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Abstract

This report, the twenty-fourth in a series of biweekly updates, is part of an effort by CNA to provide timely, accurate, and relevant information and analysis of the field of civilian and military artificial intelligence (AI) in Russia and, in particular, how Russia is applying AI to its military capabilities. It relies on Russian-language open source material.

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Approved by:

October 2021



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Highlights of Issue 24

- Russian government announces six AI university centers, creates new laws for unmanned aerial systems, and continues developing standards for big data.
- The Russian military continues its widespread development of UAV technologies, pursuing greater autonomy, use in urban combat, and help in defeating amphibious assaults.
- Russian enterprises seek to develop industrial and agricultural AI applications.
- Russian government combats skills shortages by creating advanced engineering schools, discussing the possibility of offering a free second higher education degree in the IT field.
- NtechLab succeeds at G20 Innovation League international startup competition, plans to use its facial recognition technology at Expo-2020 in Dubai.

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Governance and Legal Developments

1. Russian government names six universities as Russia's leading AI centers

As discussed in issue 23 of *AI and Autonomy in Russia*, the Russian government has sought to competitively select universities in Russia to receive federal grants of up to 1 billion rubles (over \$14 million) each as part of the AI Federal Project (see the report *AI and Autonomy in Russia* for an explanation of the AI Federal project: <https://www.cna.org/centers/cna/sppp/rsp/russia-ai>). On October 4, an expert group led by Deputy Prime Minister Dmitry Chernyshenko announced the selection of six universities that the government will designate as Russia's AI centers. There were no unexpected winners among those selected: Skolkovo Institute of Science and Technology (Moscow), Moscow Institute of Physics and Technology (Moscow), V.P. Ivannikov Institute for System Programming (Moscow), Innopolis University (Tatarstan Republic), ITMO University (Saint Petersburg), and Higher School of Economics (Moscow, with subsidiaries across Russia). Industrial partners are providing additional investments for the centers. For example, ITMO will open a research center, "Strong Artificial Intelligence in Industry," with additional investment from Gazprom Neft. Some of its projects will be aimed at the creation of a decision support system for planning oil and gas field development. Other ITMO center projects will involve applied work for foreign companies such as Siemens and Huawei. Chernyshenko stated, "These 6 centers will become the reference points for the development of AI technology. They should not only help the rest of the participants to pull themselves up and pump themselves in the conditions of the new competition, but also provide Russia with a leading position in the world in the development of AI technology."

Sources: "Six AI research centers to receive federal grants of up to 1 billion rubles" [6 исследовательских центров по ИИ получат федеральные гранты до 1 млрд рублей], RF government analytical center, Oct. 5, 2021, <https://ac.gov.ru/news/page/6-issledovatel'skih-centrov-po-ii-polucat-federalnye-granty-do-1-mlrd-rublej-27059#>; "ITMO university wins grant to develop strong AI research center" [Университет ИТМО выиграл грант на развитие исследовательского центра по искусственному интеллекту], ITMO News, Oct. 5, 2021, https://news.itmo.ru/ru/university_live/achievements/news/12152/.

2. Russian government seeks to integrate UAS into single airspace by 2030, creates new digital sandbox for UAS in Tomsk

On October 11, 2011, the Russian government approved a concept for the integration of unmanned aerial systems into a single airspace in Russia by 2030 in a three-phase process that includes changes in existing laws, the development of a normative base to ease drone developers' application process for flight approval, and the modernization of communications, navigation, and tracking infrastructure. Tens of thousands of drones used in various sectors are officially registered in Russia, according to reports, and testing is underway for some drone systems to conduct commercial cargo delivery.

Separately, the Ministry of Economic Development has reportedly developed and made public the text of a draft government decree, "On the establishment of an experimental legal regime in the field of digital innovation and the approval of the Program of an experimental legal regime in the field of digital innovation for the operation of unmanned aerial systems in the Tomsk region." The pilot legal regime (digital sandbox) would be valid for three years and would apply to aerial work using drones, including those with a maximum take-off weight of more than 30 kg, and including cargo delivery from 0.1 kg to 1,500 kg.

