



Russia's Artificial Intelligence Strategy: The Role of State-Owned Firms

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Abstract: In 2017, Russian President Vladimir Putin declared that whichever country becomes the leader in artificial intelligence (AI) “will become the ruler of the world.” Yet Russia lags competitors like China and the United States substantially in AI capabilities. What is Russia’s strategy for boosting development of AI technologies, and what role do groups within the Russian elite play in shaping this strategy? Russia’s AI development strategy is unique in that it is led not by the government, nor by the private sector, but by state-owned firms. The government’s distrust of Russia’s largest tech firm, Yandex, has sidelined the company from national AI planning. Meanwhile, Russia’s defense conglomerate Rostec publicly appears to focus less on artificial intelligence than on other high-tech priorities. As a result, Russia’s AI development has been left to a state-owned bank, Sberbank, which has taken the lead in devising plans for government-backed investment in AI.

Whichever country becomes the leader in artificial intelligence (AI) “will become the ruler of the world,” Russian Federation President Vladimir Putin declared in 2017.¹ For Putin, the wide-ranging capabilities that come with artificial intelligence offer the possibility of enhancing states’ power on the international stage. Artificial intelligence can be used to improve military capabilities, advance science and medicine, and boost industrial efficiency. Russia’s military is trying to capitalize on artificial intelligence by replacing older weapons systems with “modern ones, including those based on digital technology and artificial intelligence,” Putin has declared.²

Though officials tout the benefits of AI, Russia lags its peers significantly in artificial intelligence capabilities by many metrics. From 1996 to

¹ James Vincent, “Putin says the nation that leads in AI ‘will be the ruler of the world,’” *The Verge*, Sept. 4, 2017, <https://www.theverge.com/2017/9/4/16251226/russia-ai-putin-rule-the-world>.

² “Defence Ministry Board meeting,” *The President of Russia*, Dec. 24, 2019, <http://en.kremlin.ru/events/president/news/62401>.

2017, Russia ranked 33rd and 42nd in global AI publications and citations, respectively. By comparison, the United States and the People's Republic of China ranked first and second in each category.³ Russia's private sector AI ecosystem is also notably smaller than that of its competitors. The country currently has 193 startups focused on artificial intelligence—a far cry from the United States' 8,161 and China's 1,226.⁴

Recognizing that these shortcomings will limit Russia's ability to harness artificial intelligence, the Kremlin has sought to kickstart its AI development. What is Russia's strategy for boosting development of artificial intelligence technologies, and what role do groups within the Russian elite play in shaping this strategy? The Kremlin has opted not to take the lead directly on Russia's AI endeavors; instead, it is outsourcing planning and implementation to state-owned firms. Government cooperation with the private sector has proven successful in the United States and China, where firms like Microsoft and Tencent collaborate with government. Yet, Russia's largest tech firm, Yandex, has taken a backseat in national AI efforts due to its complicated relationship with the Kremlin. Russia's military-industrial conglomerate, Rostec, meanwhile, publicly appears to focus less on artificial intelligence than on other high-tech priorities. As a result, Russia's AI development has been left to a state-owned bank, which has taken the lead in devising plans for government-backed investment in AI.

Challenges to Russian AI Innovation

A key challenge that Russia faces in developing and deploying artificial intelligence to different sectors is its talent pipeline. There are too few people studying artificial intelligence, researching new methods, or deploying AI algorithms in different contexts. While the legacy of the Soviet education system, which was praised widely for math and science education, has enabled some success in AI development at a few elite Russian universities, the country ranks substantially below other developed nations in high-tech research and technology-based degrees. According to a 2019 Organization for Economic

³ Forrest E. Morgan, Benjamin Boudreaux, Andrew J. Lohn, Mark Ashby, Christian Curriden, Kelly Klima, and Derek Grossman, "Military Applications of Artificial Intelligence," *Rand Corporation*, 2020, https://www.rand.org/pubs/research_reports/RR3139-1.html.

⁴ Nikolai Markotkin and Elena Chernenko, "Developing Artificial Intelligence in Russia: Objectives and Reality," Aug. 5, 2020, <https://carnegie.ru/commentary/82422>; "Artificial Intelligence Startups in Russia," Tracxn, April 16, 2020, <https://tracxn.com/explore/Artificial-Intelligence-Startups-in-Russia>; "Artificial Intelligence Startups in United States," Tracxn, April 16, 2020, <https://tracxn.com/explore/Artificial-Intelligence-Startups-in-United-States>; "Artificial Intelligence Startups in China," Tracxn, April 16, 2020, <https://tracxn.com/explore/Artificial-Intelligence-Startups-in-China>.

Co-operation and Development (OECD) report, less than one percent of Russian graduates studied an information-, communications-, or technology-based degree. Moscow State University, Russia's leading computer science research university, ranked 174th in the 2021 Times Higher Education World University Rankings.⁵ With relatively limited educational opportunities in AI, and even less cutting-edge academic research, Russian firms and government agencies have a smaller pool of qualified and experienced workers from which to draw on for AI research and development.

Of those students who earn AI-relevant degrees in Russia, many often seek more fruitful opportunities in the West. Russian developers earn about one quarter the salary of their U.S. counterparts.⁶ Similar pay differentials in a variety of sectors have led more than 100,000 Russians to settle abroad each year.⁷ According to an Atlantic Council survey of 400 of those emigres who left Russia since 2000 and who currently live in either the San Francisco, New York, London, or Berlin metropolitan areas, only 19 percent had less than a university degree when they left Russia, while 45 percent had a bachelor's/specialist degree and 36 percent held a master's degree or doctorate.⁸ Half of Russian doctoral students have expressed interest in emigrating.⁹ Indeed, many of Russia's most successful tech entrepreneurs, such as Mail.ru Group co-founder Yuri Milner, have resettled in Silicon Valley.¹⁰

⁵ "Education at a Glance 2019: OECD Indicators," Organisation for Economic Co-operation and Development 2019, [https://www.oecd-ilibrary.org/docserver/f8d7880d-en.pdf?expires=1601413783&id=id&accname=guest&checksum=390A775DF649613999776BAD076C5522](https://www.oecd-ilibrary.org/docserver/f8d7880d-en.pdf?expires=1601413783&id=id&accname=guest&checksum=390A775DF649613999776BAD076C5522;); and "The World University Rankings, Lomonosov Moscow State University," *World University Rankings*, 2020, <https://www.timeshighereducation.com/world-university-rankings/lomonosov-moscow-state-university>.

⁶ Keith Dear, "Will Russia Rule the World Through AI?," *RUSI Journal*, Nov. 29, 2019, <https://doi.org/10.1080/03071847.2019.1694227>.

⁷ Morgan, Boudreaux, Lohn, Ashby, Curriden, Klima, and Grossman, "Military Applications of Artificial Intelligence."

⁸ John Herbst and Sergei Erofeev, "The Putin Exodus: The New Russian Brain Drain," Atlantic Council Eurasia Center, Feb. 2019, <https://www.atlanticcouncil.org/wp-content/uploads/2019/09/The-Putin-Exodus.pdf>.

⁹ "Half of Russian PhD Students Want to Move Abroad," *Moscow Times*, April 4, 2018, <https://www.themoscowtimes.com/2018/04/04/half-russian-phd-students-want-move-abroad-a61050>.

¹⁰ Jon Swaine and Luke Harding, "Russia funded Facebook and Twitter investments through Kushner investor," *Guardian*, Nov. 5, 2017, <https://www.theguardian.com/news/2017/nov/05/russia-funded-facebook-twitter-investments-kushner-investor>; Nellie Bowes, "Russians in Silicon Valley Can't Shake Hacking's Shadow," *New York Times*, October 8, 2017, <https://www.nytimes.com/2017/10/08/technology/russian-election-hacking-silicon-valley.html>.

This brain drain has had a particularly noticeable effect on Russia's defense sector. In 2016, half of Russian military-industrial complex enterprises were experiencing personnel shortages. The share of specialists in the defense industry under 30 years of age was just four percent.¹¹ There is little evidence to suggest these figures have improved. Low government spending on technology development is partly to blame for Russia's difficulties attracting talent in the defense sector. By some open source estimates, Russia's defense ministry spends as little as \$12 to \$36 million on AI research annually.¹² The accuracy of these figures is difficult to assess given the classification of defense spending in Russia, but they are far below AI spending levels in the United States and China. The U.S. Department of Defense spends \$7.4 billion annually on unclassified AI development, for instance, and China reports that it plans to spend \$150 billion through 2030.¹³ Even if Russia's spending levels are substantially understated and China's are overestimated, a large gap in spending remains.

