

Not Just Money

Constraints Facing the Russian Armed Forces

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A handwritten signature in black ink that reads "Ken G. Gause".

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Abstract

In this CNA Occasional Paper, noted Russian military journalist Alexei Nikolsky analyzes the macroeconomic conditions and budgetary constraints that affect Russia's military expenditures. The paper contains data on the main programs that attempt to overcome the current budgetary constraints for financing the State Armaments Program (SAP). It assesses the rationality of SAP priorities and highlights the financial and non-financial constraints that hamper its implementation. The report highlights examples of successful and unsuccessful procurement programs and discusses the reasons for these successes and failures. The report also discusses the importance of export programs for domestic procurement, the involvement of the private sector and academic institutions in critically important R&D programs, the impact of Western sanctions on the implementation of the SAP and the extent to which industrial programs have succeeded in counteracting these sanctions.

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Introduction

Major progress in size and combat capabilities made by the Russian Armed Forces since the late 2000s has required a boost in spending on personnel, combat training, and arms procurement programs. In the early 2010s, arms procurement became the largest single item in the Russian defense budget. Spending figures have largely reflected the overall state of the economy, but there has been a certain amount of decoupling since 2012. For some defense procurement items, for example, spending has sometimes been reduced not because of any financial constraints but simply because the Russian defense industry could not meet the Ministry of Defence (MoD) delivery targets. Other changes in spending plans have reflected shifting defense priorities. And, when faced with a pressing need, the government has been willing and able to allocate additional funds to meet that need—and not necessarily from the MoD's own budget—in circumvention of strict budgetary rules. Overall, Russian defense spending began to decline in 2015–2017, suggesting only a tenuous link between the state of Russia's increasingly volatile foreign relations and its willingness to lavish funds on the armed forces.

Meanwhile, there is still a lot of untapped potential to further optimize Russian defense spending. Many costly programs seem to be driven by considerations of prestige rather than genuine military necessity. The government is imposing increasingly more onerous budget management requirements on the defense sector, leaving R&D—including cutting-edge weapons programs—especially hard-hit. The official reason for tighter controls and supervision is the government's determination to defeat corruption, even though the corruption scandals that have been allowed to reach the public domain have been few. The role of the private sector and academia in defense R&D is tangible but limited. On the whole, innovative defense research remains seriously underfunded.

The sole reason for some of the ongoing procurement programs is to save jobs and keep several defense contractors (whose bosses still retain a lot of political clout) from going out of business.

Russia's ambitious rearmament plans have clearly been held back by the sanctions imposed by the United States and its allies since 2014, and by the slow progress of the ensuing import substitution programs. Despite these structural limitations, the Russian nuclear deterrent—viewed as the cornerstone of the Russian defense capability—is not facing a shortage of funds or any other significant constraints.

This report attempts to show macroeconomic conditions and budgetary constraints that affect Russia's military expenditures. The bulk of these expenditures is contained in the ten-year State Armaments Program (SAP). The report contains data on the main programs that attempt to overcome the current budgetary constraints for financing the SAP, as well as on "dual-purpose" budget programs to support the defense industry and military development.

The second part of the report attempts to assess the rationality of SAP priorities and non-financial constraints that hamper its implementation. I assess the implementation of the SAP-2020 that was adopted in 2011. The report highlights examples of successful and unsuccessful procurement programs and discusses the reasons for these successes and failures. Also in the second part, an

attempt is made to assess R&D priorities in the interest of SAP implementation, as well as the lack of scientific and technological potential and measures to strengthen it including through attempts to revive large-scale Soviet programs. This section also discusses the importance of export programs for domestic procurement, the involvement of the private sector and academic institutions in critically important R&D programs, the impact of Western sanctions on the implementation of the SAP and the extent to which industrial programs have been able to counteract these sanctions.

The MoD budget and the state of the Russian economy

Has the economic situation affected arms procurement spending in 2012–2018?

According to the MoD, Russia needs to spend 60-80 trillion rubles (\$1.37 trillion at the 2017 exchange rate) on the State Armament Program (SAP) by 2027 to keep up with global defense innovation.¹ The actual funding already approved for the SAP is only 19 trillion rubles, so the MoD’s ambitious target appears to be a purely theoretical construct, rather than a starting point in the typical budgetary negotiation process. Nevertheless, the figure at stake in the tussle between the MoD and the Finance Ministry is measured in the trillions over the next one or two decades. So far, the Finance Ministry seems to be retaining the upper hand in setting the defense spending ceilings. For example, in 2014 it postponed the adoption of the latest SAP by two years. The Finance Ministry successfully argued that, amid plummeting oil prices and a sharp devaluation of the Russian ruble, it was not possible to formulate any reliable macroeconomic projections. Table 1 shows key Russian macroeconomic indicators from the last six years. The new SAP, covering the period until 2027, was adopted in early 2018—but planners are already working on the next program, which is expected to cover 2021–2030.² This follows the old Soviet pattern of approving 10-year programs and revising them once every five years.

Table 1. Key Russian macroeconomic indicators

	2012	2013	2014	2015	2016	2017	2018 (projection)
GDP, trillion rubles	62.486	63.602	64.071	62.445	85.917**	87.427	88.90
GDP,* billion dollars	2,011	1,998	1,665	1,018	1,279	1,500	
GDP growth, %	3.5	1.3	0.6	-2.8	-0.2	1.5	1.7
Inflation, %	6.57	6.47	11.35	12.91	5.39	2.51	0.52
Oil price, (Urals blend), \$	110.52	107.88	97.60	51.23	41.9	53.03	40

Source: Figures from the websites of the Federal Service for State Statistics (<http://www.gks.ru/>), the Ministry of Finance (<http://www.minfin.ru/>), and the Bank of Russia (<http://www.cbr.ru/>)

* Dollar GDP is calculated using the Russian Central Bank's annualized exchange rate.

** A sharp increase in nominal GDP in 2016 was caused by the Russian statistics agency using a new metric. The author did not re-calculate the 2012–2016 figures because the budget planning process relied on the figures available at the time.