Sources: "The Cabinet of Ministers approved the concept of integrating drones into a single airspace" [Кабмин утвердил концепцию интеграции беспилотников в единое воздушное пространство], TASS, Oct. 11, 2021, <https://tass.ru/obschestvo/12628643>; "An experimental legal regime for the operation of drones will be established in the Tomsk region for 3 years—draft resolution" [В Томской области на 3 года установят экспериментальный правовой режим для эксплуатации дронов – проект постановления], D-Russia, Oct. 5, 2021, <https://d-russia.ru/v-tomskoj-oblasti-na-3-goda-ustanovjat-jeksperimentalnyj-pravovoj-rezhim-dlja-jekspluatacii-dronov-proekt-postanovlenija.html>.

3. Russia develops big data standards in line with international standards

As part of Russia's National Technological Initiative project, a technical committee on standardization, titled "Artificial Intelligence (TK-164)," released the draft text of a big data analytics process management systems standard, developed chiefly by the M.V. Lomonosov National Center for Digital Economy of Moscow State University (MSU). The standard is reportedly a Russian-language adaptation of ISO/IEC 24668, "Information technology—Artificial Intelligence—Process management framework for Big data analytics." Earlier this year, according to *Vedomosti*, the Federal Technical Regulation and Metrology Agency

(Rosstandart) approved the Russian-language version of the international dictionary “Information technology—Big data—Overview and vocabulary.” According to MSU’s Yuri Khokhlov, “The adoption of the first national standard sets the vector of joint actions of the authorities, business, and the scientific and educational community for the development of the data economy in Russia. We aim to close the big data standardization gap.” A set of seven additional standards in the big data sphere remain under development.

Sources: “A national standard in the field of big data has been written in Russia” [В России написан национальный стандарт в области больших данных], CNews, Oct. 5, 2021, https://www.cnews.ru/news/top/2021-10-05_v_rossii_napisan_natsionalnyj; Valeriy Kodachigov, “The first national standard in the field of big data approved in Russia” [В России утвержден первый национальный стандарт в области больших данных], *Vedomosti*, July 15, 2021, <https://www.vedomosti.ru/technology/articles/2021/07/15/878242-utverzhdn-pervii-standart-v-oblasti-bolshih-dannih>.

Military and Security Developments

4. Grom UAV to be completely autonomous and self-learning

According to Nikolay Dolzhenkov, general designer at the Kronstadt Company, the Grom (“Thunder”) drone will be capable of working both with other manned aircraft and with human operators but also completely autonomously. Dolzhenkov goes on to say that the “operator’s control of the drone lies only at the upper level.” Operators will purportedly be able to give voice commands to the drone and it will perform those tasks completely autonomously. The announcement did not include examples of autonomous tasks or details about how the military would implement machine learning in the drone.

Sources: “The creator of the drone with AI “Thunder” spoke about its ability to self-study” (Создатель беспилотника с ИИ «Гром» рассказал о его возможности самообучаться), Oct. 10, 2021, Tvzvezda.com, <https://tvzvezda.ru/news/202110101124-iRSbr.html>.

5. Extending ground communication with UAVs

During a recent exercise, soldiers of the Western Military District extended the range of their communications, using UAV-enabled communications repeaters. The article did not indicate the range of communications or whether the units used multiple UAVs to facilitate beyond-line-of-sight flight operations.

Sources: Source: Andrey Arkadiev, “Military personnel of the Western Military District increased the communication range with the help of drones” (Военнослужащие ЗВО увеличили дальность связи при помощи беспилотников), Tvzvezda.com, Sept. 28, 2021, <https://tvzvezda.ru/news/2021928133-gwdf.html>.