Given challenges faced by the defense sector, can Russian business develop the country's artificial intelligence ecosystem? Russia's private sector firms, just like companies the world over, face incentives to invest in AI. AI offers opportunities to automate tasks, better understand customers, and improve processes. But Russia's private sector companies are suffering from a decade-long squeeze of low economic growth, a poor environment for venture funding, and a judiciary captured by political interests. To give just one high-profile example, the head of one of Russia's largest private equity firms, Baring Vostok, sits in house arrest on a politically motivated charge.¹⁴ Given such a business climate, private investment in Russia remains depressed, and the private sector will therefore struggle to drive AI investment in Russia as it has in the U.S. and China.

Recognizing that these limitations will exacerbate Russia's lag in AI, the Kremlin has launched a program of state support to encourage the development and implementation of artificial intelligence technologies. Russia's main AI development initiative, the Digital Economy National Project, outsources AI implementation and financing to state-owned companies—firms that the Kremlin trusts. However with a few exceptions, these companies are

¹¹ "Military "Skolkovo": why Shoigu is building a technopolis in Анапа [Военное «Сколково»: зачем Шойгу строит технополис в Анапе]," *RBC*, March 13, 2018, <https://www.rbc.ru/politics/13/03/2018/5a9e82869a7947860d0516ca>.

¹² Morgan, Boudreaux, Lohn, Ashby, Curriden, Klima, and Grossman, "Military Applications of Artificial Intelligence."

¹³ Alina Polyakova, "Weapons of the weak: Russia and AI-driven asymmetric warfare," Brookings Institution, Nov. 15, 2018, <https://www.brookings.edu/research/weapons-of-the-weak-russia-and-ai-driven-asymmetric-warfare/>.

¹⁴ Max Seddon, "Calvey fraud case casts pall over Putin's St Petersburg summit," *Financial Times*, June 6, 2019, <https://www.ft.com/content/a3d01b84-8797-11e9-a028-86cea8523dc2>.

less productive than their private sector counterparts, and they lack the competition that can help foster innovation.¹⁵ Moreover, the state sector is, if anything, even more vulnerable to politicization than the private sector, as the recent arrest of Alexander Povalko, the head of the government-backed Russian Venture Company, on charges of fraud and misuse of funds demonstrates.¹⁶ In the hardware space, meanwhile, Russia will continue to rely on U.S., Taiwanese, and South Korean semiconductor equipment on which to run AI algorithms, given that the Russian electronics industry is small and highly focused on specific military production, not generalized products. This situation is the complicated context in which the Russian government is now trying to induce state-owned firms to invest more in AI.

Russia's Official AI Strategy

In September 2017, Russia declared its entry into a global race to develop artificial intelligence technologies when Putin stated that the masters of AI will “rule the world.” Yet even earlier, despite the aforementioned obstacles to AI development, Russian government organizations and companies had begun embracing artificial intelligence for their own use. In April 2016, for example, Sberbank, a state-owned bank, created a venture capital fund focused on investing in startups in financial technology, big data, and artificial intelligence, which the bank hoped would benefit its business. In 2017, Russia's largest tech firm Yandex unveiled Alice, an AI-enabled virtual assistant like Apple's Siri.¹⁷ In the same year, Gazprom Neft signed a cooperation agreement with Yandex to implement big data and machine learning projects in the oil industry.¹⁸ Meanwhile, Rostec restructured its corporate governance to introduce the position of Managing Director for Science and Technology, which would develop AI and machine learning

¹⁵ Dear, “Will Russia Rule the World Through AI?”

¹⁶ Adrien Henni, “Russian Investment World Rocked by Yet Another Arrest,” *Moscow Times*, June 8, 2020, <https://www.themoscowtimes.com/2020/06/08/russian-investment-world-rocked-by-yet-another-criminal-case-a70507>.

¹⁷ Pavel Kantyshev, “Sberbank creates a second venture fund with a capital of \$100 million [Сбербанк создает второй венчурный фонд с капиталом от \$100 млн],” *Vedomosti*, April 10, 2016, <https://www.vedomosti.ru/technology/articles/2016/04/11/637122-sberbank-udvaivaet-venchurnie-investitsii>; and Kirill Petrov, “Local Knowledge and Personality Help Yandex's Alice Virtual Assistant Dominate the Russian Market,” *voicebot.ai*, May 17, 2019, <https://voicebot.ai/2019/05/17/local-knowledge-and-personality-help-yandexs-alice-virtual-assistant-dominate-the-russian-market/>.

¹⁸ “Gazprom Neft signs cooperation agreement with Yandex,” Gazprom Neft, June 1, 2017, <https://www.gazprom-neft.com/press-center/news/gazprom-neft-signs-cooperation-agreement-with-yandex/>.

initiatives over the next 10 to 15 years.¹⁹ These initiatives were driven by demands from within these organizations, and were not part of a government-led AI development effort.

The first major Russian government AI proposal was the Russian Ministry of Defense’s (MoD) 10-point statement issued in March 2018.²⁰ The proposal brought together the MoD, Ministry of Education and Science (MES), and the Russian Academy of Sciences (RAS) to analyze the state of AI in Russia and to unite leading Russian educational, industrial, and government organizations around artificial intelligence technologies. Specifically, it called for a new MoD research campus on the Black Sea to provide the armed forces with innovative, often AI-driven solutions. It also facilitated new partnerships between organizations like the Foundation for Advanced Research (Фонд перспективных исследований) and the MES and RAS to create new proposals for AI regulatory regimes.²¹ This 10-point AI development proposal

10 Points to Develop AI in Russia, March 2018²²
1. Form an AI and Big Data Consortium to combine leading Russian efforts in AI implementation
2. Intensify efforts to establish a Fund for Analytical Algorithms and Programs to provide expertise on automated systems
3. Create a state system for AI training and education
4. Establish an AI lab at the ERA Technopolis at Anapa to research AI, robotics, and automation
5. Establish a National Center for Artificial Intelligence to develop promising AI projects and implement AI solutions
6. Monitor global AI development
7. Hold MoD organized AI wargames
8. Check for AI compliance
9. Discuss AI proposals at domestic military forums
10. Hold annual AI conference

¹⁹ “Annual Report 2017 Rostec State Corporation,” Rostec, April 19, 2018, http://let.iiec.unam.mx/sites/let.iiec.unam.mx/files/Rostec-Annual_Report_2017.pdf

²⁰ “Conference “Artificial Intelligence: Problems and Solutions – 2018” [Конференция «Искусственный интеллект: проблемы и пути их решения – 2018»],” Ministry of Defense of the Russian Federation, 2018, <http://mil.ru/conferences/is-intellekt.htm>.

²¹ “Conference “Artificial Intelligence: Problems and Solutions – 2018” [Конференция «Искусственный интеллект: проблемы и пути их решения – 2018»].”

²² Samuel Bendett, “Here’s How the Russian Military Is Organizing to Develop AI,” *Defense One*, July 20, 2018, <https://www.defenseone.com/ideas/2018/07/russian-militarys-ai-development-roadmap/149900/>.

was military-specific. It lacked information regarding potential private sector partnerships and proposed that government entities take the lead on AI technologies in Russia.²³

Almost a year after his “rule the world” comment, Putin issued a series of “May Decrees” in 2018 outlining Russia’s national development goals through 2024. These goals included increasing Russian life expectancy to 78 years, cutting poverty in half, and introducing digital technologies into the economy and social sphere.²⁴ The Decrees provided the basis for creating “National Projects,” government spending, and infrastructure plans designed to achieve Putin’s targets. One National Project that emerged from the May Decrees was the Digital Economy National Project, which was tasked with accomplishing several aims in the sphere of advanced technologies, including artificial intelligence.

Within the Digital Economy National Project, the government has pursued two parallel initiatives to develop AI. The first falls within a Digital Economy sub-project aimed at developing seven end-to-end digital technologies (сквозные цифровые технологии), the so-called Digital Technologies Federal Project. In addition to artificial intelligence, the Digital Technologies Federal Project focuses on wireless communications (5G), robotics, virtual reality, blockchain, quantum computing, and new production technologies. The second initiative, which began with the National Strategy for the Development of AI and culminated in the AI Federal Project, focuses exclusively on artificial intelligence. While developing these two initiatives, the government has issued three AI-specific policy documents to guide government and private sector activity in the sphere of AI. The documents leaned heavily on the private sector, and they therefore differed from the 10-point MoD proposal introduced a year prior.

The first policy document appeared in May 2019 under the Digital Technologies Federal Project. A couple months prior, the government had tasked state-owned companies with drafting implementation and financing plans, called “roadmaps,” for developing each technology. For example, Rostec was tasked with drafting the 5G implementation roadmap and Rosatom with the quantum computing roadmap.²⁵

²³ Bendett, “Here’s How the Russian Military Is Organizing to Develop AI.”

²⁴ “The President signed Executive Order On National Goals and Strategic Objectives of the Russian Federation through to 2024,” President of Russia, May 7, 2018, <http://en.kremlin.ru/events/president/news/57425>.