As shown in Table 2, national defense accounts for the largest share of Russian military spending. It includes defense procurement (new weapons, repairs and upgrades, and R&D), payroll (military servicemen as well as civilian personnel), combat training, catering and supplies, subsidized mortgages, and the repayment of loans taken out by defense contractors under the defense procurement program. It does not include military pensions, some construction programs, and militarily-relevant spending by other ministries and government agencies, such as the Industry and Trade Ministry's spending on the national program of defense industry development.

Table 2. Spending on individual budget items, billion rubles

	2012	2013	2014	2015	2016	2017	2018*
Total	23,174	25,291	27,611	29,741	31,324	31,989	**
National defense	1,814	2,105	2,481	3,182	3,778	2,854	2,953
Security and law-enforcement	1,929	2,159	2,193	2,072	2,011	2,034	2,035
National economy	3,274	3,281	4,543	3,774	3,890	4,332	4,576
Social policy	7,731	8,757	8,803	10,480	10,914	11,616	13,731
Education	2,558	2,888	3,073	3,035	3,103	3,264	3,544
Health	2,283	2,318	2,533	2,861	3,124	2,821	3,413

Source: Finance Ministry website, figures on the consolidated (federal and regional) budget // <https://www.minfin.ru/ru/statistics/conbud/>

* Spending in accordance with the approved budget.³ The figures shown represent consolidated spending from the federal budget, extra-budgetary funds, and regional budgets. The latter two sources account for about half of the total spending on health and education.

** Figure not available.

Figures under national defense in Table 2 demonstrate that spending rose sharply in 2013–2016, despite the economic crisis of 2014–2015 and falling oil prices. Defense spending began to decline in 2017 (or even as early as 2016, if we take into account the winding down of the credit financing scheme). In 2018, defense spending rose by approximately 99 billion rubles (a 3.47 percent rise), even though President Vladimir Putin and other officials had previously announced defense spending cuts.⁴

Non-MoD defense spending

Credit financing scheme

Various arms programs (known collectively as the defense procurement program) account for the bulk of the spending under the national defense line of the federal budget. Although the government stopped disclosing the procurement spending figures in the budget drafts in 2014, government officials occasionally mentioned some of them. The government continues to disclose military R&D spending figures, in an apparent effort to make Russian R&D spending in general (i.e., not just on defense) look more impressive by world standards. Table 3 shows that, in the early years of the SAP-2020 program (under which the MoD was supposed to spend 19.4 trillion rubles on arms programs over 10 years to 2020), annual spending was less than half of the 1.94 trillion annualized average.

Table 3. Russian spending on arms programs (new weapons, repairs and upgrades, and R&D), billion rubles.

	2012	2013	2014	2015	2016	2017	2018
Total	677	1,160	1,450	1,740	1,700	1,600	1,500
R&D	91.4	165.4	217.5	298.36	311.2	346	284.8

Source: Olga Kuvshinova, Aleksey Nikolsky. "End of maneuver," *Vedomosti*, October 1, 2014 // <https://www.vedomosti.ru/politics/articles/2014/10/01/konec-manevra>

The government had originally planned to spend 10.5 trillion rubles in the 2011–2018 period (including the 581 billion rubles spent in 2011), which makes up 55 per cent of the SAP-2020 total. Even if 1.5 trillion rubles a year is spent in both 2019 and 2020, total spending will reach only 73 percent of the nominal figure originally announced in 2010.

Such fluctuations in actual spending figures over the years, caused by the government's inability to make more precise economic projections, were not unexpected. To minimize the fluctuations, then-Defense Minister Anatoliy Serdyukov devised the credit financing scheme, under which defense contractors took out two- or three-year bank loans to enable them to work on long-term government contracts. The loans were later repaid using budget funds allocated under the appropriate arms programs. The total amount of loans issued under the scheme in 2011–2013 was 439 billion rubles.

By 2016, when the government decided to discontinue the scheme, the total amount of loans had reached 1.5 trillion rubles (of which 900 billion was issued by the state-owned VTB bank). Most of those loans (worth 1 trillion rubles) were repaid before the end of that year. According to then-Deputy Prime Minister Dmitry Rogozin, 200 billion rubles' worth of loans was to be repaid in 2017, and another 300 billion in 2018.⁵

In an interview with the author of this paper, a top manager of one of the banks participating in the scheme said that the bankers were not particularly enthusiastic about the early repayment of those loans. To them, it represented the loss of a big and reliable client (essentially the government itself). The banker said the reason the government decided to end the scheme early was that the Finance Ministry wanted to stop a rapid buildup of quasinational debt.

As shown in Table 4, the government is planning a flat spending curve for the first three years of the new SAP-2027 program to avoid repeating the steep rise in 2011–2013. That action may point to the absence of any plans for large new orders for new weapons systems.

Table 4. Federal budget spending under the national defense line in 2017-2020, billion rubles

	2017	2018	2019	2020
Total federal budget	16,881.6	16,519.2	16,373.7	16,726.4
National defense line	2,854	2,953	2,798.5	2,808

Source: Law on the budget for 2018 and for the 2019-2020 planning period // <http://sozd.parlament.gov.ru/bill/274618-7>

'State Defense Industry Program (SDIP)

Launched in 2016, the SDIP is the largest of the defense industry development programs. It replaced the Federal Targeted Program for the Development of the Defense Industry to 2020, which was adopted in 2012.⁶ The government intends to spend up to 3 trillion rubles under the SDIP to upgrade the existing manufacturing capacity and build new capacity, which the government hopes will ensure timely deliveries under the SAP-2020. The Federal Targeted Program suffered from inadequate funding guarantees; to address that weakness it was upgraded to a state program.

Actual funding disbursed under the SDIP and its predecessor does not approach the originally planned 3 trillion rubles; it is estimated to be no more than 1.8 trillion over the 2011–2020 period, including 1.067 trillion to be spent in 2016–2020.⁷ As part of the SDIP, 929 new manufacturing facilities (ranging from new plants to minor additions to the existing facilities) are scheduled for launch in 2016–2020. Only 37 new facilities were launched under the previous federal program, with a further 368 under construction, so the ambitious new target does not appear realistic.