6. Russia gears up for potential Orion MALEUCAV exports

According to Sergey Bogatkov, the CEO of the Kronstadt Company, the Orion MALE (medium-altitude, long-endurance) combat UAV export version will feature an open architecture, enabling consumers to customize munitions. The Kronstadt executive expressed confidence that Russia’s first MALE drone would be able to gain a market share among a growing list of

potential customers around the world. At the same time, Bogatikov noted that Orion would be better able to patrol the Arctic region, a key area for Russia's geopolitical strength and influence. This one-ton drone, capable of carrying up to a 200-kg payload, can also be used in a wide range of climates, with temperatures ranging from -50 to +50 Celsius, potentially increasing the number of customers from different geopolitical regions.

Sources: "Orion UAV can perform ice reconnaissance in the Arctic — CEO," Tass.com, Oct. 11, 2021, <https://tass.com/defense/1347789>; "Orion drones can use any weapons — CEO," Tass.com, Oct. 11, 2021, <https://tass.com/defense/1347791>.

7. Uran-6 UGV used in a growing range of missions

Russian sappers of the Western Military District are taking delivery of the Uran-6 demining unmanned ground vehicle (UGV). Russian military engineers used this vehicle extensively in Syria and Nagorno-Karabakh. It also featured prominently in the recent Russian-Pakistani "Friendship-2021" (Druzhiba-2021) exercises in the Krasnodar region, with Pakistani Special Forces and engineering troops learning to use the Uran-6 from their Russian counterparts. Tasks performed included terrain demining and overcoming mine obstacles. The Uran-6 operator can command the UGV at a relatively safe distance of up to 800 meters away. This UGV is featured prominently in the Russian military's strategy to utilize a growing number of remote-controlled and autonomous robotic systems in order to remove soldiers from dangerous front-line duties and combat.

Sources: Andrey Arkadiev, "Western Military District sappers received two Uran-6 demining UGVs" (Саперы ЗВО получили два новейших робота-сапера «Уран-6»), Tzvvezda.ru, Oct. 7, 2021, <https://tvzvezda.ru/news/20211071734-BB1Hn.html>; "Russian and Pakistani Special Forces used the latest robots for mine clearance" (На учениях спецназа России и Пакистана применили новейших роботов для разминирования), tass.ru, Sept. 30, 2021, <https://tass.ru/armiya-i-opk/12539777>.

8. Russian military to acquire small UAVs for urban operations

The Russian Ministry of Defense has agreed on the tactical and technical requirements for new weapons systems for its Radiation, Biological, and Chemical (RBC) forces, which will include small quadcopter-type UAVs. These drones will target the adversary using compact thermobaric or incendiary charges in order to quickly destroy targets in urban areas, as well as in complex terrain. According to Viktor Murakhovskiy, Russian military expert and the chief editor of *Arsenal Otechestva* magazine, such drones, because of their ability to strike with

precision, will be indispensable in street battles and in reducing losses among civilians and military personnel during combat. These small UAVs can also potentially hit targets in the enemy's rear areas, such as ammunition and fuel depots, communication centers, and command posts. This is consistent with the Russian military's announcement in late 2019 that it is working on a strategy to use robotics and autonomous systems in urban operations. The Russian military's RBC Troops differ from analogous US forces in that they have offensive roles in combat. In addition to protecting Russian troops in a nuclear, biologic, or chemical environment, one of their core functions is to inflict "losses on the enemy using incendiary devices" such as the TOS-1A multiple rocket launcher that utilizes thermobaric munitions, referred to in Russia as "flamethrower systems."

Sources: "Flamethrower drones to appear in the Russian army" (В российской армии появятся дроны-огнеметчики), Iz.ru, Oct. 5, 2021, <https://iz.ru/1230980/2021-10-05/v-rossiiskoi-armii-poiaviatsia-dronu-ognemetchiki>; "Russia will develop tactics for using robots in urban combat" (Источник: в РФ разработают тактику применения роботов в уличных боях), Ria.ru, Mar. 3, 2020, <https://ria.ru/20191124/1561522690.html>.