²⁵ “Rosatom summed up the results of tenders for the development of ‘roadmaps’ for end-to-end technologies [«Росатом» подвел итоги конкурсов на разработку «дорожных карт» по сквозным технологиям],” *D-Russia.ru*, April 1, 2019, <https://d-russia.ru/rosatom-podvel-itogi-konkursov-na-razrabotku-dorozhnyh-kart-po-skvoznym-tehnologiyam.html>.

Sberbank, the state-owned bank led by Putin confidant and former Economy Minister German Gref, was chosen to draft the “Roadmap for Artificial Intelligence.” In the document, Sberbank identified sub-technologies within AI and outlined methods to advance Russia’s capabilities in each field along with detailed funding figures.²⁶ After making multiple revisions, the government approved the AI Roadmap in October 2019.²⁷

For full implementation of the AI Roadmap, Sberbank estimated that an investment of 392 billion rubles (\$5.13 billion) was needed to meet Russia’s AI-specific digital technology goals.²⁸ However, in February 2020 total funding was revised downwards to 244 billion rubles (\$3.83 billion). Per this proposal, the federal budget would allocate 91 billion rubles (\$1.43 billion) towards the Roadmap with the remaining 152 billion rubles (\$2.39 billion) coming from other sources. Sberbank said it was ready to fund 112 billion rubles (\$1.76 billion) of the cost, 45 percent of the total and 74 percent of the extra-budgetary funding. Sberbank’s Roadmap envisions the bank investing almost 55 billion rubles (\$864 million) into AI applications for its own business (these funds would count toward the national investment spending), 34 billion (\$534 million) into the design and development of AI software, 13 billion (\$204 million) into scientific research, and 4.5 billion (\$70.7 million) to improve the quality of data required for machine learning technologies.²⁹ The Russian Direct Investment Fund, a Russian state-backed fund that often pursues projects of special political interest to the Kremlin, was tasked with funding some investments as well.³⁰

²⁶ “Roadmap for the Development of ‘end-to-end’ digital technologies ‘Neurotechnology and artificial intelligence’ [Дорожная карта развития «сквозной» цифровой технологии «Нейротехнологии и искусственный интеллект»],” Ministry of Digital Development, Communications, and Mass Media, October 14, 2019, <https://digital.gov.ru/ru/documents/6658/>.

²⁷ “Russian artificial intelligence has grown wiser. Now it needs 392 billion [Российский искусственный интеллект поумнел. Теперь ему нужно 392 миллиарда],” *CNews*, Oct. 28, 2019. https://www.cnews.ru/news/top/2019-10-28_rossijskij_iskusstvennyj.

²⁸ “Roadmap for the Development of ‘end-to-end’ digital technologies ‘Neurotechnology and artificial intelligence’ [Дорожная карта развития «сквозной» цифровой технологии «Нейротехнологии и искусственный интеллект»],” Ministry of Digital Development, Communications, and Mass Media, October 14, 2019, <https://digital.gov.ru/ru/documents/6658/>.

²⁹ Igor Korolev, “Russian artificial intelligence needs 244 billion rubles. Sberbank is ready to give 112 billion [Российскому искусственному интеллекту нужно 244 млрд руб. Сбербанк готов дать 112 миллиардов],” *CNews*, Feb. 14, 2020, https://www.cnews.ru/news/top/2020-02-14_rossijskomu_iskusstvennomu.

³⁰ Based on exchange rates from Feb. 14, 2020, the date of publication of the source.

AI Roadmap Funding by Sub-Technologies 2020-2024, as approved in October 2019 (billion rubles)³¹			
Sub-Technology	Share of Funding	Budgetary Investment	Non-budgetary Investments
Computer Vision	21.6%	12.3	72.4
Natural Language Processing	16.2%	9.2	54.3
Decision Making Systems	35.1%	19.9	117.7
Speech Recognition and Synthesis	16.2%	9.2	54.3
Advanced AI Methods and Technologies	10.8%	6.1	36.2
Sum	100%	56.8	334.9

As the government developed the Digital Technologies Federal Project, the Kremlin singled out artificial intelligence for additional attention. In February 2019, Putin instructed the government to create a separate National Strategy for the Development of AI through 2030. Officials again tasked Sberbank with preparing the policy document, and Yandex, Mail.ru Group, and Gazprom Neft reportedly contributed.³² Putin approved the Strategy in October 2019.³³ The document outlined the Kremlin's broad plan to boost Russia's share of the global AI market from 0.2 percent in 2018 to 1.8 percent in 2024 via greater scientific research into AI, increased data availability, and a new digital regulatory system.³⁴ Yet, the document was vague and lacked

³¹ Roadmap for the Development of 'end-to-end' digital technologies 'Neurotechnology and artificial intelligence' [Дорожная карта развития «сквозной» цифровой технологии «Нейротехнологии и искусственный интеллект»], Ministry of Digital Development, Communications, and Mass Media, October 14, 2019, <https://digital.gov.ru/ru/documents/6658/>.

³² "Sberbank unites developers of the strategy of artificial intelligence [Сбербанк объединит разработчиков стратегии искусственного интеллекта]," *Vedomosti*, July 16, 2019, <https://www.vedomosti.ru/technology/articles/2019/07/16/806677-sberbank-obedinit-razrabotchikov-iskusstvennogo-intellekta>.

³³ "Sberbank explained to the state how to spend 120 billion on artificial intelligence [Сбербанк объяснил государству, как потратить 120 миллиардов на искусственный интеллект]," *CNews*, Dec. 18, 2019, <https://www.cnews.ru/news/top/2019-12-11-sberbank-obyasnil-gosudarstvu>.

³⁴ "Decree of the President of the Russian Federation from October 10, 2019 No. 490 "On the development of artificial intelligence in the Russian Federation" [Указ Президента РФ от 10 октября 2019 г. No. 490 "О развитии искусственного интеллекта в Российской Федерации"]," *garant.ru*, Oct. 14, 2019, <https://www.garant.ru/products/ipo/prime/doc/72738946/#1000>.

information on funding. It suggested that the Kremlin would lead AI development in Russia, but the government was simultaneously outsourcing the implementation and some of the financing of AI development to state-owned companies under the Digital Technologies Federal Project.

To realize the National Strategy's objectives, the Kremlin instructed the government to develop a new artificial intelligence federal project within the Digital Economy National Project. Sberbank prepared the policy document for the AI Federal Project, which added performance indicators and funding figures to the goals set out in the National Strategy. The government approved the AI Federal Project in August 2020. However, the coronavirus pandemic has dramatically reduced planned government funding for the project. The project originally called for 90.5 billion rubles (\$1.17 billion) in federal funding through 2024.³⁵ When it was approved in August 2020, federal funding had dropped to 29.4 billion rubles through 2024.³⁶

Sources indicate that Russia's AI development plans face further uncertainty due to the effect of the COVID-19 pandemic on AI investment. During federal budget planning in September 2020, the government proposed reducing funding for the AI Federal Project to just 16.5 billion rubles (\$217 million) in 2021-2023.³⁷ It is unclear how the pandemic will affect the AI Roadmap's funding, but it likely will be cut as well.³⁸ As part of a broader revision of the National Projects spurred by the COVID-19 economic crisis, officials have proposed reducing funding for the Digital Economy National Project by 92 billion rubles (\$1.19 billion) in 2021-2023. A portion of these cuts will come from the Digital Technologies Federal Project, which contains the AI Roadmap.³⁹

³⁵ "Sberbank explained to the state how to spend 120 billion on artificial intelligence [Сбербанк объяснил государству, как потратить 120 миллиардов на искусственный интеллект]," *CNews*, Dec. 18, 2019, https://www.cnews.ru/news/top/2019-12-11_sberbank_obyasnil_gosudarstvu.

³⁶ "Passport of the AI Federal Project," Ministry of Economic Development, August 27, 2020, which can be accessed via: https://www.tadviser.ru/images/5/5b/2_5373326957167511384.pdf.

³⁷ "The budget of the "Digital Economy" may be cut by 92 billion rubles [Бюджет «Цифровой экономики» может быть урезан на 92 млрд рублей]," *CNews*, Sept. 21, 2020, https://www.cnews.ru/news/top/2020-09-21_byudzheth_tsfirovoj_ekonomiki.

³⁸ Based on exchange rates from Sept. 21, 2020, the date of publication of the source.

³⁹ "The budget of the "Digital Economy" may be cut by 92 billion rubles [Бюджет «Цифровой экономики» может быть урезан на 92 млрд рублей]," *CNews*, Sept. 21, 2020, https://www.cnews.ru/news/top/2020-09-21_byudzheth_tsfirovoj_ekonomiki.

