Research Paper

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Russia's New State Armament Programme

Implications for the Russian Armed Forces and Military Capabilities to 2027

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Summary

- The newly approved state armament programme (GPV 2027) will form the basis of Russia's defence procurement and military priorities until 2027. It is expected to build on the progress made under the previous programme, GPV 2020, and further strengthen and modernize the Russian armed forces.
- GPV 2020 helped revitalize sections of the Russian defence-industrial complex (OPK). New capital stock was installed, higher wages attracted younger and better-qualified workers, and production lines underwent a shift towards serial production of equipment for the first time in the post-Soviet era. This bodes well for GPV 2027. Some of the problems Russia encountered when developing and introducing weapons systems for GPV 2020 are likely to have been overcome by 2020. As a result, the defence industry looks set to start GPV 2027 from a much better position compared with where it started GPV 2020.
- Over the next decade, the Ministry of Defence will be allocated the vast majority of around R19 trillion ($306 billion) for the procurement of military equipment, its modernization and repair, and research and development (R&D). Additional funds are likely to be allocated for investment in upgrading storage infrastructure. The headline sum of R19 trillion is very close to that allocated to GPV 2020. However, as inflation has eroded the value of the rouble since 2011, the new programme is less ambitious than its predecessor in real terms.
- Because GPV 2027 is effectively more limited in scope than GPV 2020, it is more likely that it will be fully funded. Even if the Russian economy grows at a modest annual average rate of only 2 per cent over the next decade, and even if the burden of defence spending is reduced to the historic post-Soviet average of 4 per cent of GDP, the authorities should at least come close to allocating the R19 trillion earmarked for GPV 2027.
- Although the programme itself is classified, statements by senior officials from Russia's military and defence-industrial establishment mean that it is possible to make out the probable future shape of the Russian military in the mid-2020s. GPV 2027 is likely to focus on force mobility and deployability, military logistics, and strengthening command-and-control (C2) systems. Additional emphasis is likely to be placed on the standardization and optimization of existing systems. GPV 2027 should allow the defence industry to streamline priority technological developments.
- GPV 2027 will guide defence procurement and the modernization of the armed forces. The modernization of Russia's strategic nuclear triad is expected to remain a priority. While the navy is likely to receive less funding and prioritize the acquisition of smaller vessels, the ground forces can expect a larger share of funding than before. Meanwhile, the country's Aerospace Forces (VKS) will probably concentrate on filling existing gaps in procurement (especially with regard to transport aircraft), as well as on boosting power-projection capabilities and force mobility. Air defence systems, and the honing of deterrence and anti-access capabilities, will probably keep playing an important part in military planning.

- Implementation of GPV 2027 will necessarily be affected by external and internal factors. Issues such as production capabilities, adaptation and technological development will continue to present challenges for the military industry throughout the 2020s.
- Key external factors will include 'lessons learned' from operational combat experience in Ukraine and Syria since 2014, as well as negative impacts of targeted international sanctions on Russia's defence sector and from the breakdown of military cooperation with Ukraine since 2014. Technological and tactical adaptations that have been developed to mitigate these challenges are expected to drive the implementation of GPV 2027.
- Internal factors will include the struggle to modernize military equipment, the need to increase the effort around military R&D, and the existence of long-term, unresolved issues relating to the internal workings of the defence industry. These critical shortcomings are likely to remain in place throughout the implementation of GPV 2027.
- By 2027, the Russian armed forces are likely to be considerably better equipped than they are today. Nevertheless, one should not overstate the pace of probable modernization. While some progress may be made in the development of new-generation equipment, the armed forces will probably still rely on a mix of legacy hardware and modernized Soviet systems alongside new designs. Providing Russia with 21st-century military capabilities and adapting its armed forces to today's challenges will require sustained investment in modernization efforts and military R&D.