9. Okhotnik UCAV to feature AI for fully autonomous operations

According to Sergey Bibikov, chief designer at the Sukhoi company (part of Rostec's United Aircraft Corporation), the S-70 Okhotnik UCAV's autonomous operation will allow the drone to safely return to base in case connection and communication with the human pilot is lost. The Aerospace Forces intend the S-70 to operate with manned Su-57 fighters in a "loyal wingman" formation. However, a human is not intended to pilot the drone during the entire mission. Okhotnik's onboard AI-enabled operating system will allow the drone to eventually perform combat missions in a fully autonomous mode—to search, identify, and attack targets. The Russian military should begin acquisition in 2022.

Sources: "AI will allow Okhotnik drone to operate without communicating with an operator" (Искусственный интеллект беспилотника "Охотник" позволяет ему летать без связи с оператором), Tass.ru, Oct. 3, 2021, <https://tass.ru/armiya-i-opk/12564767>.

Corporate and Market Developments

10. Skolkovo Venture nurtures industrial startups

The Skolkovo Venture's "Industrial Fund" has invested 50 million rubles (\$700,000) into the AI developer Cyberphysics. Cyberphysics, founded in 2019, is a resident startup at Skolkovo. The developer's products are data modeling algorithms for industrial asset optimization and management. These tools help reduce costs in manufacturing by improving efficiencies and limiting operating costs for equipment as well as predicting industrial asset conditions over time. The startup has both international and domestic clients, including Fiat Chrysler Automobiles, Novolipetsk Steel (NLMK), Uralkali, and Gazprom. Sergei Nikolaev, the CEO of Cyberphysics, notes that the goal of their products is to allow for both data scientists and industrial engineers to "quickly and without programming skills create tools that increase the current efficiency of the enterprise" without requiring extensive experience or major debugging issues. According to the article, the products can save up to 100 million rubles per year in efficiencies.

Source: "Cyberphysics, a developer of AI tools for industry, raised 50 million rubles from Skolkovo Ventures" ["Разработчик ИИ-инструментов для промышленности Cyberphysics привлек 50 млн рублей от Skolkovo Ventures"], CNews, Oct. 11, 2021, https://www.cnews.ru/news/line/2021-10-11_razrabotchik_iinstrumentov.

11. Russia seeks to become leader in agricultural AI applications

The executive director of the Department of Technological Expertise at the state-owned Russian Agricultural Bank (Rosselkhozbank), Anton Tikhonov, stated that Russia may become a leader in applying AI to greenhouse horticulture. He explained that this is because of the rich network of research institutes and large agribusiness ventures in the country. Given the many systems for controlling and monitoring greenhouse microclimates, digital solutions that allow for unified systematic control over various processes are particularly attractive. According to Tikhonov, "Greenhouse vegetable growing and horticulture are on the verge of introducing robotic systems with machine vision. Artificial intelligence will increase yields by 20-30%, increase the accuracy of crop forecasting up to 90%." Modernizing Russian greenhouses is a major concern for Rosselkhozbank, which ComNews reports as having "supported the

implementation of 153 investment projects for the construction and modernization of greenhouses with a total funding of 225 billion rubles with a planned total capacity of 855 thousand tons of vegetable products per year.”

Sources: “Neural networks and robots will increase the productivity of greenhouses and gardens” [Нейросети и роботы повысят урожайность теплиц и садов”] ComNews, Oct. 8, 2021, <https://www.comnews.ru/digital-economy/content/216820/2021-10-08/2021-w40/neyroseti-i-roboty-povyshat-urozhaynost-teplic-i-sadov>.