Targets of the AI Federal Project ⁴⁰						
Indicator	Unit	Starting Point, 12/31/19	2021 Goal	2022 Goal	2023 Goal	2024 Goal
Publications of Russian Specialists at Conferences in the AI Field	Per Year	33	36	48	60	90
Share of Federal Executive Authorities Approving or Implementing Digitalization and AI Measures	%	0%	50%	100%	100%	100%
Number of AI Specialists Trained in Higher Education	Per Year	650	1916	2434	2128	4241
Size of AI Community	%	100%	120%	140%	160%	200%
Number of Companies Developing AI Solutions That Received Government Support Within the AI Federal Project	Cumulative	0	247	620	920	1,199

In addition to issuing strategic policy documents such as the AI Roadmap and AI Federal Project, Russian officials have pursued other initiatives to strengthen Russia's AI ecosystem. Starting in January 2021, so-called "regulatory sandboxes," or experimental legal regimes, will become available for technologies included in the Digital Technologies Federal Project. Officials hope that by relaxing the laws that companies claim stifle innovation, regulatory sandboxes will improve Russia's investment climate by making it easier to develop and test innovations.⁴¹

The government also seeks to stimulate cooperation between Russia's private tech firms. In November 2019, Sberbank CEO German Gref announced the creation of the AI-Russia Alliance, which will be supervised by

⁴⁰ Passport of the AI Federal Project," Ministry of Economic Development, August 27, 2020, which can be accessed via:

https://www.tadviser.ru/images/5/5b/2_5373326957167511384.pdf.

⁴¹ "Putin signs experimental legal regime law," CNA Artificial Intelligence in Russia, Issue 8, August 14, 2020,

https://www.cna.org/CNA_files/centers/CNA/sppp/rsp/newsletter/DOP-2020-U-027816-Final2.pdf.

the economy ministry.⁴² The Alliance's goal is to foster greater cooperation on AI in the private sector. Participants in the alliance include Yandex, Mail.ru, Gazprom Neft, MTS, Sberbank, and the Russian Direct Investment Fund.⁴³ While the Alliance says that it will play a major role in AI development in Russia, little visible cooperation has occurred.⁴⁴ One success has been lobbying for the creation of "regulatory sandboxes." Yet implementation of Russia's official AI strategy continues to be the responsibility of prominent state-owned firms, with Sberbank in the lead.

The Role of State-Owned Firms in Russia's AI Plans

As the realities of Russia's investment climate mean its AI ecosystem will struggle to grow organically via the emergence of innovative startups, the Kremlin has relied on large firms to drive its AI agenda. Sberbank, Rostec, Yandex, and Gazprom Neft—respectively, Russia's largest bank, military-industrial behemoth, largest tech firm, and fourth largest oil producer—have each emerged as a leader of Russian AI in their fields. They advance artificial intelligence technologies for diverse purposes, ranging from improving bank operations and streamlining military manufacturing to creating driverless delivery vehicles and managing oil production.

Given the predominant role of the state in Russia's economy, many of these large firms leading AI development are state-owned. Yandex is the exception. Yet this firm's frosty relationship with the Kremlin has meant that the government has turned elsewhere for leadership on AI issues. State-owned firms will thus continue to play the largest role in Russia's government-sponsored AI efforts, with Sberbank chief among them.

Sberbank: The Leader of Russia's National AI Push. As noted above, Sberbank was tasked with developing the Artificial Intelligence Roadmap, the National Strategy for the Development of AI, and the Artificial Intelligence Federal Project under the auspices of the Digital Economy National Project. While it might seem strange for a bank to lead a technology effort, Sberbank has long devoted substantial resources to technology, with the aim of both

⁴² "Sberbank, "Yandex", "Gazprom Neft", RDIF, Mail.ru and MTS to create an alliance in AI [Сбербанк, "Яндекс", "Газпром нефть", РФПИ, Mail.ru и МТС создадут альянс в области ИИ]," *TASS*, Nov. 7, 2019, <https://tass.ru/ekonomika/7092208>.

⁴³ "Russian majors to create AI alliance, says Sberbank CEO," *TASS*, Nov. 8, 2019, <https://tass.com/economy/1087734>.

⁴⁴ "Comparison of Dutch-Russian AI Strategies," Kingdom of the Netherlands, July 10, 2020, <https://www.nederlandwereldwijd.nl/binaries/nederlandwereldwijd/documenten/publicaties/2020/07/10/factsheet-comparison-dutch-russian-ai-strategies/200706+Comparison+Dutch-Russian+AI+strategies.pdf>.

boosting the efficiency of its banking business and of diversifying into other product lines. As a result, in addition to being Russia's largest bank, Sberbank is also one of Russia's leading technology companies. In September 2020, to reflect this focus on technology, Sberbank announced a new logo which removed the word "bank" and simply read "Sber."⁴⁵ Even before being chosen to develop the Artificial Intelligence Roadmap, Sberbank was investing heavily in AI for its own purposes.

Sberbank recognizes that integrating AI into its operations will benefit its own business, as well as the country's broader AI aims. Sberbank has modernized its internal processes using AI-based solutions. As early as 2011, Sberbank created Sberbank Technologies (SberTech), an IT developer whose only client is the bank itself. SberTech now has more than 500 ongoing projects and 11,500 employees.⁴⁶ SberTech initiatives include a business development support platform intended to increase the bank's operational efficiency and a data factory that monetizes data by analyzing client behavior.⁴⁷

Sberbank has invested heavily in data processing. In 2017, it opened a 355,000-square-foot data processing center at the Skolkovo innovation center.⁴⁸ The new processing center is Russia's largest, though it is substantially smaller than massive data centers in the United States. Such data centers are crucial for gathering, storing, and processing data using artificial intelligence techniques. Since 2016, Sberbank has increased the number of "big data initiatives" undertaken by the firm from ten to 575.⁴⁹

Sberbank has trained more than 35,000 employees in AI technology competencies at a newly established Data Academy at Sberbank's Corporate University. The bank also has heavily digitized its corporate human resources department through streamlined monitoring and control processes.⁵⁰ No single

⁴⁵ "Sberbank will abandon the word "bank" in the logo [Сбербанк откажется от слова «банк» в логотипе]," *Kommersant*, Sept. 21, 2020, https://www.kommersant.ru/doc/4501014?utm_source=twitter.com&utm_medium=social&utm_campaign=amplifr_social.

⁴⁶ "2020 Sberbank Strategy," *Sberbank*, 2020, https://www.sberbank.com/common/img/uploaded/files/2020_sberbank_strategy_eng.pdf.

⁴⁷ "2020 Sberbank Strategy," *Sberbank*, 2020.

⁴⁸ Shura Collinson, "Sberbank opens Russia's biggest data-processing centre at Skolkovo," *Skolkovo*, Dec. 18, 2017, <https://old.sk.ru/news/b/articles/archive/2017/12/18/sberbank-opens-russia-1920-s-biggest-dataprocessing-centre-at-skolkovo.aspx>.

⁴⁹ "2020 Sberbank Strategy," *Sberbank*, 2020.

⁵⁰ Prajjal Saha, "How Jaguar Land Rover, Lufthansa, & Sberbank digitised HR for business excellence," *HRKatha*, June 21, 2017, <https://www.hrkatha.com/technology/how-jaguar-land-rover-lufthansa-sberbank-digitised-hr-for-business-excellence/>; and "Case study: Sberbank—tech them on," *Fintech Futures*, Feb. 2, 2018, <https://www.fintechfutures.com/2018/02/case-study-sberbank-tech-them-on/>.

application of AI has transformed Sberbank's business, but an array of small improvements reportedly has substantially boosted efficiency at the bank. Similarly, the ability to use artificial intelligence to process data has enabled the bank's expansion into new markets, such as home product delivery and taxi services.

In September 2020, Sberbank CEO Gref unveiled a new suite of AI-driven customer technologies during a 90-minute rebranding presentation.⁵¹ The main product launch was a family of three virtual voice assistants like Amazon's Alexa and Apple's Siri. The system, known as Salyut, will be able to recognize Russian and English voices, and can be used to play music, book doctor and hair salons appointments, transfer money between bank accounts, order grocery or food takeout deliveries, and answer basic questions. Salyut is also compatible with a new video device, SberPortal, which can recognize hand gestures, such as a thumbs up to like a song, a finger to the lips to mute, and an open palm to pause. Gref announced that Sberbank will create an app store on Salyut that will allow businesses and entrepreneurs to teach the system new skills by marketing their AI-driven services.⁵² In addition to Salyut, Gref unveiled new AI-driven ATMs, 100 of which will be installed across Russia by the end of 2020. Using facial and voice recognition technology, the ATMs will perform standard banking functions as well as possess the ability to order taxis and food delivery.⁵³

In addition to using AI to enhance its own business practices, Sberbank has invested in Russia's AI ecosystem, for reasons of self-interest, as well as from a desire to help implement the government's goals. Sberbank has partnered with Russian and foreign companies to accelerate the adoption and implementation of AI technologies across Russian society. Through a partnership with 500 Startups, an early stage venture fund and startup accelerator, Sberbank provided a platform for Russian AI startups to spend three months in Moscow and one month in Silicon Valley working with experts in the field.⁵⁴ Sberbank officials selected seven winners from over 800 entries

⁵¹ SberConf, Sber.ru, Sept. 24, 2020, <https://www.sber.ru/conf>.

