives into Russian debates on autonomy, and

1 Ministry of Science and Higher Education of the Russian Federation, "2021 Is Announced as the Year of Science and Technology in Russia," n.d., https://www.minobrnauki.gov.ru/god-nauki/.

2 Evgeny Kalyukov, "Putin Named the Conditions for the Emergence of the Future Ruler of the World," *RBC*, September 1, 2017, https://www.rbc.ru/technology_and_media/01/09/2017/59a947189a79470f49873a14.

3 Dominik P. Jankowski, "Russia and the Technological Race in an Era of Great Power Competition," *Center for Strategic and International Studies*, September 2021.

Valery Falkov, Minister of Science and Higher Education of the Russian Federation, remarking on the Year of Science and Technology in December, 2021. (Source: minobrnauki.gov.ru)

especially autonomous weapons systems, as well as discussions on the ethics of developing so-called "killer robots," or autonomous combat robots (боевые роботы, or военные роботы), a term often used in the Russian-language literature.

The analysis is based on a survey of open-source materials, including media reports, press releases, official statements and speeches, peer-reviewed articles and think tank reports, as well as publications in Russian military journals. The author would like to present it as the first step in an ongoing doctoral research project, as well as a contribution to the emerging English-language literature on how weaponized AI is perceived in Russia.

A NOTE ON CONCEPTS

This report analyzes conceptions of autonomy, automation, and AI — three terms that are often confused with each other, both in Russia and abroad. It is worth starting by exploring these concepts. Automation is a way of delegating tasks to machines that is based on a specific sequence of actions or rules, making the process more predictable. An automated system is one "that acts according to a preprogrammed script for a task with defined entry/exit condition."[4] Autonomy is a more complex process, and broadly means "programming machines to perform some tasks or functions that would ordinarily be performed by humans," but without detailed rules, thus making it more unpredictable.[5] AI can be defined as the "ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings."[6] AI and its sub sets such as machine learning, as well as its applications such as computer vision, facial and sound recognition, can be used to achieve a higher level of automation and

WITH THE HELP OF ADVANCES IN AI, WEAPONS SYSTEMS CAN MOVE FURTHER ON THE SPECTRUM OF AUTONOMY, HAVE MORE TASKS, AND EVENTUALLY REPLACE HUMANS ON THE BATTLEFIELD.

autonomy in weapons systems. Autonomous weapons systems are usually defined as "robotic weapons systems that, once activated, can select and engage targets without further intervention by a human operator."[7] A United Nations Security Council report published in March 2021 suggests that the Turkish-made *Kargu-2* loitering munition system was programmed to select and attack targets in an autonomous mode during the Libyan Civil War.[8] This was portrayed as the

4 M. L. Cummings, "The Human Role in Autonomous Weapon Design and Deployment," in *Lethal Autonomous Weapons: Re-Examining the Law and Ethics of Robotic Warfare*, ed. Jai Galliott, Duncan MacIntosh, and Jens David Ohlin (Oxford: Oxford University Press, 2021), 277.

5 Michael C. Horowitz and Paul Scharre, "Meaningful Human Control in Weapon Systems: A Primer," *Center for a New American Security*, 2015, 5, https://www.cnas.org/publications/reports/meaningful-human-control-in-weapon-systems-a-primer.

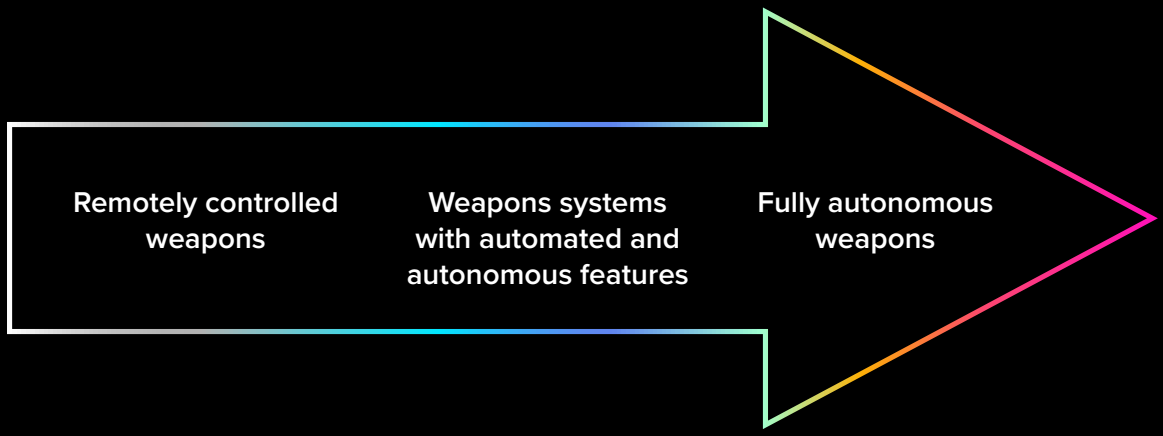
6 B.J. Copeland, "Artificial Intelligence," in *Encyclopedia Britannica*, 2021, https://www.britannica.com/technology/artificial-intelligence.

7 Christof Heyns, "Human Rights and the Use of Autonomous Weapons Systems (AWS) During Domestic Law Enforcement," *Human Rights Quarterly* 38 (2016): 356.

8 United Nations Security Council, "Final Report of the Panel of Experts on Libya Established Pursuant to Security Council Resolution 1973 (2011)," March 8, 2021, 17, https://undocs.org/S/2021/229.

Figure 1.

SPECTRUM OF AUTONOMY IN WEAPONS SYSTEMS



Source: Ingvild Bode and Hendrik Huelss, Autonomous Weapons Systems and International Norms (Montreal: McGill-Queen's University Press, forthcoming 2022), chapter 1.

first use of a lethal "killer robot" by media around the world. However, it remains unclear whether the system actually operated autonomously at the time of the attack.

At the same time, capabilities between those areas are not always equal. In the Russian case, automation and the development of unmanned robotic systems are more advanced than integration of more modern machine learning-based systems. The "automation" (автоматизация) process, as it is often referred to in Russian military literature — other terms include "robotization" (роботизация), "intellectualization" (интеллектуализация) or "digitalization" (дигитализация) — is not a new phenomenon.[9] Russia's capabilities in terms of automated and remotely controlled weapons systems are relatively better than its ability to integrate machine learning and other sub-elements of the broad technology under the AI umbrella term. The position of many military policymakers and analysts is that, with the help of advances in AI, weapons systems can move further on the spectrum of autonomy, have more tasks, and eventually replace humans on the battlefield.

9 For more on automation vs. intellectualization, see Anya Fink, "Russian Thinking on the Role of AI in Future Warfare," *Russian Studies Series 5/21*, November 8, 2021, https://www.ndc.nato.int/research/research.php?icode=712.

DOES RUSSIA WANT TO RULE THE WORLD THROUGH AI?

AI is often described as a technology with the potential to substantially transform the practices and norms of warfare.[10] In its official discourse, Russian leadership presents AI in the same way. AI and its applications are portrayed as one of the key technologies of the 21st century, if not the most important one, with revolutionary impact for the future of defense and military strategy. Further integrating AI is perceived as necessary to gain strategic advantage over adversaries. It is argued to be the key to developing more advanced weapons systems, which in turn will determine the results of future, and current, battles.[11] President Putin named technologies such as robotic systems, unmanned aerial vehicles (UAVs), and automated control systems as priorities for the Russian armed forces and said that they could, "in the near future, determine the outcome of a battle."[12]

One of the main arguments to pursue systems with more automated and autonomous features is improving the efficiency of the army, as part of the broader modernization of command and control (C2) capabilities and armament equipment, as well as reduction of the number of conscripts.[13] This modernization would address several domestic challenges, including geography, demography, and economy, which are further explored below.

AI AND ITS APPLICATIONS ARE PORTRAYED AS ONE OF THE KEY TECHNOLOGIES OF THE 21ST CENTURY, IF NOT THE MOST IMPORTANT ONE, WITH REVOLUTIONARY IMPACT FOR THE FUTURE OF DEFENSE AND MILITARY STRATEGY.