12. Yandex releases machine learning library for open access

Yandex has released a new version of the open-source machine learning library, Catboost, for public access. Catboost was originally released in 2017, and has been popular for commercial and research institutions for gradient boosting projects, a machine learning approach used to produce predictive models. The head of the machine learning systems development group at Yandex, Stanislav Kirillov, noted that the library is used by international projects, such as the European Organization for Nuclear Research (CERN). The new update, denoted as version 1.0.0, includes full support for the distributed learning platform Apache Spark, and allows for faster learning processes and classification solutions when using multi-label intersecting classes. Catboost is used extensively by Yandex products that engage with non-numeric data, such as music recommendation algorithms and the Alice (Alisa) intelligent personal assistant program.

Sources: “Yandex has released the Catboost 1.0.0 machine learning library for open access” [«Яндекс» выложил в открытый доступ библиотеку машинного обучения Catboost 1.0.0”], CNews, Oct. 1, 2021, https://www.cnews.ru/news/line/2021-10-01_yandeks_vylozhil_v_otkrytyj.

13. Article notes challenges of AI use in employment recruiting

A recent article in the trade publication CNews provided an in-depth look at potential problems with using AI in the sphere of human resources. The stated goal of the piece was to dampen excesses of enthusiasm in Russia for the widespread value of AI by highlighting potential issues in a relatively narrow sphere, so that they can be fixed before AI is adopted more broadly throughout the economy.

The article notes that, according to a 2019 worldwide survey, 17 percent of HR departments had already implemented AI technologies, while another 30 percent expected to do so by the end of 2022. The main goals among respondents included improving the quality of decision-

making by using data (62 percent), improving the quality of work with personnel (57 percent), automating routine processes (56 percent), and saving money (51 percent). Despite this enthusiasm, problems have emerged with the implementation of AI in the HR sphere. One problem is that AI is generally trained on the basis of historical data. And if such data are from a different “historical epoch,” with different priorities and values, the company using the technology may appear in a poor light. For example, historical data may be biased against women because women were historically under-represented in a particular field. In general, AI training may be biased against representatives of social groups that are less likely to appear in the training data. Such problems are best solved for now by using humans to check AI recommendations. Other problems include the possibility of breaches of confidentiality, difficulties in integrating AI solutions with existing technological infrastructure, and a lack of financing because management does not see the benefits of AI solutions. Eighty-four percent of survey respondents expressed concern about excessively long time horizons for deriving value from investments in AI in the HR field. Almost half of the respondents in a 2021 survey went further, noting that AI technologies were hindering their work, while 24 percent mentioned that they did not fully understand how AI affects HR management.

For the moment, AI is not being used extensively in the HR sphere in Russia, while discrimination against certain groups is practiced by human HR workers. But in the future, AI is expected to be used in Russia as well. The article concludes by suggesting that Russian implementation take into account existing foreign experience, in order to avoid problems from the start.

Source: “Use of AI in recruiting could lead to big problems” [Применение ИИ в рекрутинге может привести к большим проблемам], CNews, Oct. 7, 2021, https://www.cnews.ru/articles/2021-10-07_primenenie_ii_v_rekrutinge_mozhet.

Education and Training Developments

14. Government plans to create 30 advanced engineering schools

According to Deputy Prime Minister Dmitry Chernyshenko, Russia will create 30 advanced engineering schools (on the basis of existing universities) in partnership with high-tech companies. These schools will train students “in most relevant areas of technology and technology development,” including digital design and modeling, advanced production technologies, robotics and mechatronics, sensor technology, IoT, artificial intelligence and big data, and unmanned transport systems. According to Chernyshenko, by the end of next year, university professors and field experts will undergo professional training specifically for the launch of the project. By the end of 2024, about 5,000 employees of the advanced engineering schools will be trained, and by 2030 the number will have doubled to 10,000. This effort is being carried out as part of the “Advanced Engineering Schools” strategic initiative. According to an article in the October 7 edition of Scientific Russia, Chernyshenko “added that this initiative is one of the tools for solving the problem of modernizing the Russian economy and transferring it to an innovative development path.”