Spending under the SDIP consists of direct subsidies and a government-subsidized interest rate on bank loans. The companies receiving the assistance are required to provide co-financing from their own sources. The money is being spent on such projects as two new plants built by the Almaz-Antey

Aerospace Defense Corporation in Nizhny Novgorod and Kirov, and an upgrade program being implemented at the corporation’s Obukhovsky plant in St. Petersburg. A government-subsidized loan is the sole source of financing for the Obukhovsky program. The two new plants were built using a 16 billion ruble direct subsidy, 51 billion rubles of Almaz-Antey’s own funds, and a 25 billion ruble subsidized bank loan (the entire sum of interest on that loan will be paid by the government). Government subsidies therefore cover 17.4 percent of the project’s cost, not including the interest payments.

Other state defense programs of the Industry and Trade Ministry

The Industry and Trade Ministry has several other state programs tasked with developing the defense industry. The largest of them, the State Program for Aviation Industry Development, which provides government financing to the aerospace industry, was launched in 2013 and will run until 2025. Table 5 shows the financing for this program.

Table 5. Financing of State program for Aviation Industry Development, billion rubles

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Target	54	58.7	62.6	-	-	-	-	-	-	-	-	-	-
Actual	51.1	59.4	84	52.9	58.9	58.4	40.5	69	81.8	79.9	86.1	86.1	81.6

Source: Industry and Trade Ministry website // <http://minpromtorg.gov.ru/docs/#142258>

The government intends to spend a total of 870.5 billion rubles under the State Program for Aviation Industry Development—nearly equaling the entire R&D spending under the SAP in 2016–2018. The aerospace program’s spending items include R&D, the rollout of new technologies, and retooling programs under several individual military and civilian projects. Using the United Aircraft Corporation as an example, the breakdown of the company’s total investment spending (R&D and installation of new manufacturing capacity) is as follows: military aircraft, 47 percent, transport aircraft and special aircraft (most if not all used by the military), 19 percent, and civilian aircraft, 33 percent.

The SAP finances military satellites and the launchers that put them into orbit. The Federal Space Program to 2025, which was approved in 2017, is a separate program worth 1.4 trillion rubles. It covers civilian and research satellites, spaceports, and the development of new space launchers.

The third most significant of the non-MoD but militarily relevant programs is the State Program for the Development of the Electronics Industry, which is worth 175 billion rubles and covers 2013–2025. The program uses its funds for developing various electronic components, IT and telecommunication equipment, and intellectual control systems.⁸ The program’s main focus—especially since the

announcement of Western sanctions against Russia in 2014—is import substitution in the national defense and security sectors.

Some of the dual-use projects also receive funding from other state programs, but they are regarded as secondary priorities.

Ever more stringent controls to prevent misappropriation

When the first SAP-2020 program was approved, efforts to prevent embezzlement and misappropriation of defense procurement funds were top priorities. These efforts included new legislation; for example, in 2013, the government introduced administrative penalties for a growing range of minor irregularities affecting SAP contracts. These penalties were followed by criminalization in 2017, with jail terms of up to 10 years.⁹ In fact, long-existing articles of the Penal Code enable prosecution of these violations. Thus, these new efforts designed to deal specifically with corruption in defense procurement were more a demonstration of the government’s resolve than a tangible change of policy.

The Prosecutor General’s Office, the Investigations Committee, the FSB, the Interior Ministry, and the Audit Chamber have all been drafted into this campaign—but the results so far are unimpressive. According to Prosecutor General Yuri Chayka, cases of procurement-related embezzlement and misappropriation uncovered in 2017 caused a loss of only 1.9 billion rubles. Chayka has also announced that 20 billion rubles’ worth of various procurement-related irregularities involving front companies were uncovered in 2017 and early 2018.

In practice, the episodes described as “irregularities” are usually cases of defense contractors using front companies to minimize their tax bill when paying for outsourced services, often related to software development. We are not aware of any prosecutions over serious embezzlement episodes affecting major arms programs. The most high-profile prosecution to date was over the misappropriation of 3.5 billion rubles at one of the Rostech subsidiaries.¹⁰ But there have been several cases of police officers fabricating charges of illegal use of foreign labor or other less serious violations against the management of defense companies to extort money from them, or of the *siloviki* becoming involved in corporate conflicts. Billions are being lost to embezzlement in the Russian defense industry, but the true scale of the problem is unclear and unlikely to be a serious factor affecting major procurement programs.

In 2015, the government passed a new Law on Defense Procurement (Law 275-FZ) that obligates defense contractors to open special bank accounts for earmarked funds received under the defense procurement program. The MoD believed that the measure would enable easy and continuous online tracking of all the movements of procurement-related funds.¹¹ Early on, however, the new system proved so onerous that companies were not even able to use the money received from the government to pay the travel expenses of their personnel during the field testing of new weapons systems.

Eventually—and despite numerous difficulties—the defense industry learned to live with the new restrictions, and the oft-predicted paralysis of payments was avoided.

For a long time, the MoD found it very difficult to ensure a timely disbursement of funds under defense procurement contracts. Until 2011, contractors often complained that MoD funds arrived only toward the end of the year, forcing them to take out bank loans to pay their suppliers and avoid wage arrears. To resolve that problem, in 2012 the MoD began to make 80 percent or even 100 percent upfront payments at some time in the spring. Another effort was to sign contracts covering longer periods (usually three years). That effort, however, quickly led to other problems, such as the misspending of funds and contractors' inability to use up the money within the required time frame. Thus, in 2014–2015, the MoD began to make the upfront payments in smaller installments spread over the financial year. That solution has worked for the largest Russian defense suppliers. According to Deputy Defense Minister Tatyana Shevtsova, the introduction of special defense procurement accounts to earmark the money was instrumental in eliminating the problem with timely payments. As a result, defense procurement deliveries had reached 73.3 percent of the annual target in ruble terms by the end of Q3 in 2017, up sharply from the 34.4 percent completed by the end of Q3 in 2015.¹²

Another frequent complaint of the industry relates to the government's 2011 decision to introduce a 20 percent ceiling on the profit margins of general contractors, whereas the margins of the subcontractors are limited to only 1 percent.¹³ That limitation essentially amounts to a ban on outsourcing, and it encourages various underhanded schemes.