10 For instance, see James Johnson, "Artificial Intelligence & Future Warfare: Implications for International Security," *Defense and Security Analysis* 35, no. 2 (2019): 147–69; Jürgen Altmann and Frank Sauer, "Autonomous Weapon Systems and Strategic Stability," *Survival* 59, no. 5 (September 3, 2017): 117–42; Denise Garcia, "Lethal Artificial Intelligence and Change: The Future of International Peace and Security," *International Studies Review* 20 (2018): 334–41; Peter Asaro, "Autonomous Weapons and the Ethics of Artificial Intelligence," in *Ethics of Artificial Intelligence*, ed. Matthew S. Liao (Oxford University Press, 2020), 212–36; Ingvild Bode and Hendrik Huelss, "The Future of Remote Warfare? Artificial Intelligence, Weapons Systems and Human Control," in *Remote Warfare: Interdisciplinary Perspectives*, ed. Alasdair McKay, Abigail Watson, and Megan Karlshøj-Pedersen (Bristol: E-International Relations Publishing, 2021), 218–33.

11 Katarzyna Zysk, "Defence Innovation and the 4th Industrial Revolution in Russia," *Journal of Strategic Studies* 44, no. 4 (2020): 543–71.

12 *Vedomosti*, "Putin Commented on the Role of Artificial Intelligence in the Wars of the Future," December 21, 2020, https://www.vedomosti.ru/society/news/2020/12/21/851812-putin-otsenil-rol-iskusstvennogo-intellekta-v-voinah-buduschego.

13 Niels Bo Poulsen and Jørgen Staun, eds., *Russia's Military Might – A Portrait of Its Armed Forces* (Copenhagen: Djøf Publishing, 2021).

Students present projects during the main discussion at the AI Journey 2021 conference. (kremlin.ru)

First, defending and patrolling such a large border, as well as the infringement of maritime exclusive economic zones, is a challenge that, following Russia's reasoning, AI-based systems can help address. Reducing the number of personnel physically stationed at borders and introducing remote control systems — based on cameras, sensors, drones, and other systems — has been one of the priorities in recent years.[14] The defense industry has been responding to these needs set by top leadership by developing and testing technologies, especially unmanned vehicles that can operate in extreme conditions such as those in the Arctic. For instance, the head of the United Shipbuilding Corporation (USC), Alexey Rakhmanov, said that USC enterprises are planning to design an underwater robot to safeguard the Arctic continental shelf and drilling platforms.[15]

In addition, the Russian armed forces face decreasing numbers of military personnel and budget constraints.[16] Modern technology is necessary to complement reforms focused on making the army more professional and providing more education and training to conscripts. There is an interest in and logic to adapting to the reduced number of personnel by removing humans from the frontline to the largest extent possible and assisting operators in their decision-making with the help of AI systems, while also arguing that

14 Nikolai Grischenko, "Smart Robots Will Defend Russia's Borders," *Rossiyskaya Gazeta*, May 28, 2017, https://rg.ru/2017/05/28/umnye-roboty-zashchitiat-granicy-rossii.html.

15 TASS, "USC Enterprises Could Create Underwater Robots to Defend the Arctic Shelf," June 8, 2021, https://tass.ru/ekonomika/11593599.

16 Forrest E. Morgan et al., "Military Applications of Artificial Intelligence: Ethical Concerns in an Uncertain World," *RAND Corporation* (Santa Monica, California, 2020), chap. 6.

this would help mitigate the errors of human military personnel and the cognitive burden on soldiers.[17]

In recent years, defense spending in Russia has been decreasing, compared to spending in 2015-2016.[18] During the first year of the COVID-19 pandemic, the spending priority was on economic matters, overtaking the defense budget for the first time since 2014. For 2022, expenses on national security are estimated to increase again, at 2.6% of the forecasted Russian GDP, and then remain at 2.5% of GDP in 2023-2024.[19] However, this remains lower than the budgets of the United States or China, which implies that Russian decision-makers have to prioritize some areas if they want to level the playing field with competitors.[20] Some analysts note that, given that the Russian Federation spends substantially less on defense than the U.S. and other governments perceived as opponents, it is necessary to find "more efficient and less costly ways to counteract existing and future threats," such as focusing on technologies that will be relevant in decades. Instead of trying to catch up in everything, the argument goes, the focus should be on key trends.[21] Following this line of thinking, modernization with the help of AI, autonomy and automation would undoubtedly be a key trend to follow.

Russia in the 'AI global race'

International factors play a key role in the Russian reasoning. The whole security apparatus closely monitors developments in other countries, including but not limited to the U.S., China, Israel, and South Korea. In the current atmosphere of distrust between Russia and the U.S./NATO, the feeling of competition[22] and a global AI or tech race may appear inescapable.[23] Thus, demonstrating capabilities in AI, autonomy, and automation becomes important for sending the message that Russia is entering, or already part of, the global competition. As Vadim Kozyulin from the PIR Center think tank notes, for Russia,

17 Nadezhda Alexeeva and Elizaveta Komarova, "'Providing Humans with Ready-Made Solutions': How Weapons with Artificial Intelligence Are Developing in Russia," *RT in Russian*, February 10, 2021, https://russian.rt.com/russia/article/830565-iskusstvennyi-intellekt-oruzhie; O.V. Maslennikov et al., "Man and Artificial Intelligence Systems in Military Affairs," *Voyennaya Mysl*, no. 6 (2021): 46–56.

18 BBC News Russian, "Military Spending in the Coronavirus Era: Russia in the Top Five, Britain Is Breathing Down Its Neck," April 26, 2021, https://www.bbc.com/russian/news-56886362; Siemon T. Wezeman, "Russia's Military Spending: Frequently Asked Questions," *Stockholm International Peace Research Institute*, April 27, 2020, https://www.sipri.org/commentary/topical-backgrounder/2020/russias-military-spending-frequently-asked-questions; Georgy Tadtaev, "Putin Explains the Decrease of Spending on Defense," *RBC*, November 11, 2019, https://www.rbc.ru/politics/11/11/2019/5dc92ce29a794747c333ec7f.

19 Ivan Tkachev, "The Military Section Will Rise to Second Place in Russian Budget Expenditures," *RBC*, October 3, 2021, https://www.rbc.ru/economics/03/10/2021/61571a279a79478e0bc0b011; TASS, "Russia Will Spend 3,51 Trillion Rubles on National Security in 2022," September 21, 2021, https://tass.ru/ekonomika/12465593.

20 Morgan et al., "Military Applications of Artificial Intelligence: Ethical Concerns in an Uncertain World," 84.

21 Aleksey Bytyev and Lyudmila Smirnova, "Shock Intellect: Humans Are Leaving the Battlefield," *Voenno-Promyshlennyy Kurier no. 37 (800), September 24-30, 2019*.

22 Michael C. Horowitz et al., "Strategic Competition in an Era of Artificial Intelligence," *Center for a New American Security* (Washington, DC, 2018); S.V. Ionov, "Innovative Technologies in the Automated System of Troop Control as Viewed by the US Department of Defense Leadership," *Voyennaya Mysl*, no. 10 (2021): 135–47.

23 See, for instance, the language used in European Parliament Special Committee on Artificial Intelligence in a Digital Age, "Draft Report on Artificial Intelligence in a Digital Age," November 2, 2021.

Russian President Vladimir Putin and Rostec CEO Sergei Chemezov at the International Aviation and Space Salon MAKS-2021. (en.kremlin.ru)

"combat robots have become one of the symbols of the renaissance of armed forces, a promising export product and a signal to the world of the country's readiness to challenge the technological leadership of the United States."[24]

IN THE CURRENT ATMOSPHERE OF DISTRUST BETWEEN RUSSIA AND THE U.S./NATO, THE FEELING OF COMPETITION AND A GLOBAL AI OR TECH RACE MAY APPEAR INESCAPABLE.