⁵² "Sber to provide free access to training its virtual assistant Salute on Smart Market platform," Sberbank, Sept. 24, 2020, https://www.sberbank.ru/en/press_center/all/article?newsID=e61929de-9b54-4216-ad7b-9c7a84f7b7f3&blockID=1539®ionID=77&lang=en&type=NEWS.

⁵³ "Sberbank showed a new logo, voice assistant, and cable box [Сбербанк показал новый логотип, голосовых помощников и приставку. Главное]," RBC, Sept. 24, 2020, <https://www.rbc.ru/finances/24/09/2020/5f6c4b509a79474e48d2fea6>.

⁵⁴ John Dunn, "A New Breed Of Russian Startups Make Their Debut In Silicon Valley," *Tech Times*, June 13, 2019, <https://www.techtimes.com/articles/244312/20190613/a-new-breed-of-russian-startups-make-their-debut-in-silicon-valley.htm>.

to receive further investments in their projects.⁵⁵ One winner was “Third Opinion,” which uses AI to analyze and provide feedback on medical images like MRIs and X-rays.⁵⁶ Sberbank also has partnered with companies like Cognitive Technologies to develop driverless cars and other AI products in Russia.⁵⁷ Given the limited private venture capital funds in Russia, support from state-owned firms like Sberbank is crucial to developing startups in the field of AI.

Sberbank has led Russia's official, government-backed charge into AI partly because the firm is seen in Russia as an example of how technology can make existing organizations more efficient. Before German Gref took over as CEO in 2007, Sberbank was widely associated with its sclerotic, Soviet-legacy bureaucracy. Many Russians credit Gref's investments in technology with enhancing the company's efficiency. The Kremlin evidently saw Sberbank as a leading example of how artificial intelligence can be deployed and hoped that other parts of the Russian government and other state-owned firms could follow its example. Rather than devising Russia's AI Roadmap itself, the Kremlin outsourced this task to Sberbank.

However, Sberbank's reputation with technology explains only part of its role in the AI Roadmap. Bureaucratic politics matter, too. Some technology-focused officials in the Kremlin may have seen choosing Sberbank to lead the Roadmap development as a means of keeping artificial intelligence investment from becoming a sphere dominated by the security services and military. In addition, unlike Yandex (analyzed below), which has had open conflicts with the Kremlin, Sberbank's loyalty allows authorities to maintain confidence in their control while Sberbank reaps the commercial benefits. Sberbank, for example, has its own incentives to be viewed as leading the Russian government's efforts. More than 20 percent of the Roadmap's investment budget will be spent on Sberbank's own processes. Other Roadmap spending will boost the ecosystem that Sberbank can tap into. As Gref continues to seek a competitive advantage via technology, his leadership on the

⁵⁵ “Sberbank and 500 Startups launch the second wave of the international accelerator of IT startups [Сбербанк и 500 Startups запускают вторую волну международного акселератора IT-стартапов],” *vc.ru*, Sept. 4, 2019, <https://vc.ru/sberbank500/81749-sberbank-i-500-startups-zapuskayut-vtoruyu-volnu-mezhdunarodnogo-akseleratora-it-startapov>.

⁵⁶ John Dunn, “A New Breed Of Russian Startups Make Their Debut In Silicon Valley,” *Tech Times*, June 13, 2019, <https://www.techtimes.com/articles/244312/20190613/a-new-breed-of-russian-startups-make-their-debut-in-silicon-valley.htm>.

⁵⁷ Nadezhda Tsydenova, “Russia's Sberbank agrees venture with driverless technology firm,” *Reuters*, Nov. 28, 2019, <https://www.reuters.com/article/us-sberbank-driverless-deal/russias-sberbank-agrees-venture-with-driverless-technology-firm-idUSKBN1Y217X>.

AI Roadmap and AI Federal Project lets him play the role of “good corporate citizen,” while making investments that Sberbank likely would have made regardless.

Rostec: Russia’s Defense Sector and AI Development. While Sberbank has been vocal about its embrace of artificial intelligence to enhance efficiency and develop new technologies, Rostec, the state-owned defense conglomerate that produces most of Russia’s military equipment, has publicly been less forward leaning. Rostec is naturally interested in artificial intelligence as part of its effort to develop new weapons systems. The Ministry of Defense’s 2018 10-point AI proposal, moreover, called for greater investment in AI research and development. Rostec will thus benefit from the MoD’s AI development efforts via new procurement contracts.

Under the auspices of the Digital Economy National Project, Rostec was not tasked with any artificial intelligence work (which went to Sberbank). Instead, Rostec was instructed to devise roadmaps for Russia’s investment in 5G telecom technologies, blockchain and distributed ledger technology, and Industrial Internet of Things devices. All three of these spheres overlap with existing Rostec capabilities, and the company hopes to use them to enhance the quantity and reliability of its data regarding manufacturing processes. When it comes to 5G telecom equipment, Rostec is trying to convince the Russian government to mandate that 5G equipment be purchased solely from Russian sources—as it is the only such provider in Russia.⁵⁸ Rostec’s embrace of blockchain technology may have industrial uses, too. The conglomerate hopes to use blockchain to manage data subsidiaries such as Autovaz, Kamaz, and Kalashnikov—but the company also appears to treat blockchain as a popular buzzword that attracts attention and makes the firm sound high tech.⁵⁹

In Rostec’s public discussion of advanced technologies, AI often plays a less prominent role than these other projects. When the government announced the competition for organizations to draft the digital technologies roadmaps, Rostec subsidiaries applied to develop the 5G, blockchain, quantum technologies, robotics components, industrial internet, and big data roadmaps. Not a single Rostec subsidiary participated in the artificial intelligence competition. Rostec is not transparent about its finances, so there is no data about its investment in different types of technological development. Yet despite its less forward-leaning posture regarding state artificial intelligence

⁵⁸ Janis Kluge, “Russia’s Transition to 5G: Stuck in a Regulatory Tug of War,” Foreign Policy Research Institute, Aug. 2020, <https://www.fpri.org/wp-content/uploads/2020/08/rpe-kluge-pdf>.

⁵⁹ “Manufacturing Giant Rostec to Manage Data on Waves Blockchain Platform,” *coindesk.com*, Sept. 13, 2018, <https://www.coindesk.com/rostec-waves-blockchain-smart-cities>.

planning, it is clear that the company clearly has embraced AI for civilian and military platforms.

In the civilian sector, Rostec's most prominent use of AI is in facial recognition technology. Russian companies and government agencies have invested heavily in facial recognition. Partnering with state-owned firms and security agencies, software developers, such as NtechLab, Vocord, and Ivideon, have installed facial recognition devices for surveillance purposes at events like the 2018 World Cup and in transportation hubs like the Moscow Metro system.⁶⁰ In 2018, a subsidiary of Rostec invested in NtechLab, the company behind the FindFace technology that reportedly led to the detainment of almost 180 people at the World Cup. The Rostec subsidiary, Yota Holding LTD., acquired a 12.5 percent stake in NtechLab, and Rostec's Director of Special Assignments became the head of NtechLab's board of directors.⁶¹ A Rostec representative explained that the company's access to NtechLab's FindFace technology will help it implement part of its Digital Economy Project roadmaps.

Rostec has sold FindFace and other AI-driven technologies to multiple parts of the Russian security apparatus. Russian police reportedly are testing the FindFace software in their body cameras. Beginning in 2021, Russian police officers in large Russian cities will be outfitted with augmented-reality glasses that utilize the facial recognition technology to identify criminal suspects.⁶² Furthermore, NtechLab partnered with Chinese company Dahua Technology in May 2019 to develop a facial recognition camera for both Russian and

⁶⁰ Victoria Zavyalova, "In your face: New facial recognition system catches criminals in Russia," *Russia Beyond*, Nov. 27, 2018, <https://www.rbth.com/science-and-tech/329587-facial-recognition-system-catches-criminals>; Felix Light, "Russia Is Building One of the World's Largest Facial Recognition Networks," *Moscow Times*, Nov. 12, 2019, <https://www.themoscowtimes.com/2019/11/12/russia-building-one-of-worlds-largest-facial-recognition-networks-a68139>; and "Moscow Subway testing face recognition payment system," *eturonews.com*, Sept. 12, 2019, <https://www.eturonews.com/266418/moscow-subway-testing-face-recognition-payment-system/>.