Troops and hardware: could Russia do with less of both?

Military personnel: wages and benefits flat since 2012; rising payroll

One of the key goals of the military reform of 2008–2011 was to boost the pay of officers and professional soldiers to make military service a more attractive career option and draw better talent. To accomplish this goal, in 2008 the government decided to slash the number of officer positions in the Russian Armed Forces by 185,000, from 335,000 to 150,000. Taking unfilled vacancies into account, some 160,000 officers were to be released; that number was later reduced to 90,000.¹⁴

Some of these cuts were reversed in May 2012, when President Putin ordered an increase in the number of professional soldiers serving under contract from 241,300 in 2013 to 425,000 in 2017.¹⁵ Also, shortly after his appointment, Defense Minister Sergey Shoygu decided to re-hire some of the officers discharged under his predecessor, Anatoliy Serdyukov, and to increase the size of several armed services. According to Shoygu, in late 2017 the Russian Armed Forces had a nominal size of 1 million people, with 95-100 percent of all vacancies filled.¹⁶ That translates to an actual size of roughly 950,000 people—an increase of at least 283,000 from 2012, when the figure stood at 667,000.

Meanwhile, in 2013 the government suspended a 2011 bill under which military servicemen’s wages were to increase every year in line with inflation. Consumer prices rose by 46 percent over that period, according to official statistics.

Looking at the figures in Table 6, it becomes clear that, despite a 47 percent nominal growth in spending on MoD personnel (excluding pensions) in 2012–2017, high inflation and the growing MoD payroll mean that servicemen’s real incomes have actually decreased.

Table 6. Government spending on MoD personnel and military pensions, billion rubles

	2012	2013	2014	2015	2016	2017	2018*
Pensions	252.6	262.6	287.4	306.2	328.1	335.8	344.5
Wages	464.5	487.9	526.4	577.6	613.9	622.1	685

Source: Pensions figures cited from budget statements on the treasury website (<http://www.roskazna.ru/ispolnenie-byudzhetrov/federalnyj-byudzhet/>). MoD reports do not contain figures on wages paid to military and civilian personnel, so the figures used in this paper are sourced from assessments made by the Duma select committee on defense. These assessments should be very close to the actual figures.

* budget draft figures

Meanwhile, Russia continues to spend more on weapons programs than on military wages and pensions (see Table 7). In fact, in most years it spends more on weapons than on all other items of the national defense budget combined, even if military pensions (financed under a different line of the national budget) are included. The only exceptions to this spending pattern were in 2012, when the rapid rise in spending on arms programs was just beginning, and in 2016, which saw a blip caused by the winding down of the credit financing scheme.

Table 7. Spending on weapons and other items of the Russian defense budget, billion rubles

	2012	2013	2014	2015	2016	2017	2018*
Weapons	677	1,160	1,450	1,740	1,700	1,600	1,500
Other items	1,137	945	1,031	1,442	2,078	1,254	1,453
Share of the total*	36.3%	55.1%	58.4%	54.7%	45%	56.1%	50.8%
Share of the total, incl. pensions	32.8%	49%	52.3%	49.9%	41.4%	50.1%	45.6%

Source: Olga Kuvshinova, Aleksey Nikolsky. "End of maneuver," *Vedomosti*, October 1, 2014 // <https://www.vedomosti.ru/politics/articles/2014/10/01/konec-manevra>; Data for 2015-2018 is taken from the conclusions of the State Duma Defense Committee with regards to federal budget drafts, as well as statements by Minister of Defense Sergei Shoigu and Russian Deputy Prime Minister Yuri Borisov

* This total covers spending under the national defense line of the budget, which does not include military pensions.

In France, which in dollar terms spends about the same as Russia on national defense weapons programs accounted for only 24 percent of total defense spending, including pensions, in 2016.¹⁷ Brazil and India are more like Russia than France in that both spend a lot more on weapons than on military personnel (pensions included). The high Russian spending on weapons is explainable because spending was very low in the preceding 20 years—thus the SAP-2020 program represents a one-off, monumental effort to compensate for two decades of penny-pinching. It can be assumed that, at some point in the future, Russia will begin to spend less on arms programs as a proportion of its total defense spending, but that proportion will still remain higher than that of most other comparable countries as measured by the size of their military expenditures in dollars.

SAP-2020 priorities, results, and impact on likely priorities of SAP-2027

At several meetings co-chaired by President Putin in 2011–2012, spending figures for individual branches of the Russian Armed Forces under the SAP-2020 program were announced (see Table 8).

Table 8. SAP-2020 spending priorities

Branch of the armed forces	Funding, trillion rubles	% of the total
Army and Airborne Assault Troops	2.6	15
Navy	5.0	25
Air Force	4.7	24
Strategic Missile Troops	1.0	5
Aerospace Defense Troops*	3.4	17
Other branches and universal systems	2.7	14
Total	19.4	100

Source: Figures from: “Russian Defense Procurement Programs: Problems and room for improvement,” CAST, 2015, p.23. http://www.cast.ru/files/Report_CAST.pdf

* Incorporated into the Air Force in 2016

No such figures have been released for the SAP-2027. Unofficially, various sources have reported that priorities are being distributed evenly between the main branches.¹⁸ From that information, some analysts speculate that each of the branches will receive roughly 2.6 trillion rubles in SAP-2027 funding,¹⁹ but we believe that such a conclusion is too simplistic.