At the same time, Russia's pursuit of weaponized AI should not only be associated with strategic motivations. Ideology and beliefs about Russia's state identity and its role in the world are important features of the discourse relating to AI. As Putin has said, he is convinced that Russia "must, and can, become one of the global leaders in the sphere of AI. This is a question of our future, the place of Russia in the world."[25]

Technological and scientific innovation has historically been closely associated with Russia's self-perception as a great power and quest to be recognized as such.[26] As noted by Federation Council Chairwoman Valentina Matviyenko, science and technology have been key factors in the development of Russia throughout history. She quotes the scientist Mikhail Lomonosov, who said in the 17th century that, "The honor of the Russian people demands that they should show their ability and sharpness in science."[27] Mastering AI therefore comes to be perceived as continuing the trajectory of previous technological achievements presented as part of Russia's great power status, such as space exploration and nuclear weapons.

Military technology is arguably particularly important for signaling great power status, and demonstrating military revival is closely related to Russian leadership's quest to be taken "seriously" by other great powers in what it sees as a post-hegemonic, multipolar (or polycentric) world.[28] To be recognized as part of the modern great power club, Russia believes that it must be at the forefront of AI development. As Putin argued, "it is not coincidental that many developed countries of the world have already adopted their own action plans for the development of such technologies. And we, of course, must ensure

24 Vadim Kozyulin, "'Killer Robots' at the UN Platform," *Kommersant*, November 15, 2017, https://www.kommersant.ru/doc/3467291.

25 President of Russia, "Conference on Artificial Intelligence," *Kremlin.ru*, November 9, 2019, http://www.kremlin.ru/events/president/news/62003.

26 For a literature review on Russia's great power status pursuit, see Cristian Nitoiu, "Aspirations to Great Power Status: Russia's Path to Assertiveness in the International Arena under Putin," *Political Studies Review* 15, no. 1 (2017): 39–48.

27 Valentina Matviyenko, "Science and Technology – Key Factors in the Development of Russia," *The Parliamentary Newspaper*, November 10, 2017, https://www.pnp.ru/economics/nauka-i-tekhnologii-klyuchevye-faktory-razvitiya-rossii.html.

28 Andrew Radin and Clint Reach, "Russian Views of the International Order," *RAND Corporation* (Santa Monica, California: RAND Corporation, 2017); TASS, "Putin Called the Unipolar World an Illusion," December 19, 2019, https://tass.ru/politika/7380485.

COMPARING PLANS AND CAPABILITIES

technological sovereignty in the field of AI."[29]

Having this complex mix of motivations in perspective, in the last years, the Ministry of Defense (MoD) has been presenting plans for further modernizing Russia's armed forces. AI and robotics feature prominently in these plans. The fact that these statements have become more frequent since 2014 does not mean that Russian leadership was not previously interested in technologies that we would call AI today. Trends towards automation and robotics began decades ago, when the Soviet Red Army was developing and testing, for instance, remotely controlled tanks prior to and during the Second World War,[30] as well as automatic air defense systems during the Cold War.[31]

A set of factors, however, highlighted the perceived need for developing more concrete goals to further the integration of autonomy and automation. These factors included rapid technological advances, such as in the sphere of civilian applications of AI, developments in the United States, as well as Russia's opportunity to test some unmanned systems in its military operations, especially in Syria.[32]

Who are the main actors?

The Russian state and its affiliated corporations are the main actors in military AI, as well as in AI development more broadly.[33] The Russian government's approach to technological development is one that focuses on top-down processes, where innovation, research, and development are often implemented through a national project, a working group, or a commission.[34] As an example, the Code of AI Ethics, a voluntary document signed by a number of corporations and organizations in October 2021, was

29 BBC News Russian, "Putin Has Taken Up Artificial Intelligence: What Was Discussed at the First Meeting," May 30, 2019, https://www.bbc.com/russian/news-48463710.

30 Alexandr Khrolenko, "The Perspectives of Robotization of Russian Armament," *RIA Novosti*, February 9, 2016, https://ria.ru/20160209/1371988520.html.

31 Vincent Boulanin and Maaike Verbruggen, "Mapping the Development of Autonomy in Weapons Systems," *Stockholm International Peace Research Institute*, 2017.

32 Jeffrey Edmonds et al., "Artificial Intelligence and Autonomy in Russia," *Center for Naval Analyses*, 2021, 78.

33 Stephanie Petrella, Chris Miller, and Benjamin Cooper, "Russia's Artificial Intelligence Strategy: The Role of State-Owned Firms," *Orbis* 65, no. 1 (2021): 75–100.

34 Echo of Moscow Radio, "Sergei Guriev on the Change of World Elites," 5 August 2021, https://www.youtube.com/watch?v=RBKmfjl-W8Ys.

Table 1.

SELECTED DOCUMENTS AND STRATEGIES RELATED TO AUTONOMY, AUTOMATION AND AI

In 2014, the MoD adopted the "Concept for the Use of Robotic Systems for Military Use until 2030" and the comprehensive target program "Creation of Prospective Military Robotics Through 2025 with a Forecast up to 2030" (КЦП «Роботизация-2025»), setting a goal of 30% of combat power being robotized, or partially or fully autonomous, by 2025.[1]

In 2016, Putin approved the "Strategy of Scientific and Technological Development of the Russian Federation," which includes as a priority the "transition to advanced digital, intelligent production technologies, robotic systems, new materials and design methods, the creation of systems for big data processing, machine learning and artificial intelligence."[2]

In March 2018, the MoD hosted a joint conference with the Ministry of Education and Science as well as the Russian Academy of Sciences. The three jointly proposed 10 points to develop AI, including, for instance, the organization of a series of war games to understand the influence of AI on the character of war.[3]

In October 2019, Russia adopted the "National Strategy for the Development of AI Through 2030," which, while not focusing on weaponized AI, mentions the "inadmissibility of using AI for the purpose of the deliberate infliction of harm to individuals and legal entities, as well as prevention and minimization of risks of negative consequences of using AI technologies."[4] Similarly, at the 2021 AI Journey conference, which has taken place every November since 2019, Putin mentioned the importance for AI technologies "not to harm in any way, but to work for the benefit of humankind, help [in] saving our planet and ensure its sustainable development."[5]

1 Vladislav Gordeev, "Minoborony Promised to Increase the Share of Robots in the Armament Structure to 30%," RBC, November 6, 2014, https://www.rbc.ru/society/06/11/2014/545b78d4cbb20f9df71de816; A.V. Lopota and A.B. Nikolayev, "Overground Robotic Complexes for Military and Special Use," TsNII RTK (St. Petersburg, n.d.), https://rtc.ru/media/images/docs/book/nazemnie.pdf.

2 "Decree of the President of the Russian Federation dated 01.12.2016 No. 642 On the Strategy of Scientific and Technological Development of the Russian Federation," *Kremlin.ru*, December 1, 2016, 9, http://kremlin.ru/acts/bank/41449.

3 Ministry of Defense of the Russian Federation, "Conference 'Artificial Intelligence: Problems and Their Solutions – 2018,'" 2018, https://mil.ru/conferences/is-intellekt.htm.

4 Russian Federation, "National Implementation of the Guiding Principles on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems," 2020, https://perma.cc/Z67Q-5J5N.

5 President of Russia, "Conference on Artificial Intelligence," Kremlin.ru, November 12, 2021, http://kremlin.ru/events/president/news/67099.

Russian President Vladimir Putin with Defense Minister Shoigu at the theme exhibition following the Defense Ministry Board's December meeting in 2021. (en.kremlin.ru)

an idea mentioned by President Putin in December 2020. It was then implemented by the AI Alliance, and representatives of the government's think tank, the Ministry for Economic Development, and academic experts.[35] This contrasts with a bottom-up approach, where, although the government can be a major actor, most of the innovation comes from the private sector. While the private sector is not non-existent in Russia, the most important developers of (military) AI are associated with state corporations and the government.[36] State-affiliated research institutes, design bureaus and organizations involved in military research and development (R&D) have a central role in advancing autonomy and robotics.[37] They employ the majority of researchers in the area of AI.[38] Given that the integration of AI and autonomy is applied to different spheres, the network of actors involved in military innovation is vast.[39]

The largest state corporation in terms of

35 TASS, "First Code of Ethics of Artificial Intelligence Signed in Russia," October 26, 2021, https://tass.com/economy/1354187. In December 2021, Putin assigned the government to increase the number of organizations who have joined the Code. Kremlin.ru, "List of Assignments Following the Conference 'Journey to the World of AI'," December 16, 2021, http://kremlin.ru/acts/assignments/orders/67375.