1. Introduction

After considerable delay, President Vladimir Putin approved Russia's latest 10-year state armament programme (*gosudarstvennaia programma vooruzheniia*, hereafter referred to as 'GPV 2027') at some point in mid-December 2017.[1] The programme was officially accepted on 22 December 2017, during Putin's address to the Collegium of the Military-Industrial Commission at the newly built training facility of the Academy of the Strategic Rocket Forces in Balashikha.[2]

This new programme will replace its predecessor, GPV 2020, which was approved at the end of 2010. The procurement, refurbishment and development of military hardware that took place under GPV 2020 played an important role in reshaping the Russian armed forces, delivering new and modernized equipment in significant volumes for the first time in the post-Soviet period.[3] GPV 2027 is expected to build on the progress made under GPV 2020, and to strengthen the Russian armed forces further.

In this paper, we consider the main objectives of GPV 2027 and examine whether Russia's financial and defence-industrial capabilities are sufficient to meet them. We then consider how the Russian armed forces are likely to be equipped by the mid-2020s, should the main objectives of GPV 2027 be achieved. Although the programme itself is classified, enough details have entered the public domain – for instance, through statements by officials, news reports, federal budgets and draft budgets – for educated inferences to be made as to its broad contours, likely priorities and strategic direction. Such assessments are the basis of this paper.

The paper is organized as follows. In Chapter 2 we outline the main achievements of GPV 2020 to establish areas of strength and weakness in Russia's defence-industrial sector (also widely referred to as the 'OPK'), and to identify the starting point for the successor programme. In Chapter 3, we consider whether the reported financial commitment associated with GPV 2027 is feasible given current and projected rates of economic growth. We argue that while the sums likely to be allocated to GPV 2027 are considerable, the Russian federal government should, assuming a moderate average annual rate of economic growth, be in a position to honour its spending commitments. In Chapter 4, we present the main military procurement plans under GPV 2027 and consider the impact that these might have on the modernization of the armed forces, notwithstanding the fact that 'modernization' is a loaded term in the Russian military industry. In Chapter 5, we examine some of the most important factors – external and internal – that are likely to shape the ability of Russia's defence industry to implement GPV 2027.

[1] Comments from the president's press secretary, Dmitry Peskov, in mid-February suggested that the programme had yet to receive Putin's approval. However, Peskov later clarified his remarks by confirming that the new GPV had indeed been signed off. These remarks were supported by similar comments by Dmitry Rogozin, the deputy prime minister with responsibility for the defence industry, on 26 February. See Safronov, I. (2018), 'Luchshe odin dorogostoiashchii pritsel'nyi udar, chem sto udarov bez razbora' [One high-cost targeted strike is better than a hundred indiscriminate strikes], *Kommersant*, 26 February 2018, https://www.kommersant.ru/doc/3558424; and TASS (2018), 'Peskov podtverdil fakt podpisaniia novoi Gosprogrammy vooruzhenii' [Peskov confirms signing of new state armament programme], 26 February 2018, http://tass.ru/armiya-i-opk/4987923.

[2] President of Russia (2017), 'Rasshirnoe zasedanie kollegi Ministerstva oborony' [Extended board session of the Russian Defence Ministry], 22 December 2017, http://kremlin.ru/events/president/news/56472; and Safronov, I. (2018), 'Ballisticheskaia ekonomika' [The ballistic economy], *Kommersant*, 2 March 2018, https://www.kommersant.ru/doc/3561294?query=%D0%A1%D0%B0%D1%84%D1%80%D0%BE%D0%BD%D0%BE%D0%B2.

[3] Cooper, J. (2016), *Russia's State Armament Programme to 2020: A Quantitative Assessment of Implementation 2011–2015*, Stockholm: Swedish Defence Research Agency, https://www.foi.se/rapportsammanfattning?reportNo=FOI-R--4239--SE; and Renz, B. (2018), *Russia's Military Revival*, London: Polity Press.

2. Trends in Military Procurement Under GPV 2020

Before assessing the main contours of the new state armament programme, we first review the manner in which its predecessor – GPV 2020 – was implemented. We identify areas where the Russian defence industry has proven capable and areas where it has proven lacking. In this chapter, we first examine the financial resources committed to defence procurement under GPV 2020. We then examine the extent to which the financial resources allocated to defence procurement caused military equipment to be delivered to the Russian armed forces according to schedule.