⁶¹ "Rostec subsidiary and Ruben Vardanyan Foundation invested in facial recognition technology [«Дочка» «Ростеха» и фонд Рубена Варданяна вложились в технологию распознавания лиц]," *Vedomosti*, March 22, 2018, <https://www.vedomosti.ru/technology/articles/2018/03/22/754535-rostecha-wardanyana-raspoznaniya-lits>.

⁶² "Russia to arm police with face recognition glasses," *Planet Biometrics*, May 28, 2019, <https://www.planetbiometrics.com/article-details/i/10226/>; and "Russian police officers will receive glasses with facial recognition technology in 2020 [Российские полицейские в 2020 году получат очки с функцией распознавания лиц]," *TASS*, May 23, 2019, https://tass.ru/armiya-i-opk/6463727?utm_source=twitter.com&utm_medium=social&utm_campaign=smm_social_share.

Chinese law enforcement.⁶³ Before displaying the technology to the defense ministers of over 30 countries at the Moscow Conference on International Security in 2019, Rostec announced that it would be exporting the facial recognition technology to foreign militaries, too. NtechLab General Director Alexander Minin says FindFace is applicable in “flashpoint areas and during counter-terrorism operations.”⁶⁴ In addition to FindFace, Rostec CEO Sergey Chemezov revealed in 2019 that Ruselectronics, a Rostec subsidiary, is developing an AI-operated system to collect data to assist Russia’s border control agencies.⁶⁵ By investing in NtechLab and selling AI software to domestic and foreign partners, Rostec has played an important role in the development of surveillance technology for domestic security and commercial purposes.

Beyond surveillance products, Rostec has invested in artificial intelligence for military purposes, as Samuel Bendett, an expert in Russian Ai, has extensively documented.⁶⁶ Rostec is integrating artificial intelligence into new military equipment. For example, the RB-109A Bylina EW, an electronic warfare system developed in part by Rostec subsidiary KRET, reportedly uses AI to “prioritize and jam electronic signals.”⁶⁷ According to one analyst, the Bylina will exceed the effectiveness of existing EW systems by 40-50 percent thanks to its advanced, AI-enabled software.⁶⁸

⁶³ Dmitri Simes, “Huawei plays star role in new China-Russia AI partnership,” *Nikkei Asian Review*, Feb. 4, 2020, <https://asia.nikkei.com/Spotlight/Asia-Insight/Huawei-plays-star-role-in-new-China-Russia-AI-partnership>.

⁶⁴ “Rostec Will Start Exporting Face Recognition Technology to the Armed Forces,” Rostec, April 25, 2019, <https://rostec.ru/en/news/rostec-will-start-exporting-face-recognition-technology-to-the-armed-forces/>.

⁶⁵ Nikolai Markotkin and Elena Chernenko, “Developing Artificial Intelligence in Russia: Objectives and Reality,” Carnegie Moscow Center, Aug. 5, 2020, <https://carnegie.ru/commentary/82422>; and “Russia working on AI-operated border security system,” *TASS*, Feb. 21, 2019, <https://tass.com/defense/1045855>.

⁶⁶ Researchers interested in artificial intelligence in the Russian military should see CNA’s “Artificial Intelligence in Russia” biweekly newsletter, which can be found at <https://www.cna.org/centers/cna/sppp/rsp/>.

⁶⁷ “Artificial intelligence takes control of “Krasuha,” “Judoka” and “Infaua” [Искусственный интеллект берет под управления “Красуху”, “Дзюдоиста” И “Инфауну”],” *AviaPort*, April 22, 2020, <https://www.aviaport.ru/digest/2020/04/22/635879.html>; and DFRLab, “#MinskMonitor: New Russian Electronic Warfare Systems in Eastern Ukraine,” *Medium*, Aug. 22, 2018, <https://medium.com/dfrlab/minskmonitor-new-russian-electronic-warfare-systems-in-eastern-ukraine-5b913afbb455>.

⁶⁸ “The enemy will be eliminated by artificial intelligence: the Russian Armed Forces are preparing to receive new electronic warfare systems [Врага устранил искусственный интеллект: ВС РФ готовятся получить новые комплексы РЭБ],” *Tsargrad*, April 17, 2020, https://tsargrad.tv/news/vraga-ustranit-iskusstvennyj-intellekt-vs-rf-gotovjatsja-poluchit-novye-kompleksy-rjeb_248823.

Rostec reportedly also is outfitting more traditional weapons systems with AI technology to improve their efficiency and communication capabilities. Existing MiG-35 and Su-35 fighter jets, both produced by companies that are part of United Aircraft Corporation (itself a subsidiary of Rostec), are equipped with AI units to improve targeting and aircraft operation.⁶⁹ Rumors suggest that Russia's third generation combat gear, called Sotnik, may integrate AI to provide soldiers with better protection via "powered exoskeletons, microdrones, and new weapons."⁷⁰ Rostec subsidiaries Kalashnikov, Tecmash, High Precision Systems, and TsNIITochMash have all reported that they are developing weapons systems that will use AI, potentially enabling more efficient operational capabilities for the armed forces in conflict areas.

Finally, Rostec is also using artificial intelligence to improve manufacturing processes. Rostec subsidiary United Engine Corporation partnered with Tsifra, an AI and Internet of Things manufacturer, to install an AI-enabled manufacturing system at the Salyut production complex in Moscow. The system tracks engine manufacturing and simulates engine tests in a virtual environment.⁷¹ Another subsidiary, RT-Techpriemka, a steel manufacturer, uses AI to identify product defects. RT-Techpriemka will supply products to Russian Helicopters for production of civilian and combat helicopters.⁷²

Rostec's investments show that it is turning to AI both to enhance Russian weapons systems and to improve manufacturing processes. It also has invested in civilian-sector AI tools, including facial recognition. However, Rostec's broader technology strategy does not appear to foreground artificial intelligence, as its public statements reference other types of advanced technologies, including Industrial Internet of Things-enabled manufacturing, digital ledger technology, and 5G networks, as often as they mention artificial intelligence. As Rostec has led the government's official strategies to develop

⁶⁹ "Russia's Newest Fighter the MiG-35 Integrates Basic AI as Pilot Assistant," *Military Watch*, June 10, 2020, <https://militarywatchmagazine.com/article/russia-s-latest-fighter-mig-35-integrates-basic-ai-as-pilot-assistant>; and "Russian Su-35 Fighter Equipped With 'Artificial Intelligence,'" *DefenseWorld*, Nov. 13, 2017, <https://www.defenseworld.net/news/21257/Russian-Su-35-Fighter-Equipped-With-Artificial-Intelligence-#.X2p1RZNKg8M>.

⁷⁰ Roger McDermott, "Moscow Develops Next-Generation Combat Infantry System," Jamestown Foundation, July 15, 2020, <https://jamestown.org/program/moscow-develops-next-generation-combat-infantry-system/>.

⁷¹ Roger McDermott, "Moscow's Pursuit of Artificial Intelligence for Military Purposes," Jamestown Foundation, July 1, 2020, <https://jamestown.org/program/moscows-pursuit-of-artificial-intelligence-for-military-purposes/>.

⁷² "Rostec will control steel quality using artificial intelligence [Ростех проконтролирует качество стали с помощью искусственного интеллекта]," Rostec, July 14, 2020, <https://rostec.ru/news/rostekh-prokontroliruet-kachestvo-stali-s-pomoshchyu-iskusstvennogo-intellekta/>.

the advanced technologies of its choosing, it has ceded leadership in artificial intelligence to Sberbank.

Yandex: Russian Private Tech and AI Development. Yandex, Russia's biggest and most successful tech firm, might be expected to be a leader in Russian national AI development plans, but it has played a secondary role in the Russian government's official AI strategy to Sberbank. In contrast to the United States and China, where internet firms like Google and Tencent spend substantial sums developing artificial intelligence and collaborate with their governments on certain projects, the Kremlin views Yandex with some suspicion.

Despite Yandex's status as Russia's leading tech firm, its uneasy relationship with the Kremlin may limit its interaction with Russia's government and other state-owned firms. Yandex is privately-owned, which the Kremlin views as a threat. Putin has insinuated that the Americans who helped found Yandex and still serve on its board of directors are agents of foreign influence.⁷³ Moreover, Yandex recently exited a partnership with Sberbank after disagreements between the companies forced them to dissolve their joint ventures. On September 22, 2020, Yandex announced plans to acquire Tinkoff, a major private Russian bank, placing the firm in direct competition with Sberbank, which now partners with Yandex's rival, Mail.ru.⁷⁴ While, the deal fell through less than one month later, Yandex has not abandoned its plans to create a financial technology empire that rivals Sberbank's.⁷⁵

Fearing the potentially destabilizing influence of privately-owned technology, the Russian government has forced Yandex to change its governance structure to ensure that the Kremlin has a certain level of control. In 2019, legislation was introduced in the Duma to cap foreign ownership at 20 percent in "key internet resources."⁷⁶ Yandex, domiciled in the Netherlands, did not meet the criteria. If the legislation had passed, Yandex would have lost the ability to operate in Russia or would have been forced to dramatically change its ownership structure—likely via its acquisition by a Russian state-

⁷³ Evan Gershkovich, "The uneasy coexistence of Yandex and the Kremlin," *MIT Technology Review*, Aug. 19, 2020, <https://www.technologyreview.com/2020/08/19/1006438/yandex-putin-arkady-volozh-kremlin/>.