The highest proportion of the SAP-2020 spending (41 percent) is allocated to weapons systems for the combined Russian Aerospace Forces. The second-highest proportion of SAP-2020 spending has gone to the Navy weapons section of the program, which has been the least successful of the services in meeting its targets. An estimated two-thirds of the naval weapons budget (3.6 trillion rubles) was earmarked for new ships.²⁰ The original plan was to build 24 submarines (including eight SSBN and seven SSN) and 54 surface ships (including 15 frigates and 35 corvettes). But the numbers actually delivered by 2018 included only 12 submarines (three SSBN and a single SSN), five frigates (if one includes the *Admiral Gorshkov* frigate, the first ship of the Project 22350 series), and 11 corvettes. This failure to meet the targets of the original plan can be mostly attributed to unrealistic deadlines for launching such new types of ships and submarines as the *Yasen*-class SSN and the *Admiral Gorshkov*-class frigates, as well as the impact of the sanctions imposed on Russia in 2014. Those sanctions have made it impossible to procure Ukrainian gas-turbine engines for Project 11356 and Project 20350 frigates, or German diesel engines for several types of corvettes.²¹

The **Air Force/Aerospace Forces** part of the SAP-2020 program has met almost all of its original targets for combat planes already in production, including the Su-30SM, the Su-34, and the Su-35.²² In contrast, the latest version of the Su-57 fifth generation fighter program is well behind schedule. Delivery of the first Su-57 batch for trial operation has been pushed from 2013 to 2019. The 2011 contract for 38 new Il-76MD-90A transports (a major upgrade of the Il-76 MD design) to be delivered by 2020 is languishing, with only five planes delivered by 2018. The programs to upgrade Tu-95MSM and Tu-160 strategic bombers, as well as the Tu-22M3M long-range bombers, are also several years behind schedule, as are deliveries of new and upgraded special aircraft (spy and anti-submarine planes). Deliveries of the latest S-500 long-range and S-350 intermediate-range air defense systems will not commence by 2020, as originally scheduled. On the plus side, deliveries of the S-400 SAM systems and Pantsir gun-missile AA systems to the Aerospace Forces, and of the Buk-M2 and Tor-M2 SAM systems to Army air defense units, are close to being on schedule.

As for the **Army** weaponry part of the SAP-2020 program, deliveries of the ESU TZ network-centric Command, Control, Communications, Computers, and Intelligence (C4I) systems have not started.²³ Deliveries of new combat platforms (T-14 tank, T-15 and Kurganets infantry fighting vehicles, Koalitsiya-SV self-propelled artillery, and Bumerang APCs) for trial operation have predictably been delayed by at least four or five years. Mass production of these vehicles for regular Army units is unlikely to begin before the second half of the SAP-2027 program. Because of financial constraints, the MoD has slashed procurement programs for army trucks, but Army and Airborne Assault units have finally begun to receive Mine-Resistant Ambush Protected (MRAP) vehicles. Almost all of the Army's missile brigades have been rearmed with the new Iskander systems.

Finally, in the **Strategic Missile Troops** section of the SAP-2020 program, development of the Sarmat heavy liquid-fuel ICBM is at least three years behind schedule; the original deadline was 2018. The rollout of the Yars ICBM, however, is on schedule.²⁴

The priorities of the SAP-2027 program are informed by the success or failure of the various SAP-2020 sub-programs, as well as by the state of the Russian economy. In 2016, President Putin announced reductions in spending on arms programs and set an ambitious target for the Russian defense industry to bring the proportion of civilian product ranges in its revenue stream to 50 percent. Adjusted for inflation, the SAP-2027 program will be at least 40 percent cheaper than the SAP-2020.²⁵

In view of the abysmal results of the **Naval Weapons** section of the SAP-2020, we expect that the SAP-2027 will prioritize spending on the naval programs nearing completion. These programs include primarily the Project 22350 frigates, Project 885M and Project 955A nuclear submarines, and repairs and upgrades to the *Admiral Nakhimov* and *Pyotr Veliky* Project 1144 nuclear cruisers and the *Admiral Kuznetsov* aircraft carrier. Any plans for developing and/or building large ships of new types—such as the *Lider* class destroyers, universal amphibious landing ships, or a new aircraft carrier—are patently unrealistic and highly unlikely to be included in the SAP-2027. Furthermore, underfunding has already affected even smaller programs for support ships, such as minesweepers and icebreakers. Nevertheless, even those programs that will probably be included in the SAP-2027 are likely to cost up to 3 trillion rubles.

Spending on the **Army and Airborne Troops** section of the SAP-2027 will probably be more in line with the other sections. Because large deliveries of new combat platforms are unlikely before 2025, the main priorities will include the rollout of C4I systems and new infantry gear, new light armored vehicles (MRAP and BMP-3), short-range air defense systems, and upgrades to the existing fleet of tanks. All these programs are likely to cost at least 3 trillion rubles.

The **Aerospace** weapons programs may end up with the naval section at the bottom of funding priorities of the SAP-2027. Deliveries of the attack and multirole combat planes (Su-34, Su-30, and Su-35) are likely to be reduced compared to the relatively high SAP-2020 levels because heavy funding will have to be ploughed into the program of resuming production of the Tu-160 strategic bomber. Helicopter deliveries will also be slashed. Contracts for new S-500 SAM systems are unlikely before the final few years of the SAP-2027 program. Deliveries of the Su-57 fifth-generation fighters are not expected to exceed a few dozen planes.

In the **Strategic Missile Troops** section, most of the new missile deliveries (with the exception of the Sarmat ICBM) will happen after 2020. Meanwhile, the closure of such programs as the RS-26 Rubezh mobile ICBM and the Barguzin railway-based ICBM may cause spending figures to remain flat or even decline in nominal terms.

Price escalation has been a major factor in the fulfillment of Russian arms procurement programs. In 2013–2014, the government began to release significantly fewer details about arms procurement tenders, and, in late 2017, it stopped publishing such details almost completely as a precaution following the passage of the Countering America’s Adversaries Through Sanctions Act in the United States. Nevertheless, it is well-known that the price tag of most major weapons platforms has increased

by at least 50 percent, and often by even more. For example, from 2011 to 2016, the price of a single Project 20380 corvette rose from 11 billion to 17 billion rubles.²⁶ A BTR-82 armored personnel carrier (APC) rose in price from about 10 million rubles in 2010 to 34 million in 2016, and a Su-35 fighter from an estimated 1.3 billion in 2009 to almost 2 billion in 2017. The development costs of the Sarmat ICBM have doubled from their original target.