36 There are increasing efforts to engage with the civilian sector, see Katarzyna Zysk, "Military R&D, Innovation and Breakthrough Technologies," in Samuel Bendett et al., "Advanced Military Technology in Russia: Capabilities and Implications," *Chatham House* (London, 2021), chap. 2.

37 For an overview of the Russian military R&D landscape, see Johan Engvall, "Russia's Military R&D Infrastructure: A Primer" *Swedish Defence Research Agency (FOI)* (Stockholm, April 2021).

38 Vadim Kozyulin, "Militarization of AI from a Russian Perspective," *The Stanley Center for Peace and Security,* July 2019.

39 Vadim Kozyulin and Albert Efimov, "'The New Bond: A Machine with a License,'" *Security Index* 1, no. 116 (2016): 17–40.

Drone technology utilized during Russian military training exercises in December, 2021. (en.mil.ru)

developing, testing and producing AI-based and autonomous systems is Rostec and the hundreds of entities it comprises, including the Kalashnikov Concern, High Precision Weapons, Techmash, and the United Aircraft Corporation (UAC). However, there are also other companies which are successful in securing both MoD contracts and interest from abroad. Kronstadt (Кронштадт), a subsidiary of the joint stock financial corporation *Sistema* and a developer of high-tech equipment focusing on unmanned aircraft, is one such manufacturer.[40]

In 2012, the government established the Advanced Research Foundation (ARF, in Russian: Фонд перспективных исследований, ФПИ), one of the leading centers working on R&D in national defense and security, with the overall goal of developing a new generation of weapons systems, including unmanned vehicles and hypersonic vehicles.[41] It was designed as an equivalent or a competitor to the Defense Advanced Research Projects Agency (DARPA) in the U.S. and labeled as a "scientific and technological predator" by then Deputy Prime Minister Dmitry Rogozin. Its work is broadly structured around three themes:

40 Nikolai Novichkov, "From Drones to Robot Civilization: The General Constructor of 'Kronstadt' On the Future of UAVs in Russia," *TASS,* August 22, 2021, https://tass.ru/interviews/12167495.

41 Alexandr Emelyanenkov, "The Advanced Research Foundation Challenges the American DARPA," *Rossiyskaya Gazeta*, February 12, 2021, https://rg.ru/2021/02/12/fond-perspektivnyh-issledovanij-brosaet-vyzov-amerikanskoj-darpa.html.

Russian Defence Minister Shoigu and President Putin at a 2018 presentation of plans for the Technopolis project. (kremlin.ru)

soldiers, weapons, and cyberweapons of the future. In 2020, the ARF was working on approximately 40 projects in collaboration with many laboratories and universities across the country.[42] Its annual budget for 2021 is estimated at 63 million USD.

The MoD-owned Military Innovative Technopolis ERA (Военный инновационный технополис «ЭРА») in Anapa was created in 2018 to lead R&D on military technology, with the goal of reducing the time from the creation of innovative military projects to their implementation in the form of weapons, military and special equipment.[43] ERA brings together hundreds of experts from different fields and backgrounds working in one big "tech city," in an effort to strengthen the public-private partnership. It hosts an AI research lab and cooperates closely with the ARF. Its division by clusters of military research, one of which is AI technologies, is said to be inspired by similar institutions operating in China.[44] Whether the ARF and ERA have succeeded in their missions to encourage innovation and partnership with the civilian sector is debated. Some note that,

42 Andrey Goncharov, "Features of the Organization of Innovative Activities in the Russian MoD," *Natsionalnaya Oborona*, March 23, 2020, https://2009-2020.oborona.ru/includes/periodics/armedforces/2020/0323/103628949/print.shtml.

43 Ministry of Defense of the Russian Federation, "The Military Innovative Technopolis 'ERA,'" March 5, 2020, https://mil.ru/era/about.htm.

44 Inna Sidorkova, "Military 'Skolkovo': Why Shoigu Is Building a Technopolis in Anapa," *RBC*, March 13, 2018, https://www.rbc.ru/politics/13/03/2018/5a9e82869a7947860d0516ca.

unlike DARPA, the ARF seems to be not an initiator of projects, but only a supporter of ideas developed elsewhere.[45]

The MoD Department for Research and Technological Support for Advanced Technologies (Главное управление научно-исследовательской деятельности и технологического сопровождения передовых технологий, ГУНИД), vested with the authority to organize innovative activities, coordinates the activities of ERA, the Patriot Park near Moscow, as well as international exhibitions such as "ARMY" («АРМИЯ»), and "The Day of Innovation" («День инноваций»), which regularly showcase Russian robotic and unmanned systems. In addition, it maintains cooperation agreements with more than 1,200 innovation-related organizations, including industrial parks and engineering centers.[46]

The MoD hosts a Research and Testing Robotics Center (Главный научно-исследовательский испытательный центр робототехники, ГНИИЦР), created in 2012 with the goal of carrying out research and testing of robotic complexes for military use, in the Arctic for example.[47] Not many details are available about this center given the secrecy of its work.[48]

In addition, the Commission for the Development of Robotic Systems for Military Purposes (Комиссия Минобороны по развитию робототехнических комплексов военного назначения is led personally by Defense Minister Sergei Shoigu and is responsible for the development of a united approach towards robotic systems between different MoD departments.

An overview of current and future efforts

While it is difficult to assess capabilities and the amount of spending on military applications of AI by relying on media reports and information provided by manufacturers, some priority areas can be highlighted. The first sphere where significant resources are spent is in the development and testing of unmanned vehicles — often called combat robots (боевые роботы) in the Russian literature — in the air, on the ground, and underwater. Most of them are at the stage of R&D, while those employed remain remotely operated.[49] Not all of these systems have been using or currently use AI, but there are plans to integrate AI further.

45 Ivan Cheberko, "Noncombat Robots: Why Russia Will Not Have a DARPA Analogue," *RBC*, April 12, 2018, https://www.rbc.ru/opinions/politics/12/04/2018/5ace03ea9a79475603462ad7.

46 Goncharov, "Features of the Organization of Innovative Activities in the Russian MoD."

47 Anna Yudina, "Center for Robotics of the Ministry of Defense: Micro-Robots of 'Pocket' Size Will Appear in the Arctic," *TASS*, August 24, 2017, https://tass.ru/interviews/4502372.

48 For more on Russian robotics, see Timothy Thomas, "Russian Robotics: A Look at Definitions, Principles, Uses and Other Trends," *The MITRE Corporation*, no. February 2021 (2021): 1–46.

49 Samuel Bendett et al., "Advanced Military Technology in Russia: Capabilities and Implications" *Chatham House* (London, 2021), chap. 5.

Combat reconaissance and fire support drones Uran-9 and Nerekhta tanks first used among the ground troops' battle formations during the Zapad 2021 military exercises. Twitter/@mod_russia)

UAVs, or drones, which are currently remotely controlled by human operators, deserve special attention in the discourse of Russian leadership. According to Putin, there are more than 2,000 UAVs in service in the Russian army. He has noted that drones have demonstrated their effectiveness in, for instance, defending against terrorist groups in Syria, and therefore should remain a priority, including for the integration of AI.[50] Many commentators support the view that UAVs are one of the most "promising" uses of AI, noting that swarms of drones "can destroy or paralyze" the functioning of equipment such as tanks, anti-missile systems, planes, submarines and ships, while removing humans from the battlefield.[51] The Nagorno-Karabakh war of 2020, and especially Azerbaijan's use of remotely controlled UAVs and loitering munitions, seems to have reinforced this perspective.[52]

50 RIA Novosti, "Russia Learned How to Repel Drone Attacks, Said Putin," November 2, 2021, https://ria.ru/20211102/bespilotniki-1757386697.html.

51 Vasily Burenok, "Artificial Intelligence in the Military Confrontation of the Future," *Voyennaya Mysl*, no. April (2021): 106–12; Vasily Burenok, "And the Drone Will Strike," *Voenno-Promyshlennyy Kurier* 42, no. 657 (October 31, 2016), https://vpk-news.ru/articles/33312.