⁷⁴ Jake Cordell, "Russia's Yandex Agrees \$5.5Bln Deal For Tinkoff Bank," *Moscow Times*, Sept. 22, 2020, <https://www.themoscowtimes.com/2020/09/22/russias-yandex-agrees-55bln-deal-for-tinkoff-bank-a71513>.

⁷⁵ "Oleg has been trying to sell his bank for many years': Yandex explains the collapse of its deal with Tinkoff [«Олег уже много лет старается продать свой банк»: «Яндекс» объяснил срыв сделки с «Тинькофф»], *The Bell*, October 16, 2020, <https://thebell.io/oleg-uzhe-mnogo-let-staraysya-prodat-svoj-bank-yandeks-obyasnil-sryv-sdelki-s-tinkoff>.

⁷⁶ Stephanie Petrella, "The Kremlin Has Set Its Sights on Russia's Private Tech Firms," *Foreign Policy*, Nov. 26, 2019, <https://foreignpolicy.com/2019/11/26/kremlin-moscow-nationalize-russian-private-tech-firms-yandex-mailru/>

owned firm. The company ultimately struck a deal with the Kremlin in November 2019, creating a public interest foundation that will represent the Kremlin's interests via two board seats and will be able to block the sale of over ten percent of Yandex's shares. After the deal, the legislation on foreign ownership was removed from parliament. This maneuvering signaled the importance the Kremlin places on controlling key internet assets.

Much of Russia's official strategy to develop AI emerged before Yandex made the Kremlin's requested ownership changes, and as a result, Yandex was sidelined during the development of the Digital Economy National Project. Yandex did not create a roadmap for the implementation of a specific technology like 5G, AI, or quantum computing—something one would expect from Russia's largest technology firm. Yandex did not even apply to draft a roadmap, indicating that its relationship with the Kremlin prevents it from playing a major role in state-driven technology initiatives. While the firm contributed to the drafting of the National AI Strategy, ownership of the document belonged to Sberbank. In November 2019, Yandex joined the new AI-Russia Alliance, along with Sberbank, Gazprom Neft, Mail.ru Group, MTS, and the Russian Direct Investment Fund. Yet, as previously mentioned, while the alliance intends to foster AI cooperation between private sector firms, it has not yielded much substance.⁷⁷

Yandex played a secondary role in the government's official AI efforts despite being a leading Russian player in the field. The firm is continuously developing its products like voice assistant Alice and driverless car technology. These services have been particularly successful in the Russian market. Alice, for example, controls 77 percent of the Russian voice assistant market due to its integration into smartphones, satellite navigation services, and smart speakers.⁷⁸ Yandex launched Yandex.Rover in August 2020, an autonomous delivery robot which takes advantage of the company's self-driving technology. Yandex plans to use the technology to deliver food through Yandex.Eats, small packages to and from offices, and potentially products to individuals affected by COVID-19.⁷⁹ After investing over \$35 million in self-driving technology, Yandex reached a major milestone in February 2020 when it surpassed two

⁷⁷ "Russian majors to create AI alliance, says Sberbank CEO," *TASS*, Nov. 8, 2019, <https://tass.com/economy/1087734>.

⁷⁸ "Smart speakers and voice assistants. Russia and global markets," *ICT Moscow*, July 7, 2020, <https://ict.moscow/en/research/smart-speakers-and-voice-assistants-russia-and-global-markets/>

⁷⁹ Kyle Wiggers, "Yandex deploys autonomous delivery robots in Moscow's Skolkovo district," *VentureBeat*, April 29, 2020, <https://venturebeat.com/2020/04/29/yandex-deploys-autonomous-delivery-robots-in-moscows-skolkovo-district/#:~:text=Yandex%20today%20announced%20the%20first,of%20documents%20and%20small%20packages.>

million self-driving car miles.⁸⁰ Yandex still lags behind global leaders in autonomous vehicles with Google's Waymo hitting 20 million miles in January 2020 and Tesla surpassing over three billion in April 2020, but the number is a significant achievement for the Russian market.⁸¹ Despite these achievements, Yandex has not played a leading role in Russia's government AI development efforts. Instead, it has been relegated to a secondary position behind Sberbank in the government's AI planning.

Gazprom Neft: AI in the Russian Energy Sector. In addition to creating artificial intelligence technologies for military, surveillance, and customer-experience purposes, Russian officials hope to utilize AI to improve industrial processes. This desire is particularly the case in the oil sector, given its outsized role in the Russian economy and the competitive nature of global oil markets. In Russia, oil firms such as Rosneft, Lukoil, and Gazprom Neft are developing AI technology to improve oil prospecting, monitor drilling, and reduce production times.⁸² Earlier this year, for example, Rosneft successfully tested Russia's first drilling system automated via AI technology to manage drilling processes and improve safety.⁸³ Lukoil has invested in similar technologies and partnered with Cervart, an AI-based program that evaluates oil reserves during exploration and while a well is in operation.⁸⁴

As in other areas, the government is not spearheading AI deployment in the oil sector. Rather, the firms are developing industrial AI technologies independently to improve their competitiveness within Russian and global oil

⁸⁰ "Yandex Demonstrates Self-Driving Car Technologies on the streets of Las Vegas During CES 2019," *Yandex*, Jan. 7, 2019, <https://www.globenewswire.com/news-release/2019/01/07/1681365/0/en/Yandex-Demonstrates-Self-Driving-Car-Technologies-on-the-streets-of-Las-Vegas-During-CES-2019.html>; and Paul Sawers, "Yandex claims 2 million self-driving car miles, double in 4 months," *VentureBeat*, Feb. 14, 2020, <https://venturebeat.com/2020/02/14/yandex-claims-2-million-self-driving-car-miles-double-in-4-months/>.

⁸¹ Aaron Pressman, "Waymo Reaches 20 Million Miles of Autonomous Driving," *Fortune*, Jan. 6, 2020, <https://fortune.com/2020/01/07/googles-waymo-reaches-20-million-miles-of-autonomous-driving/>; and Fred Lambert, "Tesla drops a bunch of new Autopilot data, 3 billion miles and more," *Electrek*, April 22, 2020, <https://electrek.co/2020/04/22/tesla-autopilot-data-3-billion-miles/>.

⁸² "Artificial intelligence in oil prospecting," *Invest Foresight*, May 14, 2019, <https://investforesight.com/artificial-intelligence-in-oil-prospecting/>; and Samuel Bendett, "Russia's National AI Center Is Taking Shape," *Defense One*, Sept. 27, 2019, <https://www.defenseone.com/technology/2019/09/russias-national-ai-center-taking-shape/160219/>; and "Rosneft Implements AI System on Drilling Rigs," *Rosneft*, Jan. 21, 2020, <https://www.rosneft.com/press/news/item/199375/>.

⁸³ "Rosneft Implements AI System on Drilling Rigs," *Rosneft*, Jan. 21, 2020.

⁸⁴ "Artificial intelligence in oil prospecting," *Invest Foresight*, May 14, 2019, <https://investforesight.com/artificial-intelligence-in-oil-prospecting/>.

markets. With the exception of Gazprom Neft, Russia's fourth largest oil producer and a member of the AI-Russia Alliance, energy firms have not been included in Russia's formal AI efforts. Gazprom Neft's participation in these endeavors, as the first industrial company to join the AI-Alliance, offers a useful case study to examine how Russian energy companies are developing artificial intelligence to improve industrial operations.⁸⁵

Gazprom Neft began exploring the potential applications of advanced technologies in 2007, when it established the Gazprom Neft Science and Technology Center (STC). The first of several Gazprom Neft research centers, the STC focuses on enhancing oil production by deploying new technologies at oil fields.⁸⁶ For example, in 2019, the STC installed a new program, ERA: OptimA, that digitally analyzes oilfield assets at the company's Vostok and Slavneft-Megionneftegaz fields. By using AI to choose the most effective oilfield development strategy, ERA: OptimA is expected to increase production at the fields by more than 8 percent and profit by 11 percent, the firm says.⁸⁷

Developing advanced technology lies at the center of Gazprom Neft's development strategy through 2030, which the firm released two years ago. By 2030, using technologies developed at its research centers, Gazprom Neft aims to halve its first-oil production lead times, accelerate implementing major upstream projects by 40 percent, and optimize production management costs by ten percent.⁸⁸ To improve innovation at the firm, Gazprom Neft's research centers regularly partner with Russian universities on joint projects.⁸⁹ In September 2020, Gazprom Neft launched the "League of Universities" project

⁸⁵ "Gazprom Neft becomes the 1st industrial company to join the AI-Russia Alliance for developing artificial intelligence," *Neftegaz.ru*, Nov. 15, 2019, <https://neftegaz.ru/en/news/companies/506369-gazprom-neft-becomes-the-1st-industrial-company-to-join-the-ai-russia-alliance-for-developing-artifi/>.