The cost of more recently designed models has risen even more steeply. A single Project 20386 modular-design corvette now costs 28 billion rubles,²⁷ whereas back in 2011 the MoD paid only 40 billion rubles for three Project 11356 frigates. Such platforms as the T-14 Armata main battle tank, the Bumerang APC, and the Su-57 are probably two or three times more expensive than their predecessors: the T-90 tank,²⁸ the BTR-82 APC, and the Su-27/30/35 fighters.

Finally, it is worth pointing out that SAP-2020 subprograms were much more likely to succeed if they were backed by efforts to upgrade the manufacturing facilities on which they relied. For example, on-target deliveries of the Su-30SM fighters and Yak-130 combat trainers owe much to the fact that the Irkutsk Aircraft Plant is constantly upgrading its production facilities and managing to keep spare capacity to a minimum. The same can be said of the Su-35 fighter, which is made at a plant in Komsomolsk-on-Amur, and the Su-34 bomber made at the Novosibirsk plant, both of which have been modernized. Other success stories include the Votkinsky Machinery Plant (the maker of Topol-M and Yars ICBM and Iskander missile systems) and the Almaz-Antey Aerospace Defense Concern, which delivers 8 to 10 S-400 SAM systems every year. Meanwhile, deliveries of the Su-30SM jets and Project 636 submarines remain firmly on target because their suppliers had used earlier export contracts to iron out early production problems.

Legacy and innovation

“Soviet nostalgia”: resurrecting costly programs of the late Soviet period

It is often argued that, since the turn of this century, the Russian defense industry has used up the R&D lead it inherited from the Soviet period. For the most part, that argument is correct. It is one of the main reasons that new Russian weapons programs are making slow progress (although the pace of such programs has slowed in the rest of the world as well). Nevertheless, —and somewhat paradoxically—since 2010 Russia has resurrected several ambitious and expensive Soviet-era programs. One of the key proponents of those decisions was former deputy prime minister Dmitry Rogozin, whose father was in charge of such programs at the Soviet MoD.

Some examples of resurrected Soviet-era programs include almost all of the advanced systems described by President Putin in his state-of-the-nation address on March 1, 2018 (which are aimed primarily at devaluing the adversary’s missile defense capability): the Peresvet laser-based air and missile defense technology; the Poseidon nuclear-powered unmanned submarine craft; the

Burevestnik nuclear-powered cruise missile; and the Avangard gliding hypersonic ICBM warhead. The Soviet programs to develop these weapons' underlying technologies (and in some cases even prototypes) were launched in the 1980s and 1990s. The Kinzhal missile system is also based on technology developed during the Soviet period, and the RS-28 Sarmat ICBM was developed to replace the Soviet R-36M UTKh Satan missile. The two ICBM projects shut down in 2016 and 2017—namely, the RS-26 Rubezh mobile ICBM and the Barguzin railway-based system—are both based on the Soviet technological legacy.

Another nod to the Soviet era is the 2015 decision to resume production of the Tu-160 strategic bomber. The plan is to build 50 new aircraft; a total of 33 were made during the Soviet period, well below the original target of 100. This is a very expensive program, with the total cost (including actual production) estimated at up to 1 trillion rubles. If the government decides to pursue this plan, it will starve the rest of the aerospace weapons programs of funds, just as the SSBN *Borei* program starved all the other Navy programs in the 2000s.

Meanwhile, grand Soviet style is back in the Russian Navy as well. The program to upgrade the *Admiral Nakhimov* and *Pyotr Velikiy* Project 1144 cruisers, which are the world's largest non-carrier warships, is likely to cost at least 60 billion rubles per ship.

Underfunding innovative R&D or running out of usable Soviet legacy? Case study: UAV and C4IR programs

The resurrection of Soviet-era megaprojects is ruinous for the Russian defense budget and of dubious real military value, with the possible exception of systems designed to defeat the adversary's missile defenses. These systems are being funded even as cheaper, more innovative systems with greater military value than the Soviet-era systems are not being funded.

For example, Russia still lacks a drone strike capability, which even Iran has managed to acquire despite crippling Western sanctions. In 2011, the MoD awarded a 1 billion-ruble contract to develop the Orion unmanned aerial vehicle (UAV) (maximum take-off weight 5 metric tonnes) to the Kazan-based Simonov Design Bureau, and a 2 billion-ruble contract for the development of the Altair drone (up to 1 metric tonne) to the private company Transzas.²⁹ Both programs are ongoing. An Orion prototype, made by Kronstadt (a Tranzas division acquired by RTI Systems, a subsidiary of AFK Sistema, one of Russia's largest non-state-owned corporations), took its maiden flight in 2016. The total cost of the Orion project so far is likely to be in excess of 6 billion rubles (of which up to half may have been funded by private investment), but it will need an even bigger influx of funding. Nevertheless, it is currently Russia's most advanced heavy UAV program.

The Altair (Altius) heavy UAV program is likely to have cost at least as much as the Orion, with all funding from the MoD budget; to bring the program to completion will require even more funding. In fact, the Orion and the Altair may both be beaten to the finish line by the Korsar light drone (weighing only 200 kg), which the state-owned Luch Design Bureau has been developing since 2012. The Korsar will be the Russian equivalent of Iranian light strike drones (which, incidentally, took the Iranians a lot

less time to develop)—but it will be nowhere near as capable as such heavy attack UAVs as America’s Predator and its Chinese equivalents.

Meanwhile, the heaviest Russian UAV in production is the Searcher Mk.2 reconnaissance drone. The drone’s technology was licensed from Israel’s Aerospace Industries after the Russian MoD bought several Searchers from Israel in 2009. This drone will remain in production until 2025; the total cost of the program is estimated at up to 100 billion rubles (1.7 billion dollars).³⁰

The ESU TZ Integrated Tactical-Tier Command and Control System developed by the state-owned Sozvezdiye concern is another example of a high-tech program not based on the Soviet technological legacy. This network-centric, brigade-level C4I system has been in development since 2000. In 2010 it was announced that the MoD might buy up over 300 billion rubles’ worth of such systems under the SAP-2020 program (the cost of equipping a single brigade is 8 billion rubles).³¹ The R&D component of the ESU TZ is likely to have cost at least 50 billion rubles. Nevertheless, trials have revealed numerous problems with the system. As a result, the MoD has replaced the general contractor, and the Sozvezdiye concern has been taken over by Kalashnikov, which is privately owned in all but name. The first deliveries of the ESU TZ systems to the armed forces are unlikely before the end of 2018. Unlike the Russian efforts to develop strike drones, this program is not held back by lack of financing. The main problem it faces is Russia’s lack of capability and expertise in developing such complex systems and the need for a lengthy period of testing and trials, especially for the software part of the system. Russia, incidentally, is not unique in that regard.