Sources: “D. Chernyshenko: Russia will create 30 advanced engineering schools in partnership with high-tech companies” [Д. Чернышенко: В России создадут 30 передовых инженерных школ в партнерстве с высокотехнологичными компаниями], Scientific Russia, Oct. 7, 2021, <https://scientificrussia.ru/articles/dmitrij-cernysenko-v-rossii-sozdatut-30-peredovyh-inzenernyh-skol-v-partnerstve-s-vysokotehnologichnymi-kompaniami>.

15. Lawmaker proposes to mitigate IT skill shortages in Russia, as number of women in field grows

An October 7 RT article notes that State Duma Deputy Ivan Sukharev proposed to provide citizens who already have higher education with the chance to obtain a free second higher education degree in an IT specialty. The proposal was sent to Minister of Science and Higher Education Valery Falkov. According to the article, the shortage of personnel in the IT sector has reached an estimated 500,000 to 1 million specialists per year.

Meanwhile, a September 30 Gazeta.Ru article notes that the proportion of female IT specialists applying for jobs has increased over the past five years. Among C++ programmers, the

proportion of women rose from 3 percent to 8 percent, and among Python developers, from 7 percent to 11 percent. The proportion of women in the field of user interface / user experience grew the most—by 15 percentage points, from 25 percent to 40 percent. These findings were the result of a joint study from the Superjob service and the Moscow Institute of Physics and Technology (MIPT).

Sources: Yana Sturm, “Russian women began to choose IT specialties more often” [Российки стали чаще выбирать IT-специальности], *Gazeta.Ru*, Sept. 30, 2021, https://www.gazeta.ru/social/news/2021/09/30/n_16615753.shtml?updated; “In Russia, it was proposed to introduce a free second higher education in IT specialties” [В России предложили ввести бесплатное второе высшее по IT-специальностям], *RT*, Oct. 7, 2021, <https://russian.rt.com/russia/article/914631-rossiya-obrazovanie-it>.

16. Lawmakers want AI tools to ID “dangerous” schoolchildren through their essays

According to an article in the September 23 edition of *Vedomosti*, 1.7 billion rubles are allocated for the creation of a text analysis program in the draft federal budget for 2022 and planning period 2023-2024. This program would identify “socially hazardous and destructive behaviors” in schoolchildren by reviewing their written work. According to Oleg Smolin, first deputy chairman of the Committee on Education and Science in the VII State Duma convocation, the impetus for the creation of a project was the increase in violent incidents in educational institutions. The article notes that on September 20, 2021, an 18-year-old carried out an armed attack on Perm State University, killing eight people and wounding others. On May 11, 2021, at a Kazan gymnasium, one of the schoolchildren attacked students and teachers, resulting in the death of seven children and two teachers. The specifics of how the algorithm will work and be applied have not yet been discussed. On September 30, 2021, the draft federal budget was sent to the State Duma, where it is being reviewed.

Sources: “Dangerous schoolchildren will be identified by their essays using AI” [Опасных школьников вычислят по сочинениям с помощью ИИ], *Vedomosti*, Sept. 23, 2021, <https://www.vedomosti.ru/economics/articles/2021/09/23/888022-potentsialnih-strelkov>.

International Collaboration

17. NtechLab succeeds at international competitions, readies to use its tech in Dubai

Russian companies continue to post successful results in international competitions. The facial recognition and video analysis company NtechLab took first place in the Innovation League international startup competition organized by the G20. The final round, which included 100 competitors, took place at a forum in Sorrento, Italy, on October 9-10. The competitors were judged on their financial results, the unique nature of the product, the quality of the team, and the quality of the product. The company had already won a previous international competition in 2021. In May, it came in first in the Face Recognition Vendor Test (FRVT) sponsored by the US National Institute of Standards and Technologies (NIST), which is considered the most prestigious competition among companies in the facial recognition field.