⁸⁶ "About Gazprom Neft Science and Technology Center," Gazprom Neft, 2020, <https://ntc.gazprom-neft.com/about/company/>.

⁸⁷ "Gazprom Neft Improves Field Efficiency Using Artificial Intelligence," *RogTec Magazine*, March 26, 2019, <https://rogtecmagazine.com/122004/>; and "Global AI in Oil and Gas Market (2020-2025)," *Mordor Intelligence*, https://www-emis-com.ezproxy.library.tufts.edu/php/search/docpdf?pc=YY&sv=EMIS&doc_id=677835493&numresult=2. Based on exchange rates from March 26, 2019, the date of publication of the source.

⁸⁸ "Gazprom Neft Technology Centers," Gazprom Neft, 2020, <https://www.gazprom-neft.com/technologies/centres/>.

⁸⁹ "Gazprom Neft Achieves Record Production at Achimovsky Strata," *Energy Industry Review*, Feb. 6, 2020, <https://energyindustryreview.com/oil-gas/gazprom-neft-achieves-record-production-at-achimovsky-strata/>.

and partnered with 24 universities in 13 different regions of Russia to develop educational programs to aid the Russian oil and gas industry.⁹⁰

Gazprom Neft also frequently partners with technology firms. In 2017, Gazprom Neft signed a cooperation agreement with Yandex to implement big data and machine learning projects in drilling and oil refining.⁹¹ This partnership expanded in May 2018 when the STC and Yandex Terra completed a two-year program testing a range of Russian-produced software supporting seismic data processing.⁹² Last year, Gazprom Neft and IBM Research Brazil agreed to enhance geological processing using AI, a project designed to reduce the exploration cycle from a year and a half down to just under a month.⁹³ Gazprom Neft also partnered with Skolkovo in 2019 to create the firm's Research and Development Center at the technology hub, which will develop software for the automation of business processes in the oil and gas industry.⁹⁴

While Gazprom Neft's technology push shows the potential of incorporating AI into the Russian energy sector, it also has demonstrated the limitations facing the industry. Gazprom Neft has struggled to foster international partnerships in AI due to sanctions on the Russian energy sector. Citing the "challenging external environment," some Western firms, such as Royal Dutch Shell in 2019, have withdrawn from proposed joint ventures that would have introduced new technologies into Russian energy operations.⁹⁵ The market for AI in the global energy sector is estimated to grow from \$1.42 billion

⁹⁰ "Work starts on an unprecedented Gazprom Neft project on collaborating with universities and higher educational institutions," Gazprom Neft, Sept. 11, 2020, https://www.gazprom-neft.com/press-center/news/work_starts_on_an_unprecedented_gazprom_neft_project_on_collaborating_with_universities_and_higher_e/.

⁹¹ "Gazprom Neft signs cooperation agreement with Yandex," Gazprom Neft, June 1, 2017, <https://www.gazprom-neft.com/press-center/news/gazprom-neft-signs-cooperation-agreement-with-yandex/>.

⁹² "Gazprom Neft working with Yandex Terra to develop innovative Russian digital solutions in seismic data processing," Gazprom Neft, May 30, 2018, <https://www.gazprom-neft.com/press-center/news/gazprom-neft-working-with-yandex-terra-to-develop-innovative-russian-digital-solutions-in-seismic-da/>.

⁹³ "Gazprom Neft, IBM Research Brazil enhance geological processing with AI," *World Oil*, April 3, 2019, <https://www.worldoil.com/news/2019/4/3/gazprom-neft-ibm-research-brazil-enhance-geological-processing-with-ai>.

⁹⁴ "Gazprom Neft to open a research and development centre at the Skolkovo high-technology business hub, Moscow," Gazprom Neft, June 16, 2016, <https://www.gazprom-neft.com/press-center/news/gazprom-neft-to-open-a-research-and-development-centre-at-the-skolkovo-high-technology-business-hub-/>.

⁹⁵ "Shell pulls out from proposed Meretoyakhaneftegaz JV with Gazprom Neft," *NS Energy*, April 14, 2020, <https://www.nsenergybusiness.com/news/shell-exit-meretoyakhaneftegaz-jv/>.

in 2016 to \$2.85 billion by 2022.⁹⁶ Yet, Russian firms, hampered by sanctions and Russia's lagging AI development compared to peers, will struggle to keep up with the advances of their Western counterparts.

In addition to sanctions, there is a structural reason why Russian oil firms will not outpace their Western counterparts in applying AI technologies. Success in the Russian energy sector is not traditionally determined by innovation. Rather, the lobbying power of energy firms to receive government support—from tax breaks to the ability to seize control of rivals—has distinguished the biggest players. State-owned Rosneft, led by Putin's close ally Igor Sechin, has been particularly effective in creating favorable regulatory conditions for its business. For example, in response to the COVID-19 pandemic, the Russian government has proposed changing oil sector taxation to raise federal revenue. The proposed changes are estimated to cost Gazprom Neft, Tatneft, and Lukoil eight to 21 percent of core earnings, while Rosneft stands to benefit.⁹⁷ So long as Russian energy firms' success is determined primarily by their relationship with the Kremlin rather than their efficiency, there will be limits to their focus on implementing artificial intelligence to improve their operations.

The predominant role of state-owned companies in Russia's AI strategy suggests that, to the extent that these investments succeed in improving processes and enhancing efficiency, they will also further entrench the role of state-owned companies. Technology like artificial intelligence is often described as “disruptive” to existing industrial and organizational structures. In Russia, however, it is not having that effect. Instead, AI has been embraced by state-owned firms, from banking to oil, to improve their operations. The government not only wholeheartedly backs this development, but it also has placed state-owned companies in the drivers' seat when it comes to national planning about AI.

Taking Stock

Putin's 2017 declaration that the leader in AI will “rule the world” kickstarted Russia's artificial intelligence investment and development strategy. The 2018 10-point plan from the Ministry of Defense set broad objectives for

⁹⁶ “Rejuvenating Established Russian Companies with AI,” *GMI Summit*, June 2019, https://gmisummit.com/wp-content/uploads/2019/06/Old-Russian-companies-and-new-tech-ARTICLE_RHIAN_EDIT.pdf.

⁹⁷ Joseph Murphy, “Russia looks to streamline oil taxation,” *Petroleum Economist*, Sept. 24, 2020, <https://www.petroleum-economist.com/articles/politics-economics/europe-eurasia/2020/russia-looks-to-streamline-oil-taxation>.

the Russian military and public sector, but lacked details on implementation and financing. When the Russian government outsourced the Digital Economy National Project roadmaps and the AI Federal Project to private companies, it made clear that the Kremlin was not going to assume direct control over the sphere of AI development. Nor would it fund much. Indeed, the COVID-induced economic slowdown has inspired additional government budget cuts, intensifying government officials' reliance on companies to drive AI investment.

Russia's AI development strategy is therefore unique. It is led not by the government, nor by the private sector, but by state-owned firms. In the United States, the government plays a role in funding some research in AI and in purchasing AI-enabled technologies, notably in the defense sector, but most investment in applied AI is undertaken by private corporations. In China, too, though state-owned firms play a massive role in the economy, private firms have driven technological advancement, including in AI. Companies like Alibaba and Tencent have fostered an AI ecosystem that responds to government guidance, but remains in private sector hands.⁹⁸

In Russia, state-owned firms are leading. While Rostec, Russia's largest defense conglomerate, is investing in AI technology to optimize existing weapons systems, its primary focus has been on other advanced technologies, such as 5G, the Industrial Internet of Things, and blockchain. Russia's largest private tech firm, Yandex, is only loosely involved in government efforts to develop AI. As a result, leadership of Russia's AI strategy has fallen to Sberbank, a bank, not a tech giant.

While Russia has substantial resources that it can invest in developing AI expertise, most metrics suggest that it will lag behind rivals. The COVID-19 pandemic has caused Putin to delay the implementation of the National Projects until 2030 and redirect funds away from the Digital Economy National Project. Sberbank's own research and development efforts will ensure the company's competitiveness, but it is less clear whether this will catalyze expertise elsewhere in Russia. The Kremlin's suspicions of Yandex and other foreign-linked tech firms creates an additional hurdle for Russia's government efforts to boost the dissemination of artificial intelligence technology.

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⁹⁸ William Carter and William Crumpler, "Smart Money on Chinese Advances in AI," Center for Strategic and International Studies, Sept. 2019.