Defense R&D priorities: The Advanced Research Foundation and engaging academia

The list below outlines the R&D priorities set out by the government under the SAP program. Each line includes subprograms and specific areas of research that have not been disclosed.³² All were approved by the Defense Industry Commission in 2016 as part of two separate documents. The first is a list of priorities in fundamental, inferential, and exploratory research (FIER) that includes 11 sections, divided into 56 subsections, which in turn consist of 722 individual research projects. The second document contains a List of Basic and Critical Defense Technologies (LBCDT) consisting of nine basic technologies, divided into 48 critical technologies that consist of 330 specific defense technologies.

The FIER list includes:

1. IT (6 subsections and 67 individual research projects)
2. Military optics and quantum electronics (6/76)
3. Mechanics, aero-, hydro, and gas dynamics (5/73)
4. Control, guidance, and navigation (6/81)
5. Radio physics and radio electronics (5/101)

6. Nuclear physics (4/37)
7. Power technologies (5/57)
8. Special chemistry and materials (5/89)
9. Biology, biotech, medicine, and related tech (5/36)
10. Geology, geophysics, and atmospheric physics (5/74)
11. Military construction projects, economic projects, and education (5/31)

The LBCDT list includes:

1. Strike technologies (10 critical and 75 specific technologies)
2. Protection of forces (3/32)
3. Mobility (4/45)
4. Reconnaissance and surveillance (6/43)
5. Navigation and target designation (5/17)
6. Troop command and control (7/43)
7. Supporting troop operations (3/16)
8. Operating and refurbishing military hardware (6/37)
9. Development and application of military hardware (4/22)

These documents were drawn up in cooperation with the Russian Academy of Sciences and the MoD's research institutes for a 30-year research planning horizon. The results of that research will be used in formulating the subsequent SAP programs. It is difficult to make any judgments about these priorities on the basis of the information available to us. Nevertheless, the two lists are clearly dominated by research in such areas as optics, electronics, and new materials, as well as strike, reconnaissance, and C&C technologies. This may indicate that these R&D efforts are mostly geared toward supporting the development and upgrade of existing or nearly-ready hardware.

To engage Russian academia in militarily relevant exploratory research, Dmitry Rogozin initiated the establishment of the Advanced Research Foundation (envisioned as the Russian equivalent of the US Defense Advanced Research Projects Agency, or DARPA) in 2012 and became its first chairman. In 2018, Rogozin was replaced as ARF chairman by Defense Minister Sergei Shoigu. Also in 2018, the MoD began to build the Military Technopolis in the Black Sea resort town of Anapa. The ARF and the head of the Kurchatov Institute, Mikhail Kovalchuk, are closely involved in that project.

In 2013–2017, the ARF received 18.2 billion rubles (about 3.5 billion a year) from the treasury,³³ which was used to fund 46 individual research projects (of which only 14 have been described in detail).³⁴ Funding for nine of those projects was awarded following open competitions. Seven of these competitions were ongoing as of May 2018; one held at the Far Eastern Federal University for Russian students more or less emulates the DARPA procedure. The goal of the competition is to develop remote-controlled submersible craft and unmanned boats. The winner will be decided in September 2018. Another DARPA-like competition for multi-rotor drone swarming technologies was held at the Moscow Institute of Physics and Technology in 2016.³⁵ The rest of the ARF programs focus on funding the procurement of equipment for university laboratories and individual R&D projects. For example, a 2015 research project at the Southern Federal University used rats to sniff out explosives and drugs, and a 2018 project at Moscow State University aimed to build a 50-qubit quantum computer received 900 rubles in funding. Several other projects are related mostly to artificial intelligence and new materials.

Foreign customers and private investment

Combat aircraft procurement for the Air/Aerospace Forces has been the most successful component of the SAP-2020 program. However, most of the plane models delivered to the Russian forces in the past 25 years were developed either using funding from foreign customers, or in the expectation of large foreign contracts. The only exceptions are the contracts for a total of 122 Su-34 tactical bombers; the 1990s contracts for 28 Su-33 carrier-based fighters; the upgrade program for 76 MiG-31 fighters; and upgrades of up to 130 Su-25 ground-attack aircraft.

Indian and Malaysian funding was used to develop the Su-30SM fighter (orders for a total of 116 planes have been placed to date). Commercial credit financing and expectations of large export contracts underpinned such programs as the Su-35 (98 planes sold to date), MiG-29 SMT, and MiG-29K (the latter two sold 68 planes between them). Chinese contracts made possible the development of Su-27SM3 and Su-30M2 models (12 and 20 planes, respectively), as well as a Su-27 upgrade option (58 planes). As a result, the Russian treasury paid for the R&D required to make 352 combat planes (including 150 new ones) in the past 25 years, while export contracts and third-party investors accounted for a further 372 planes (including 314 new ones). Thus, the R&D required for 51 percent of the planes purchased over the reported period (or 68 percent, if we exclude upgrade programs) did not cost the Russian treasury a penny.

The Navy is another branch of the Russian Armed Forces that has benefitted greatly from export-oriented R&D. India and Algeria covered a large proportion of the development costs for three Project 11356 frigates and six Project 636 submarines. Foreign customers—especially India—also contributed greatly to the cost of developing such anti-ship missiles as the Uran, the Oniks, and the Kalibr.