Financing GPV 2020

GPV 2020 was a 10-year programme designed to support the large-scale procurement of a wide range of military equipment that would modernize the Russian armed forces. It was initially envisaged that implementation of the programme would raise the share of modern equipment from an estimated 15 per cent of the total stock in 2010 to at least 70 per cent at the end of 2020.[4] A sum of R20.7 trillion (or roughly $700 billion at the average 2011 exchange rate) was reportedly assigned to GPV 2020, to be spent over the period 2011–20. This sum was to be used to finance the purchase of new military equipment, the repair and modernization of existing military equipment, the development of future weapons systems through research and development (R&D), and the modernization of Russia's defence-industrial infrastructure.[5] Overall, around R19 trillion was assigned to support spending on procurement, with the remainder of around R1.7 trillion allocated to investment in modernization of the defence-industrial base.[6]

Two points should be made at this stage. First, the sums allocated to GPV 2020 – which would be disbursed annually to finance the annual state defence order (*gosudarstevennyi oboronnyi zakaz*, or GOZ) – were always intended to be backloaded. In other words, around a third of the total sum would be spent over the course of 2011–15, with the remaining two-thirds to be spent between 2016 and 2020.[7] It was originally envisaged that a new 10-year state armament programme would replace GPV 2020 in 2016 (this would presumably have been called 'GPV 2025').[8] However, planning for federal budget spending was disrupted by the recession of 2015–16, which caused approval of the programme to be postponed until December 2017 (and later confirmed in February 2018).[9] As a result, the annual state defence order was guided by GPV 2020 until the end of 2017.

[4] The precise intended share of modern equipment varied for each branch of the armed forces. Moreover, the definition of 'modernized' included refurbished or updated versions of older systems, in addition to new or recently developed weapons systems. Official Russian statements on the delivery of 'new' equipment should therefore be interpreted with this in mind.
[5] Falichev, O. and Sukhorukov, A. (2011), 'Den'gi vydeliaiutsia zhdem kachestvennykh izdelii' [Money allocated for high-quality products], *Voenno-Promyshlennii Kur'yer*, 17 October 2011, http://vpk-news.ru/articles/8250.
[6] Ibid.
[7] Valdai Mezhdunarodyi Diskussionnyi Klub (2012), *Voennaia reforma: na puti k novomu obliku Rossiiskoi armii* [Military Reform: On the Path to a New Model Russian Army], Moscow: Valdai Mezhdunarodyi Diskussionnyi Klub, http://vid-1.rian.ru/ig/valdai/Military_reform_rus.pdf.
[8] Butrin, D. and Safronov, I. (2015), 'Vooruzheniia vstupili v boi s vozrazheniiami' [Armaments begin to battle with objections], *Kommersant*, 19 February 2015, http://www.kommersant.ru/doc/2670562.
[9] Safronov (2018), 'Ballisticheskaia ekonomika'.

Second, the amount of funding allocated to GPV 2020 was expressed in nominal terms, i.e. without accounting for future inflation. As a result, it was clear that the real (i.e. inflation-adjusted) allocation was likely to be considerably smaller than the nominal figure suggested.