52 Julian Cooper, "The Nagorno-Karabakh War: A Spur to Moscow's UAV Efforts?," *The International Institute for Strategic Studies*, 2021; Vadim Kozyulin, "Autonomous Weapons and the Laws of War," *Valdai Discussion Club*, February 9, 2021, https://valdaiclub.com/a/highlights/autonomous-weapons-and-the-laws-of-war/.

Examples include the *Orion* medium-altitude long-endurance (MALE) drones produced by Kronstadt,[53] which have reportedly been used in attacks against terrorist groups in Syria.[54] Another model in development is the *Grom* high-speed attack UAV, designed by Kronstadt to lead the forward attacking echelon (or be the leader of a "kamikaze drone armada"[55]), while interacting with manned aircraft, as well as targeting opponents' ground and underwater vehicles.[56] The ARF has proposed a complex of reconnaissance drones and cyclocopters that would operate autonomously to protect warships. This system is planned to be in development for another four years.[57] There is also no serial production of heavy and high-altitude long endurance drones, although the MoD is reportedly planning a tender for MALE drones. In December 2021, Kronstadt completed the construction of a factory which would produce dozens of unmanned vehicles per year, according to its general director.[58] Around the same time, the UAC revealed the first prototype of the Sukhoi S-70 *Okhotnik* heavy strike drone, with its use expected to begin in 2024.[59] Overall, however, the rate of Russian drone production is said to lag behind developers in countries such as the United States, China, and Israel, in terms of creation and adoption of new models.[60]

Integrating AI into unmanned ground vehicles (UGVs), both existing and future models, is another priority.[61] These include the line of *Uran* tanks, which have different capabilities. *Uran-6*, for instance, is used for demining, while the famous *Uran-9* tank is used for combat and can operate both by remote control and autonomously. *Uran-9* tanks have been used in Syria, with notable failures that developers are currently trying to correct,[62] and, most recently, in the *Zapad-2021* military

53 Igor Rozin, "Details Behind Russia's First Ever Strike Drone 'Orion,'" *Russia Beyond*, March 12, 2021, https://www.rbth.com/science-and-tech/333518-details-behind-russias-first-ever-striking-drone.

54 RIA Novosti, "Russian Drone 'Orion' Struck 17 Attacks on Terrorists in Syria," February 21, 2021, https://ria.ru/20210221/bespilotnik-1598514973.html.

55 Nikolai Litovkin, "Russia Unveils New Drones with Hi-Tech Bomber Capacities," *Russia Beyond*, September 29, 2021, https://www.rbth.com/science-and-tech/334244-russia-unveils-new-drones.

56 Alexey Moiseev, "Reactive 'Thunder' Will Be Able to Destroy Ground and Surface Targets," *Rossiyskaya Gazeta*, August 22, 2021, https://rg.ru/2021/08/22/reaktivnyj-grom-smozhet-unichtozhat-nazemnye-i-nadvodnye-celi.html.

57 Izvestia, "Russia Will Create Shipborne Drones Based on Cyclocopters," August 27, 2021, https://iz.ru/1213211/2021-08-27/v-rossii-sozdadut-korabelnye-bespilotniki-na-baze-tcikloletov.

58 TASS, "The First Factory for the Production of UAVs was Built in Russia," December 22, 2021, https://tass.ru/armiya-i-opk/13271543; TASS, "The New Factory of Joint-Stock Company 'Kronstadt' in Dubna Will Be Able to Produce Dozens of Drones Annually," October 11, 2021, https://tass.ru/armiya-i-opk/12626321.

59 TASS, "Russia Rolls out First Flight Prototype of State-of-the Art Okhotnik Heavy Strike Drone" December 14, 2021, https://tass.com/defense/1375043.

60 M. Yevtodyeva and S. Tselitsky, "Military Unmanned Aerial Vehicles: Trends in Development and Production," *Pathways to Peace and Security* 2, no. 57 (2019): 108.

61 See Sten Allik et al., "The Rise of Russia' s Military Robots: Theory, Practice and Implications," *International Centre for Defence and Security* (Tallinn, Estonia, 2021).

62 Alexandr Stepanov, "F.E.D.O.R.'s Fathers: The Ministry of Defense Unsuccessfully Spends Money on the Creation of Combat Robots," *Nasha Versiya*, September 10, 2018, https://versia.ru/minoborony-bezuspeshno-rasxoduet-dengi-na-sozdanie-boevyx-robotov.

FIGURE 2.

The anthropomorphic robot F.E.D.O.R., the Cyclone UAV, the Vityaz unmanned underwater vehicle and the Marker robotechnical complex are featured on Russian stamps in honor of the Year of Science and Technology.

Source: Ministry of Science and Higher Education of the Russian Federation, "Stamps 'Vityaz', 'Fyodor', 'Cyclone' and 'Marker' Have Entered the Postal Circulation," May 11, 2021, https://minobrnauki.gov.ru/press-center/news/?ELEMENT_ID=33510&utm_source=yxnews&utm_medium=desktop.

training.[63] The *Nerekhta* unmanned tank is designed for, among other capabilities, reconnaissance and quick delivery of ammunition and equipment, and can be used for different purposes depending on the installed module.[64]

Several models are also currently in development. For instance, the prototype of the *Udar* robotechnical complex is said to be able to move on the battlefield autonomously based on sensors and to work along with UAVs.[65] The *Soratnik* tank, produced by the Kalashnikov Concern, has integrated neural networks, the ability to cooperate with UAVs and the potential for an autonomous mode.[66] The *Marker* UGV, developed by the ARF, is reported to be able to combat swarms of drones and has been able to experimentally patrol the *Vostochny* cosmodrome in a fully autonomous regime, relying on computer vision and sensors, which allows the UGV to avoid all obstacles.[67] Based on this experiment, the ARF is planning to create more robots for the purpose of defending important strategic objects.

Moreover, there is interest in experimenting with the interactions between different automated and autonomous systems as part of a united information field. One such experiment, reported by *Rossiyskaya Gazeta*, consisted of a drone finding a target and transmitting its coordinates to a ground vehicle, which would then decide whether to attack the target. Meanwhile, the human operator was able to observe everything through the cameras attached to the robotic systems.[68]

Other spheres of interest include increased automation in air defense systems,[69] attack aircraft,[70] command and control,[71] the training of armed forces and testing of strategies,[72]

63 Ivan Potapov, "Russia Will Arm Itself with Urans," *Lenta.Ru*, October 1, 2021, https://lenta.ru/news/2021/10/01/uran/.

64 Alexandr Stepanov, "Combat Robots 'Uran-9' and 'Nerekhta' Were Used for the First Time in the 'Zapad-2021' Drills," *Rossiyskaya Gazeta*, September 13, 2021, https://rg.ru/2021/09/13/boevye-roboty-uran-9-i-nerehta-vpervye-primenili-na-ucheniiah-zapad-2021.html.

65 TASS, "The 'Udar' Robot Will Learn to Fight on Autopilot and Interact with Drones," February 11, 2021, https://tass.ru/armiya-i-opk/10672669.

66 Nikolai Litovkin, "'Comrade in Arms': Russia Is Developing a Freethinking War Machine," *Russia Beyond*, August 9, 2017, https://www.rbth.com/defence/2017/08/09/comrade-in-arms-russia-is-developing-a-freethinking-war-machine_819686; Izvestia, "Expert Commented on Poland's Fears of Russia's 'Lethal Weapons,'" June 3, 2021, https://iz.ru/1173782/2021-06-03/ekspert-otcenil-opaseniia-polshi-iz-za-smertonosnogo-oruzhiia-rossii.

67 Oleg Koryakin, "The Test of the 'Marker' Robot at the Vostochny Cosmodrome Filmed," *Rossiyskaya Gazeta*, October 21, 2021, https://rg.ru/2021/10/21/ispytaniia-robota-marker-na-kosmodrome-vostochnyj-sniali-na-video.html.

68 Sergei Ptichkin, "Soldiers Are Leaving the Battlefield," *Rossiyskaya Gazeta*, August 22, 2021, https://rg.ru/2021/08/22/distancionno-upravliaemoe-strelkovoe-oruzhie-stanovitsia-privychnym.html.