After a wave of re-nationalizations in the late 2000s, Russia was left with only a handful of privately owned top-tier defense contractors (although privately owned lower-tier contractors are still numerous). In the former group, arguably the largest contractor is RTI Systems, which has ploughed a lot of its own funds into developing the Voronezh over-the-horizon radars that now form the

backbone of the Russian missile attack early warning system. Another high-profile RTI program financed partly by the company's own money is the Orion drone. The government is now contemplating orchestrating a merger between RTI Systems and the state-owned Rostech corporation, but the role of the private sector should not be underestimated. Technology such as the Orlan-10 UAVs (developed by the Special Technological Center) or the SVP-24 targeting system for improving the accuracy of unguided bombs (developed by Gefest) have been instrumental in the success of the Russian air campaign in Syria.

Another consideration is that, faced with a shortage of budget funds and the strictures of Law 275-FZ on special bank accounts for procurement-related funds, state-owned defense contractors often resort to taking out bank loans to keep up with deadlines on defense-related R&D. Strictly speaking, however, that financing does not qualify as private investment.

Social responsibility: buying arms to save jobs

MoD contracts for weapons the Russian Armed Forces could happily do without are often explained by the government's unwillingness to jeopardize jobs in the defense industry, and its attempts to keep once-glorious firms from going under— though other motives cannot be ruled out.

One of the best examples of such an approach is forcing contracts for a total of 76 MiG-29SMT and MiG-29K fighters on the Air Force and the Navy to rescue the MiG state corporation. Taken together with direct subsidies during the economic crisis of 2009³⁶ and other forms of government support, keeping MiG afloat may have cost the taxpayer up to 100 billion rubles.

Another example is the MoD contracts for nine An-140 and 15 An-148 passenger planes, whose main purpose was to keep the VASO plant in Voronezh and Aviakor plant in Samara in business, as well as to smooth relations with Ukraine before the 2014 crisis³⁷. Those contracts may have cost over 30 billion rubles. Neither was there any obvious need for a 140 billion ruble order for 38 Il-76MD-90A military transports placed with Aviastar in Ulyanovsk in 2011³⁸; that contract eventually fell through. In 2009, the Air Force was not enthusiastic about the decision to place the first contract for 48 Su-35 fighters, but that contract was vital for Sukhoi.

There are many similar examples in the ground weaponry segment. The most high-profile is the program to upgrade T-72 tanks to the T-72B3 specification and the T-80BV fleet to the T-80BVM specification to support the politically important Uralvagonzavod (UVZ). Saving jobs was also the key reason behind numerous attempts to keep the Amur Shipbuilding Plant in Komsomolsk from idling its capacity by giving it Navy contracts.³⁹ Such lobbying is not unusual in the United States, either— but in Russia, most of the lobbying is by regional governors and directors of large state-owned companies rather than legislators (although they, too, play a role).

Sanctions and import substitution: serious but limited impact

The increasingly stringent sanctions imposed on Russia by the United States, the EU, and Ukraine since 2014 following the annexation of Crimea have been a serious problem for the SAP-2020 program, and their impact has most likely been taken into account in the new SAP-2027. That impact has been especially obvious in the naval section of the program. Russian shipyards' inability to import the necessary ship engines, and France's cancellation of the contract for the Mistral-type amphibious landing ships, has wreaked havoc on the entire surface ships subprogram. Meanwhile, the United States has banned exports to Russia of space and military-class electronic components (which have in fact never been easy for Russian companies to procure because of the International Traffic in Arms Regulations). That is probably one of the reasons that the frequency of Russian military satellite launches has fallen since 2014. Other sectors of the Russian defense industry are unlikely to have escaped unscathed, either.

Ukraine has also imposed an embargo on exports to Russia of the TV3-117 helicopter engines made by Motor Sich—but the impact on the Russian defense industry has failed to materialize because that embargo has never been properly enforced, with the tacit consent of both parties.⁴⁰ Nevertheless, the Russian company tasked with substituting the Motor Sich engine imports from Ukraine took until 2018 to ramp up its output to levels sufficient for meeting the SAP targets. As for the substitution of imported gas turbine engines for the Navy, it has now become clear that the program will take a minimum of five years.⁴¹

According to the Industry and Trade Ministry, investment in developing Russian equivalents of technology previously bought from foreign suppliers has topped 600 billion rubles since 2014, including 120 billion rubles in government subsidies. The bulk of the remaining 480 billion rubles was probably financed by bank loans taken out by defense contractors in the hope of winning future contracts. The Russian defense industry has launched a total of 1,200 individual import substitution projects, of which about a third have already reached mass production.⁴²

Meanwhile, the impact of foreign sanctions on procurement programs for the Russian strategic nuclear forces has been minimal. Nor have those sanctions seriously undermined Russia's ability to wage war in Syria or—if and when required—in Ukraine.

Conclusion: Does Russia have enough money, R&D capability, and industrial capacity to meet national security requirements?

In spite of the failure of several individual weapons R&D programs, the impact of foreign sanctions, and economic/budgetary constraints, the programs required for maintaining Russia's nuclear deterrence capability remain one of the government's highest priorities. This was demonstrated once again during President Putin's address to parliament on March 1, when he announced several new systems designed to defeat the adversary's ballistic missile defenses. Almost all of these programs were conceived during the Soviet period, but they clearly make use of new materials and technologies that have taken many years of generous and reliable funding to develop. Three of the programs announced by President Putin—the nuclear-powered cruise missile, the nuclear-powered unmanned submarine craft, and what appears to be a land-based combat air defense laser—rely on innovative nuclear reactors. The Kurchatov Institute, led by Putin's close confidante Mikhail Kovalchuk, played a leading role in the development of those reactors. That role bears striking similarities to the Soviet nuclear and missile programs, in which close confidants of Soviet leaders (such as Nikita Khrushchev's son Sergey) also played a major role. It also underlines the importance of such programs for the Russian government. That is why, despite all the financial and non-financial constraints, the capability of the Russian strategic nuclear deterrent remains a top priority for which Russia will spare no effort or resources. A reliable nuclear deterrent will minimize the detrimental impact of setbacks in the development and procurement of some conventional weapons systems, and continue to serve as the lynchpin of Russian military security.

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- ⁴¹ Interview with ODK Saturn director Viktor Polyakov, *RIA-Novosti*, February 27, 2018. <https://ria.ru/arms/20180227/1515339128.html>
- ⁴² Industry and Trade Ministry press release, 18.04.2018

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