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# RESEARCH BRIEF

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## Russian Defense Innovation in the 2010s

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Innovation in the Russian defense industry has drawn significant international attention since Russian President Vladimir Putin's state of the nation address of March 1, 2018. While the first part of the address covered the usual ground of planned economic policies, the second part was an extended presentation of Russian defense industry achievements. What Putin left out was as important as what he highlighted, and provides a clear picture of Russia's prioritization of radical over incremental innovation, sometimes to the detriment of current battlefield readiness. This research brief discusses Russia's successes and failures in modernizing its weapons systems since 2000.

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## PUTIN'S SPEECH

About one-third of President Putin's speech consisted of detailed descriptions of the new strategic weapon systems, which Russia started to develop in the early 2000s in response to the US withdrawal from the 1972 Anti-Ballistic Missile (ABM) Treaty. Putin did not try to hide his satisfaction with the results. It is obvious that he sees the new military capabilities not just as an instrument for providing security for the country, but also as a way for Russia to maintain its influence on the world stage.

The systems Putin chose to showcase during his speech highlight the real priorities of Russian defense industrial policy, in technology fields already known to be priorities for the United States and China.

**Hypersonics:** Putin claimed that Russia's first hypersonic weapon system, the Kinzhal ('Dagger') hypersonic air-launched cruise missile, is already deployed for limited service in the Southern Military District. The system is capable of carrying a nuclear or conventional weapon with a range of 2,000 km, and can be used for attacking fixed or mobile targets such as ships.

Putin claimed that another hypersonic system, the Avangard glider re-entry vehicle for ballistic missiles, is ready for mass production. The first known carriers of the Avangard gliders will be 30 legacy liquid-fuel UR-100UTTKh ballistic missiles. Later, Avangard carry the new Sarmat heavy liquid-fuel ICBMs, which are expected to have a 'global range', meaning they will be capable to attack the United States. It is now known that the Russian government some time ago decided to prioritize the procurement of Avangard and associated systems. Two ICBM projects, the rail-based Barguzin and the light road-mobile Rubezh were suspended to divert funds to Avangard.

**Lasers:** Putin claimed Russian leadership in deploying the world's first operational laser-based strategic air defense system. Existing Israeli and US systems are only specialized to deal with unmanned autonomous vehicles, incoming rockets, and mortar shells.

**Autonomous underwater systems:** Putin noted previous leaks concerning the Status-6 nuclear-powered underwater torpedo project and claimed that major technical issues in the project have been resolved. Although the system was described as primarily a component of a future nuclear deterrent force, in reality the nuclear payload is only one of several variants. Autonomous underwater vehicles are one of the most promising domains of naval warfare. Some of the Status-6 technologies, especially those associated with artificial intelligence and sensors, could be used for producing cheaper conventional-powered systems.

**Nuclear-powered cruise missiles:** This mysterious system was unknown prior to Putin's speech. From Putin's description it appears that the missile is significantly different from U.S. and Soviet nuclear-powered ramjet projects of the 1950s. Putin mentioned using a conventional Kh-101 cruise missile airframe for the tests of this mystery system. Kh-101 is known to be a subsonic cruise missile and ramjets are not effective at subsonic speeds. The system was mentioned to showcase Russian breakthroughs in the development of small nuclear power plants that could be used in unmanned aerial and underwater vehicles. China is also known to be keenly interested in such power plants for future reconnaissance satellites.

What Putin chose not to talk about is also indicative of current Russian defense innovation priorities. He left out known projects in the field of ro-

botics and a new generation of land combat vehicles and combat aircraft. He did not mention the future strategic bomber projects (T-160M2 and PAK DA), which could be attributed to strategic weapon systems development. These choices were deliberate to show Russia as a peer competitor to the U.S. in defense technology areas likely to produce the maximum impact on future warfare.