69 Alexandr Kruglov, Alexey Ramm, and Evegeny Dmitriev, "Artificial Intelligence Will Join Air Defense Systems," *Izvestia*, May 2, 2018, https://iz.ru/733333/aleksandr-kruglov-aleksei-ramm-evgenii-dmitriev/sredstva-pvo-obediniat-iskusstvennym-intellektom.

70 Daniil Irinin, "Features of the Unmanned Version of Checkmate Revealed," *Lenta.Ru*, November 12, 2021, https://lenta.ru/news/2021/11/12/unmanned/.

71 Roger McDermott, "Moscow Showcases Breakthrough in Automated Command and Control," *Eurasia Daily Monitor* 16, no. 164 (2019), https://jamestown.org/program/moscow-showcases-breakthrough-in-automated-command-and-control/.

72 Tatiana Isakova, "The Army Will Be Sent to the Virtual World," *Kommersant*, December 6, 2021, https://www.kommersant.ru/doc/5116316; Alexey Ramm and Bogdan Stepovoy, "Target Program: Troops Will Receive 'Smart' Target Robots," *Izvestia*, December 26, 2021, https://iz.ru/1269340/aleksei-ramm-bogdan-stepovoi/tcelevaia-programma-voiska-poluchat-umnye-roboty-misheni.

as well as military analysis to make data collection and decision-making more efficient. For instance, it is argued that maritime robots are predicted to improve situational analysis, enabling a ship commander to make decisions more quickly. This could make underwater robots more efficient at detecting a threat, assessing border violations, and protecting commercial interests.[73]

Challenges

Realizing Russia's declared ambitious plans requires significant scientific and technological resources, which in turn necessitates financial support and dedication to addressing issues such as the lack of specialists and the "brain drain" [74] of technical experts leaving Russia to work abroad.[75]

A note should be made here about the use of AI and robotics in the Russian economy and society. According to a survey conducted in January 2021, 68% of large and medium-sized businesses in Russia — mostly retail, supermarkets, telecom, banks and state corporations — said they were using AI in 2020, but in another survey from 2019, 69% of businesses said there was a lack of AI specialists.[76] Many industries are gradually, but slowly, integrating robots into production, which puts Russia behind in terms of the use of robotics as well.[77] Russian robotics patents from 2005 to 2019 equal around 2% of global patents. For military robotics, this increases to 17%, signaling the specific interest in military applications.[78]

Russia is not in the top 10 of publications on AI or machine learning, although the National Strategy on AI is planning to rectify this situation by increasing the number of publications at top AI conferences.[79] While there is recognition of the strong Soviet legacy in mathematics and engineering, there is also understanding that more support of these

73 Vitaly Shpikerman, "Robots Will Help You: AI Will Protect Our Seas," *Voenno-Promyshlennyy Kurier*, June 24, 2020, https://vpk-news.ru/articles/57500; Mikhail Khodarenok, "Strike from the Deep: Russia Is Working on a New System for Naval Battles," *Gazeta.Ru*, May 1, 2021, https://www.gazeta.ru/army/2021/05/01/13579544.shtml?updated.

74 The Government of Russia officially often recognizes "chronic underfunding, brain drain and import dependence" as important obstacles to the technological development of the country. See, for instance, Deputy Prime Minister Yury Borisov's visit to the Novgorod State University in October 2021. Government of Russia, "Yury Borisov Made a Work Trip to Veliky Novgorod," October 18, 2021, http://government.ru/news/43570/.

75 53% of IT students said they wanted to leave Russia, despite the rise in salaries for specialists in this sphere. See Anna Balashova, "The Drain of Programmers Starts With Students," *RBC*, November 19, 2021, https://www.rbc.ru/newspaper/2021/11/19/61966d549a7947d03a054ebb.

76 Vladislav Skobelev, "More than 40% of Russian Companies Refused to Integrate Artificial Intelligence," *RBC*, December 12, 2019, https://www.rbc.ru/technology_and_media/12/12/2019/5df0efd79a7947d21b51709f.

77 Anastasiya Stepanova, "Why There Are So Few Robots in Factories in Russia. And Where They Already Replace Humans.," *TASS*, November 22, 2018, https://tass.ru/ekonomika/5821888.

78 Margarita Konaev and Sara Abdulla, "Trends in Robotics Patents: A Global Overview and an Assessment of Russia," *Center for Security and Emerging Technology*, October 2021.

79 Nikolai Markotkin and Elena Chernenko, "Developing Artificial Intelligence in Russia: Objectives and Reality," *Carnegie Moscow Center*, August 5, 2020, https://carnegie.ru/commentary/82422.

Table 2.

EVENTS AND ANNOUNCEMENTS RELATED TO MILITARY AI, AUTONOMY AND ROBOTICS IN 2021

FEBRUARY

After stating that the goal (set by Putin in 2012) of modernizing 70% of military equipment had been achieved, Shoigu set an objective to further introduce AI technologies into military hardware, which, according to him, determines the prospective image of the Armed Forces.

APRIL

The MoD announced plans to establish the first robotic military unit, armed with combat robots such as the Uran-9 tank.

MAY

The MoD announced that it will create a special AI department with its own budget by December 2021. At the time of writing, it is reported to be a work in progress.

Shoigu said that Russia has begun producing combat robots that are able to conduct war autonomously.

AUGUST

Shoigu argued that UAVs and robotic systems bring significant changes to warfare and announced that 300 new programs have been developed by the MoD to train specialists, including in these two areas, taking into account developments in educational curricula in other countries.

SEPTEMBER

The Uran-9 and Nerekhta combat robots were used for reconnaissance and fire support as part of the Zapad-2021 military exercises.

OCTOBER

Russian Commander-in-Chief of the Land Forces Army General Oleg Salyukov said that UAVs, wearable robotics and exoskeletons will be part of the advanced equipment of the Russian Land Forces. He also announced that the Land Forces will begin a trial operation of the Uran-9 unmanned tanks starting from 2022.

RUSSIAN LEADERSHIP HAS ONLY RECENTLY UNDERSTOOD THAT, IN ORDER TO PROMOTE INNOVATION IN THE MILITARY, SUPPORT FOR AND INTERACTION WITH THE CIVILIAN, PRIVATE AND PUBLIC SECTOR IS ALSO HELPFUL.

areas is needed.[80] Until 2010-2015, there had been no visible support from the government for AI startups, for instance, resulting in the sphere being less developed than in China or the U.S.[81] In 2020, private investments in AI fell by almost 25%.[82] In an effort to correct the situation, the government plans to invest 5.26 billion rubles (approximately 70 million USD) into the sphere of AI until 2024.[83] In 2021, 1.5 billion rubles (approximately 19.8 million USD) from the federal budget were allocated to support developers of AI technologies.[84]

It seems that Russian leadership has only recently understood that, in order to promote innovation in the military, support for and interaction with the civilian, private and public sector is also helpful. Despite Shoigu calling in 2018 for civilian and military scientists to join forces in developing AI,[85] the situation in terms of cooperating with industries to understand and improve dual-use technologies — those that can be used for both civilian and military purposes — is under-developed. Some analysts argue that the priority should be to understand what is being developed in Russia before turning to foreign technologies.[86] However, Russia currently lacks the level of domestic hardware production necessary to pursue modern forms of AI and relies a lot on foreign electronic hardware, such as semiconductors.[87]

80 Robert J. Marks, "Samuel Bendett on AI Development in Russia," *Mind Matters*, July 29, 2021, https://mindmatters.ai/podcast/ep145/; Echo of Moscow Radio, "The Strengthening of Trust of Russians Towards Artificial Intelligence and the Development of the Domestic AI Industry," *Echo of Moscow Radio*, November 10, 2021, https://echo.msk.ru/programs/national/2933312-echo/; Dmitry Kochetkov, Aliaksandr Birukou, and Anna Ermolayeva, *Russia on the Global Artificial Intelligence Scene*, *Lecture Notes in Computer Science*, vol. 12602 LNCS (Springer International Publishing, 2021).

81 Dmitry Laru and Maria Nedyuk, "News from the Future: How AI Is Being Mastered in Russia," *Izvestia*, December 4, 2020, https://iz.ru/1096059/dmitrii-laru-mariia-nediuk/novosti-iz-budushchego-kak-v-rossii-osvaivaiut-iskusstvennyi-intellekt.