The overall procurement funding assigned to the Ministry of Defence was divided among the branches of the armed forces.[10] The navy was reported to have received the highest share of allocated funds (R5 trillion, or around 26 per cent of the total). It was envisaged that this sum would finance the procurement of more than two dozen modern submarines, including nuclear-powered ballistic-missile submarines (SSBNs), more than 50 surface combat vessels and dozens of other types of naval vessels, including several French-built Mistral-class helicopter carriers. The second-highest share of funding (R4.7 trillion, or roughly 25 per cent of the total) was expected to go to the air force. It was hoped that these funds would finance the delivery of more than 600 modern fixed-wing aircraft and around 1,100 helicopters. Around R3.4 trillion (18 per cent of the total) was assigned to spending on the space and air defence forces. It was hoped that this would finance the acquisition of more than 100 divisional units of surface-to-air missile (SAM) systems, and more than 100 spacecraft and launch systems. Russia's ground forces (consisting of ground troops and airborne troops) were assigned a comparatively small share of the procurement budget (R2.6 trillion, or around 14 per cent). It was reported that this would help finance the delivery of around 2,300 main battle tanks (MBTs), 17,000 armoured vehicles and 2,000 artillery systems. A further R1 trillion (5 per cent) was put aside for the procurement of just under 300 intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) for Russia's strategic nuclear forces. The remaining sum of approximately R2.5 trillion (13 per cent) was assigned to the purchase of other military equipment, such as communications and control systems.

One important and complicating qualification should be made at this stage. Spending on the state defence order from the federal budget was complemented by state-guaranteed credits (SGCs). These were issued by certified banks to Russian defence industry enterprises to execute the state defence order. Between 2011 and 2016, the cumulative value of SGCs amounted to around R1.3 trillion. During 2016 and 2017, a significant sum – just under R1 trillion – was spent from the federal budget to reduce the principal outstanding on SGCs. Including these SGCs and subsequent repayments in any calculation of defence procurement can lead to some confusion. Broadly speaking, it is possible to incorporate SGCs into any calculation of total defence spending in one of two ways. The first option is to include the annual disbursements of SGCs in total defence spending for each given year that they were made, and then to put to one side the use of federal funds released to repay these SGCs in 2016 and 2017. The second option is to ignore the annual release of SGCs and include only the repayments made in 2016 and 2017.

In practice, while annual spending on the state defence order did rise significantly between 2011 and 2015, it never reached a level at which the full R19 trillion would have been exhausted on procurement by 2020. Thus, in nominal terms, and including SGCs as well as direct federal government expenditure, approximately R9 trillion was spent on the state defence order between 2011 and 2017.[11] If we assume for illustrative purposes that a further R4.5 trillion would have been spent on the state defence order between 2018 and 2020 – i.e. in a continuation of the approximate level of state defence order spending observed in 2017 – then we can estimate that around R13.5 trillion would have been spent on GPV 2020. In nominal terms, this would have

[10] Barabanov, M., Makienko, K. and Pukhov, R. (2013), *Voennaia reforma: na puti k novomu obliku Rossiiskoi armii* [Military Reform: On the Path to a New Model Russian Army], Moscow: CAST, p. 23.
[11] Cooper (2016), *Russia's State Armament Programme to 2020*.

fallen some way short of the original target of R19 trillion. In real terms, the sum would have been considerably smaller still.

This shows that we should be cautious when interpreting official statements concerning the financial resources committed to the new GPV. A period of worse-than-anticipated economic performance, for example, or insufficient industrial capacity to meet procurement demand, might interfere with the allocation of financial resources in any given year. There is no reason to expect that the annual state defence orders over the period 2018–27 will be any less affected by such variables. As such, the reported volume of funding for GPV 2027 should be taken as a rough guideline figure, with the expectation that the Russian authorities will adjust spending on defence procurement according to changing circumstances.[12]

Implementation of GPV 2020

In a broad sense, the increased funds assigned to defence procurement have manifestly yielded significant results. As Table 1 shows, in 2013–17 the share of modern equipment in military inventories, as reported by the Russian Ministry of Defence, rose in every year. To be sure, it is likely that some of this rise can be explained by the reduction in the total inventory of equipment (the denominator in this calculation), as older equipment was retired, in addition to the delivery of modernized, refurbished or new equipment (in effect, the numerator). Nevertheless, it is beyond doubt that the increased pace of deliveries of modern and new equipment exerted a positive and transformative effect on the Russian armed forces.[13]

Table 1: Reported share of modern military equipment in total inventories for selected categories of weapons system, per cent (2013–17 = actual; 2020 = target)