## INCREMENTAL IMPROVEMENT, RADICAL INNOVATION, AND CURRENT READINESS

Another important statement made by Putin sheds additional light on Russia's general approach to defense innovation. Apparently, after the US withdrawal from the ABM treaty the choice for Russia was between incremental improvement of existing systems and long-term investment in radical innovation projects. The Russian leadership made the second choice, which was more risky and costly in the short term but promised huge gains over the long term. "All these years after the one-sided withdrawal of the United States from the ABM treaty, we worked hard on future equipment and weapons. That allowed us to make a fast, big step forward in the development of new strategic weapon systems," Putin said.<sup>1</sup>

The obvious preference of the current Russian political and military leadership for risky and ambitious projects took place at the expense of incremental innovation and, more importantly, current readiness. The Russian defense budget had already grown significantly in the first half of the 2000s, from \$6.8 bn in 2000 to \$32.4 bn in 2007. However, this growth did not lead to improvements in Russian weapons and equipment and reflected poorly on the Russian military's performance. The second Chechen war in the first half of the

<sup>1</sup> Послание президента федеральному собранию [The President's Address to the Federal Assembly], March 1, 2018, <http://kremlin.ru/events/president/news/56957>.

2000s and the military conflict with Georgia in 2008 were mainly fought with Soviet-era legacy weapons and equipment, which led to significant popular discontent. The situation did not change until major military reforms began in 2009, when additional defense budget increases and improved procurement policies allowed the Russian government to start large-scale rearmament.

The same general approach can be seen in non-strategic systems. The Russian military stopped procurement of the T-90 main battle tank (MBT) in 2011 and moved resources to the development of next-generation armored vehicles. Small-scale procurement of T-90 tanks for the Russian army resumed in 2017, possibly because the development, testing, and production of the new T-14 Armata MBT is behind schedule. The military was expected to get the first batch of 100 T-14s for extensive testing in 2018.<sup>2</sup>

The air force chose a different approach and procured the best systems that were already available. Massive procurement of 4th generation aircraft started after 2009 without waiting for the 5th-generation fighters. The decision to upgrade existing Soviet legacy fighter fleet (with exceptions such as the MiG-31) was obviously taken because of the poor state and low capabilities of the existing inventory and the high price and redundant capabilities of 5th-generation aircraft.

Progress in the development of hypersonic antiship missiles and unmanned underwater weapons partly explains major delays in Russian construction of surface ships. The Russian government is not building

and does not plan to build any ships larger than frigates. Meanwhile, the Russian force of seaworthy ocean-going naval combatants, which consists of obsolete Soviet ships (nine 1155 project destroyers, three 1164 project cruisers, two 1144 project nuclear cruisers, and one 1143.5 project carrier), continues to shrink because of aging and heavy use, especially with the Syrian conflict. The Russian leadership may believe that the emerging technologies of hypersonic, supersonic, and ballistic antiship missiles, coupled with sophisticated unmanned submarines, will make many of the existing types outdated.

Judging from statements made by Putin and the leadership of the Ministry of Defense (MoD), the Russian government believes that it has managed to solve its most pressing defense modernization issues. For example, although the original State Armaments Program 2020 aimed to achieve a 70 percent share of modern weapons in the Russian military inventory, by the end of 2017 that share, according to MoD statements, was more than 58 percent. This compares to the situation in 2009 when the ratio did not exceed 10 percent.<sup>3</sup> The government is already reducing procurement activity. The increase in the share of civilian products in defense industry sales to 50 percent from the current 17 percent is identified as one of the key goals since that will keep the defense industry financially stable.

The Russian military has managed to create a new, very important capability, called the “non-nuclear strategic deterrence force” according to General Valery Gerasimov, chief of the General Staff of the Russian Armed

Forces. This force is represented by a significant arsenal of sea and air based cruise missiles as well as a centralized structure for planning missile strikes and missile targeting.

Many of the new Russian weapons were tested in Syria, including new command and control systems, naval and air-launched cruise missiles, Su-34, Su-35, and Su-30SM combat aircraft, UAVs, Ka-50 and Mi-28 combat helicopters, Pantsir-S air defense systems, and various kinds of guided munitions and bombs. Two prototypes of the T-50 (Su-57) 5th-generation aircraft were also sent to the Syrian theater and spent a couple of days there making combat sorties, which provided significant reassurance about the new-generation weapons capabilities.

A number of significant programs were not implemented or have fallen far behind schedule. Navy programs are one example, since Russian capabilities in building surface ships have declined significantly since Soviet times. Besides, the import substitution programs necessary to replace German MTU naval diesel engines and Ukrainian gas turbine engines require some time to bring results. Overall though, the defense situation is seen as positive and the defense budget is being reduced.