82 Yulia Tserekh, "No Need for Intelligence: Investments in AI in Russia Fell by Almost a Quarter," *Izvestia*, March 28, 2021, https://iz.ru/1142922/iuliia-tcerekh/uma-ne-nado-vlozheniia-v-ii-v-rossii-upali-pochti-na-chetvert.

83 Fontanka.ru, "AI Will Be Developed for 5 Billion in Russia," March 29, 2021, https://www.fontanka.ru/2021/03/29/69837446/. Priority areas for spending these government subsidies include computer vision, natural language processing and speech recognition. See Nikita Korolev, "In Intelligence, Everything Should Be Reasonable," *Kommersant*, May 25, 2021, https://www.kommersant.ru/doc/4826683?from=main_3.

84 Interfax.ru, "Artificial Intelligence Developers Will Receive 1.5 Billion Rubles in 2021," August 24, 2021, interfax.ru/business/786201. See also RIA Novosti, "Centers for AI Priority Areas Will Be Allocated Approximately 8 Billion Rubles," November 11, 2021, https://ria.ru/20211111/ii-1758561494.html.

85 TASS, "Shoigu Urged Military and Civilian Researchers to Jointly Work on Robots and Unmanned Vehicles," March 14, 2018, https://tass.ru/armiya-i-opk/5028777.

86 Bytyev and Smirnova, "Shock Intellect: Humans Are Leaving the Battlefield."

87 Keith Dear, "Will Russia Rule the World Through AI?: Assessing Putin's Rhetoric Against Russia's Reality," *RUSI Journal* 164, no. 5–6 (2019): 53.

RUSSIAN DEBATES ON AUTONOMOUS WEAPONS SYSTEMS (AWS)

Ethical questions

It is difficult to evaluate the extent to which Russian leadership considers the ethical implications of weaponized AI and weapons systems with increasingly autonomous and automated features. On the one hand, some policymakers present automation and robotization as an inevitable trend, both in Russia and abroad, and argue that it would be strategically important to embrace the changes towards autonomy.[88]

On the other hand, debates on the ethics of AI are not absent in Russian academic and expert communities,[89] and the risks associated with AI technologies are noted by military experts.[90] Official statements mention humanitarian and ethical concerns as justifications for further autonomy, in similarity to discourses and debates in the United States. Many MoD officials and military experts argue that integration of AI will protect human lives and reduce moral and psychological burdens on soldiers. Moreover, Russian military culture places a high value on the human soldier, especially because of the losses experienced during the Second World War (Great Patriotic War), and praising military heroes is part of the new ideological orientation of the MoD.[91]

The deputy general director of the ARF, Vitaly Davydov, suggested that the process of integrating combat robots is needed in order to avoid people dying in combat, while also recognizing that human control is always required in order to set the machine's tasks and

88 See, for instance, Interfax.ru, "The Research Institute of Minoborony Proposed Allowing Russian Combat Robots to Attack," February 5, 2019, https://www.interfax.ru/russia/649273; TASS, "Artificial Intelligence to Replace Pilot in Aircraft Cockpit — Russian Senator," November 1, 2017, https://tass.com/defense/973707.

89 Some scientists in Russia are openly in favor of regulating AI for ethical purposes. See, for instance, Ksenia Krivotulova, "'The Risks Are Too High': How Russia Is Helping the World to Make Artificial Intelligence Safe," *Lenta.Ru*, July 29, 2020, https://lenta.ru/articles/2020/07/29/ethics/.

90 V.M. Burenok, R.A. Durnev, and K.Y. Kryukov, "Intelligent Armament: The Future of Artificial Intelligence in Military Affairs," *Armament and Economy* 1, no. 43 (2018): 11.

91 Kirill Shamiev, "Understanding Senior Leadership Dynamics within the Russian Military," *Center for Strategic and International Studies*, July 2021, 4.

Combat robotic technology used during the Zapad 2021 exercises. Twitter/@mod_russia)

control their actions.[92] Meanwhile, Security Council Secretary General Nikolai Patrushev called for the regulation of weaponized AI,[93] while Dmitry Medvedev, the Council's deputy chairman and former Russian president, urged restrictions on some uses of AI.[94]

There are also visible reflections on the relationship between humans and machines. A Rostec industrial director, Sergei Abramov, suggested that many weapons in development by Rostec can make the decision to select a target, but added that "this is a serious decision, therefore much still depends on the human operator. By sending the [robotic] complex into a fully autonomous regime, the human must be 100% certain that the target is right and that it is the adversary who is destroyed."[95]

Finally, it seems that there is not full trust in technology on important decisions, especially with the memory of Soviet officer Stanislav Petrov preventing a nuclear war in 1983

92 RIA Novosti, "The ARF Assessed the Prospects of Replacing Living Soldiers with Combat Robots," April 21, 2020, https://ria.ru/20200421/1570333326.html.

93 TASS, "Russia's Security Chief Calls for Regulating Use of New Technologies in Military Sphere," April 24, 2019, https://tass.com/defense/1055346.

94 TASS, "Medvedev Calls to Think About Possibly Banning Certain Forms of AI," June 8, 2021, https://tass.com/science/1300269.

95 TASS, "Weapons with Artificial Intelligence Are Being Tested in Russia," February 26, 2019, https://tass.ru/armiya-i-opk/6157919.

TABLE 3.

WORKING DEFINITION USED BY THE MOD

"Autonomous weapons system – an unmanned piece of technical equipment that is not a munition and is designed to perform military and support tasks under remote control by an operator, autonomously or using the combination of these methods."

However, Russian delegations to the GGE have been insisting that the discussion at the UN should be limited to "fully autonomous" military systems and a working definition of these systems "cannot be limited to the current understanding of LAWS. It is necessary to bear in mind the possibilities of their future development."

after he correctly concluded that a satellite warning issued was a false alarm.[96] President Putin has previously recognized that threats coming from AI are "difficult to predict."[97] In 2020, he said that AI cannot be the president of Russia, because it has no "heart, no soul, no feelings of compassion and conscience,"[98] but that it could be an assistant to the president and even a good "teacher."[99] This statement might be a good summary of the Russian approach: AI can help and teach us, but will not replace our human qualities.

96 RIA Novosti, "Scolded Instead of Encouraged: How Officer Petrov Prevented a War in 1983," September 21, 2017, https://ria.ru/20170921/1505275264.html.

97 CNBC, "Putin: Leader in Artificial Intelligence Will Rule World," September 1, 2017, https://www.cnbc.com/2017/09/04/putin-leader-in-artificial-intelligence-will-rule-world.html.

98 Putin repeated this at the AI Journey conference in 2021, when he said it was difficult to imagine that AI has emotions, empathy or a soul. TASS, "Putin: It's Hard to Imagine That Artificial Intelligence Has a Soul," November 12, 2021, https://tass.ru/ekonomika/12910167.

99 Mikhail Kotlyar and Anna Balashova, "Putin Does Not Want An Artificial Intelligence Presidency," *RBC*, December 4, 2020, https://www.rbc.ru/politics/04/12/2020/5fca2c579a79477363b99ab3.

Russia in the international AWS debate

At the United Nations Group of Governmental Experts (GGE) on lethal autonomous weapons systems (LAWS), the main international forum where the issue is currently being debated, Russia's position has been to oppose a ban or any type of new regulation of autonomous weapons.[100]

Russia likes to point out the benefits of existing systems with autonomous and automated features. In September 2021, the Russian delegation at the GGE delivered a presentation arguing that machine vision and AI are superior in terms of solving operational challenges.[101] Based on its experience using unmanned systems with automated and autonomous features, the Russian Federation believes that future LAWS systems will be able to avoid some mistakes made by human operators, avoid casualty losses, and be more reliable, if adequate data is initially provided into the system. It has been arguing for recognizing the benefits of increasing autonomy in weapons systems and has called for "for avoiding hasty decisions that could hinder technological progress."[102] At the same time, Russia's official position at the UN does "not doubt the necessity of maintaining human control over the machine."[103] Officially, Russia does not argue for fully autonomous weapons to replace humans.[104]

In sum, there is an interesting contradiction between statements delivered to international and domestic audiences.[105] At the UN, Russia says that "potential LAWS" do not yet exist and are technologies of the future,[106] while Shoigu declares that Russia has begun producing autonomous combat robots. This suggests that debates on autonomy in the military are still ongoing among the Russian political, diplomatic, and military communities, and that it might be too simplistic to conclude that ethical debates taking place elsewhere are not taking place in Russia.