NtechLab's flagship product is FindFace Multi, which serves as a multi-object video analysis platform for facial and silhouette recognition for people and automobiles. The company works in 20 countries throughout Africa, Europe, Latin America, the Persian Gulf, and South and Southeast Asia. In August, its designs were implemented at 30 stations on the most densely trafficked sectors of India's railway system, where it is being used for directing passenger traffic and for locating criminals. Among other capabilities, the system can count the number of people in a particular space, and determine their sex and age. It can inform staff when maximum occupancy limits in a particular space are being exceeded or when excessively long queues are forming.

NtechLab is looking to use this success to continue to expand in international markets. It has presented and will utilize FindFace Multi at the Dubai Expo-2020, which is taking place from October 1, 2021, to March 31, 2022. As part of the expo, NtechLab is organizing a conference on video analytics, to take place on November 23. The conference, which will include participants from 10 countries, will discuss the use of video analytics in trade, industry, government, and banking, as well as trends in facial recognition and the ethical use of AI.

Sources: "Russian startup in the AI sphere won a large international competition" [Российский стартап в сфере искусственного интеллекта стал первым на крупном международном конкурсе], *Izvestiya*, Oct. 11, 2021, <https://iz.ru/1233825/2021-10-11/rossiiskii-startap-v-sfere-iskusstvennogo-intellekta-stal-pervym-na-kрупnom-mezhdunarodnoi-konkurse>;
"NtechLab to study demography and count Dubai Expo 2020 attendees" [Ntechlab изучит демографию и посчитает посетителей «Экспо-2020» в Дубае], *CNews*, Sept. 30, 2021, https://www.cnews.ru/news/line/2021-09-30_ntechlab_izuchit_demografiyu_i.

Spotlight: UAVs and Defeating an Amphibious Assault

An article in the No. 18, June 2021, issue of the journal *Aerospace Forces: Theory and Practice*, outlines how UAVs can supplement Russia's Aerospace Forces in defeating an amphibious operation. The article begins by assessing the threat posed by US over-the-horizon amphibious assault capabilities. It is argued that over-the-horizon amphibious landings make it possible for up to 30 percent of an adversary's landing forces to approach the landing zone with little detection.

The other challenge, according to the authors, is the Russian Aerospace Forces' combat capability that remains after an adversary has prepared the landing site for the amphibious operation. This is almost certainly a reference to the longstanding view that the United States uses its long-range strike capabilities in the initial phase of any military operation.

The article puts forward the possibility of augmenting the Russian Aerospace Forces with small-scale UAVs and Russian Ground Forces aviation. In this scenario, the Russian Aerospace Forces would create tactical groups of combined manned and unmanned units that would then target the adversary landing forces. The goal is to inflict enough casualties against the initial assault (notably in the preparation stage when the adversary forces are about to board the aircraft and assault vehicles) to either buy time or cause the adversary to withdraw and suspend its operations.

The authors argue that striking the enabling assets over the horizon is unnecessary as long as Russia can retain enough combat capability to inflict heavy losses close to shore. Small-scale UAVs are more difficult to detect and defeat, are low cost, and can help designate targets for other strike systems.

According to the article, an important advantage of this method is the reduction of risk to manned aircraft. The crewed aircraft will be able to strike with high-precision weapons following the disruptive assault by the drone swarms envisioned above. The authors propose that their plan is an asymmetric response against perceived American military strength.

Sources: "Method of joint Actions of Manned Aviation Groups and Strike Unmanned Aerial Vehicles of Small Class in the Maritime Anti-Amphibious Operation" (СПОСОБ СОВМЕСТНЫХ ДЕЙСТВИЙ ПИЛОТИРУЕМЫХ АВИАЦИОННЫХ ГРУПП И УДАРНЫХ БЕСПИЛОТНЫХ ЛЕТАТЕЛЬНЫХ АППАРАТОВ МАЛОГО КЛАССА В МОРСКОЙ ПРОТИВОДЕСАНТНОЙ ОПЕРАЦИИ), *Aerospace Forces: Theory and Practice*, No. 18 (June 2021).

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