It appears that the strategy of prioritizing “future weapons” is spreading from the defense sector to the general economy. Many of Putin’s recent statements on technology center around the idea of technological breakthroughs in a number of areas, most notably artificial intelligence. Judging by recent activities, the Russian government also wants to improve the space industry, which has been declining for some time, and

2 Минобороны возобновило покупку танков Т-90, *Vedomosti*, August 25, 2017, <https://www.vedomosti.ru/politics/articles/2017/08/25/730943-minoboroni-pokupku-tankov>.

3 Доля современного оружия в ВС РФ выросла до 58,9% - Шойгу, *Zvezda Television*, November 11, 2017, [https://tvzvezda.ru/news/vstrane\\_i\\_mire/content/201711071222-e5tj.htm](https://tvzvezda.ru/news/vstrane_i_mire/content/201711071222-e5tj.htm); «Выходим на новый уровень»: какие задачи призвана решить программа вооружений России на 2018–2028 годы, <https://russian.rt.com/russia/article/486907-rossiya-programma-vooruzhenie>.

send an unmanned mission to Mars in 2019.<sup>4</sup> There are also plans to revive the civilian microelectronics industry.<sup>5</sup>

The government also seems to be moving toward greater concentration of defense and high technology assets. The defense industry is continuing to be concentrated under the control of Rostec, a state corporation responsible for consolidating strategically important companies. Rostec acquired control of the main battle tank and heavy armored vehicles producer Uralvagonzavod at the end of 2016 and is currently moving towards the takeover of the fixed wing aircraft producer United Aircraft Corporation.<sup>6</sup>

## FUTURE TRENDS

Industrial policies for the next decade appear to be largely based on the positive experience of the military reforms of the 2010s, the State Armament Program 2020, and reforms of the Rosatom State Nuclear Industry Corporation under the leadership of Sergey Kirienko from 2005 to 2016. The government will try to boost the Russian economy by implementing major, ambitious technological programs in selected priority areas while other areas of science and

technology will be largely neglected. The Russian leadership will likely follow the example of China and similar prior practices of Japan and South Korea in relying on a number of select major companies that will be designated as national champions to achieve breakthroughs in these priority projects.

While planning this technological breakthrough, the Russian government is still assuming that the country will remain in confrontation with the West for the foreseeable future. "Sanctions are forever" is a mantra used by Russian government ministers and industrial leaders. Limited access to cooperation with developed economies may create numerous obstacles for implementation of these programs. However, continuing confrontation with the West and the likely gradual closing of the Russian market will mean that many projects will be aimed at import substitution in a situation of limited foreign competition and not on global expansion, making life much easier for the domestic industrial economy.

The implementation of current grand technological initiatives will depend on the state of the Russian economy. Current Russian economic growth is sluggish (1.7 percent in 2017). At the same time, however,

inflation is at an historical low and there are hopes for a small budget surplus in 2019 or possibly in 2018. Economic policies prioritize improvements in the domestic business environment and encourage domestic investment, but increasing foreign direct investment remains problematic. Under the current situation, Russia will likely be able to maintain fast progress in a limited number of high-priority defense-related fields (hypersonics, lasers, nuclear weapons) but lack resources for wider progress. The success of this new course, which is already being heralded by the government but has yet to be fully realized, or significant foreign financing inflows (for example, from China) could change the situation.

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4 Путин: В 2019 году состоится полет российской миссии на Марс, March 15, 2018, <https://mir24.tv/news/16295971/putin-v-2019-godu-sostoitsya-polet-rossiiskoi-missii-na-mars>.

5 Путин предрек бурный рост внутрироссийского рынка гражданской микроэлектроники, NTV, March 20, 2018, <http://www.ntv.ru/novosti/1994322/>.

6 "Уралвагонзавод" официально вошел в состав "Ростеха": В России создадут единый бронетанковый холдинг, <https://defence.ru/editors-choice/uralvagonzavod-oficialno-voshel-v-sostav-rostekha-v-rossii-sozdan-edinii-bronetankovii-kholding/>; ОАК может войти в Ростех в 2018 году, <https://defence.ru/article/oak-mozhet-voiti-v-rostekh-v-2018-godu/>.