100 Human Rights Watch, "Country Positions on Banning Fully Autonomous Weapons and Retaining Human Control," August 10, 2020.

101 Russian Federation, "To Understanding the Characteristics of the LAWS Relevant to the Aims and Objectives of the Convention," 2021.

102 Russian Federation, "Considerations for the Report of the Group of Governmental Experts of the High Contracting Parties to the Convention on Certain Conventional Weapons on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems," para.6.

103 Russian Federation, "Russia's Approaches to the Elaboration of a Working Definition and Basic Functions of Lethal Autonomous Weapons Systems in the Context of the Purposes and Objectives of the Convention, " para.11.

104 For more on this debate, see Anna Nadibaidze, "Russia's Perspective on Human Control and Autonomous Weapons: Is the Official Discourse Changing?," *AutoNorms*, June 3, 2021, https://www.autonorms.eu/russias-perspective-on-human-control-and-autonomous-weapons-is-the-official-discourse-changing-2/.

105 Patrick Tucker, "Russia to the United Nations: Don't Try to Stop Us from Building Killer Robots," *Defense One*, November 21, 2017, https://www.defenseone.com/technology/2017/11/russia-united-nations-dont-try-stop-us-building-killer-robots/142734/.

106 Elena Chernenko, "An Automatic Rifle with a 'Kalashnikov,'" *Kommersant*, August 16, 2018, https://www.kommersant.ru/doc/3714419?from=doc_vrez.

CONCLUSIONS

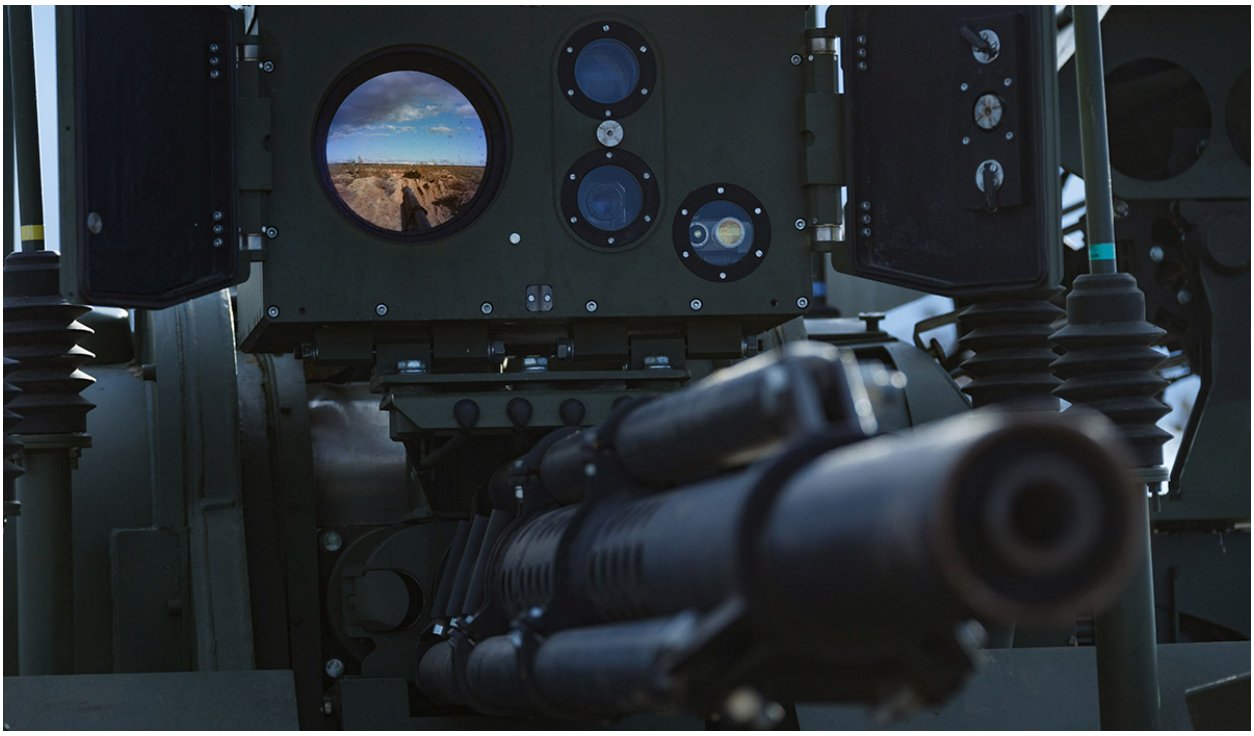
Russian leadership is visibly interested in strengthening its capabilities in terms of AI, autonomy, and automation in the Russian armed forces. These elements are associated with a mix of external and internal motivations, including strategic advantage, domestic factors and broader ideological beliefs about Russia's place in the post-Cold War world order. This report presented some of the main recent developments and debates on autonomy, automation, and AI among the Russian military and political communities. While the main objective was not to present policy recommendations or assess the quality of these efforts, it is possible to draw some conclusions based on this analysis.[107]

First, Russian discourse still features contradictions and ambiguities on the trust towards machines and whether they should function with full autonomy. Some, including President Putin, seem to be distrustful towards the capabilities of AI, and reflect this in Russia's official position in international debate at the UN, even though they oppose a ban on "killer robots." Others in the military community, including the defense minister, openly announce, predict or even encourage the reduction of human involvement in weapons systems control and data analysis.

Russian officials are also observing developments in other countries, especially the United States, where they can perceive some pressure to diminish the human role in warfare and the push to invest in AI. The National Security Commission on Artificial Intelligence, for instance, has called for the U.S. government to "embrace the AI competition."[108] In some ways, Russian and U.S. officials face similar questions on autonomous weapons, which maintains a vicious competitive cycle. At the same time, the development of AI and autonomy does not have to be inevitable, as some rhetoric suggests. There is no certain path that technology takes inevitably: It is about how policymakers decide to employ it based on various factors that are part of the debate on the spectrum of autonomy in weapons systems.

107 For another analysis of Russian debates on AI and autonomy, see Lydia Wachs, "Revival of the 'Dead Hand'? Russian Political and Military Elites' Debates on AI and Autonomy in Conventional and Nuclear Forces," in *The 2021 UK PONI Papers*, ed. Ana Alecsandru (London: Royal United Services Institute, 2021).

108 National Security Commission on Artificial Intelligence, "Final Report," March 2021.



Combat robotic technology used during the Zapad 2021 exercises. Twitter/@mod_russia)

THE POSSESSION OF CUTTING-EDGE AI TECHNOLOGY IS NOT NECESSARY FOR RUSSIA TO BE AN INFLUENTIAL ACTOR.

Finally, while Russia faces many challenges in overall AI development, especially with economic difficulties caused by the COVID-19 pandemic, this does not prevent it from becoming part of the group of essential actors in this sphere.[109] As evidenced by the increasing number of English-language publications of articles and reports about the Russian pursuit of autonomy, robotics, and related technologies, Russia is not an "outsider" in the AI debate.[110] The possession of cutting-edge AI technology is not necessary for Russia to be an influential actor. With its current capabilities, it is already a key player able to employ some of these technologies to achieve its foreign and security policy goals. In the eyes of Russian leadership, continuing to improve these capabilities and demonstrate progress to both international and domestic audiences is key to proving its place among the most powerful nations in the world.

109 Justin Haner and Denise Garcia, "The Artificial Intelligence Arms Race: Trends and World Leaders in Autonomous Weapons Development," *Global Policy* 10, no. 3 (2019): 331–37.

110 Julien Nocetti, "The Outsider: Russia in the Race for Artificial Intelligence," *Institut Français Des Relations Internationales Russie.Nei.Reports*, no. 34 (2020).

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