Type of weapons system	2013	2015	2017	2020
Submarines	47	51	59	71
Surface ships	41	44	54	71
Aircraft	23	37	55	71
Helicopters	39	63	76	85
Ground missile systems	27	64	100	100
Artillery	51	53	59	79
Armoured vehicles	20	37	56	82
Multi-role vehicles	40	48	56	72

Source: Ministry of Defence of the Russian Federation (undated), 'Plan deyatel'nosti na 2013–2020 gg' [Action Plan for 2013–2020], Moscow: Ministry of Defence, http://mil.ru/mod_activity_plan/constr/vvst/plan.htm (accessed 21 Feb. 2018).

[12] For instance, the first Russian state armament programme (GPV 2005) covered the period 1996–2005 but was recognized as a failure as soon as 1997. The programme was based on excessively optimistic macroeconomic assumptions, and envisaged annual military spending of over 5 per cent of GDP. The Russian Ministry of Defence later estimated that procurement and R&D reached just 23 per cent of what was initially planned in GPV 2005. See Cooper, J. (2006), 'Appendix 9C. Developments in the Russian Arms Industry', in SIPRI (2006), *SIPRI Yearbook 2006: Armaments, Disarmament and International Security*, Oxford: Oxford University Press, p. 441, https://www.sipri.org/yearbook/2006/09/appendix9C.
[13] Renz, B. (2014), 'Russian Military Capabilities After 20 Years of Reform', *Survival*, 56(3): pp. 61–84, doi: 10.1080/00396338.2014.920145; Cooper (2016), *Russia's State Armament Programme to 2020*; and Renz (2018), *Russia's Military Revival*.

At the end of 2017, senior Russian officials declared that significant progress had been made towards meeting military modernization objectives. According to Russian Ministry of Defence figures, modern armaments now account for 73 per cent of the equipment in the Aerospace Forces (VKS), 79 per cent in the strategic nuclear forces, 45 per cent in the land forces and 53 per cent in the navy.[14] Overall, 59.5 per cent of all armaments were classed as modern by the end of 2017. These figures indicate that rearmament is moving faster in some areas than in others. Re-equipment of the army and navy continues to lag behind that of the air force and strategic nuclear forces. To some extent this is a result of deliberate policy choices by the military leadership in Russia – strategic nuclear forces, for instance, have always been assigned priority status. However, in other areas, modernization of branches of the armed forces has been determined by defence-industrial capabilities. Naval procurement, for example, has been held back by weaknesses within the shipbuilding industry, and by a breakdown in defence-industrial relations with Ukraine since 2014.[15]

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It is beyond the scope of this paper to examine the effectiveness of GPV 2020 in great detail.[16] Nevertheless, it is possible to discern several important trends that are of relevance when considering the prospects for its successor.

First, over the course of GPV 2020, the Russian defence industry was able to deliver weapons systems and military equipment based on established designs in relatively large quantities. For instance, fighter aircraft based on Soviet-era designs – such as the Su-30 (NATO designation: Flanker-C), Su-34 fighter-bomber (NATO: Fullback) and Su-35 (NATO: Flanker-E) – were delivered in significant quantities. Similarly, hundreds of modernized T-72B3 and T-90 MBTs were delivered to the Russian army, along with thousands of armoured vehicles and trucks based on older core designs. The largest vessels delivered to the navy also tended to be based on Soviet-era designs.

Second, the Russian defence industry proved less successful in delivering genuinely new (i.e. post-Soviet) and more sophisticated weapons systems. Thus, hopes of procuring more than 2,000 new T-14 Armata tanks were dashed, with only experimental versions delivered to the armed forces. A new class of fourth-generation diesel-electric submarines – the Lada class (Project 677, NATO: St Petersburg class) – was also delayed, as the Russian shipbuilding industry was unable to produce air-independent propulsion systems. Similar delays in developing new sensors, power plants and weapons systems caused delays in the delivery of Admiral Gorshkov-class frigates (Project 22350, NATO: Admiral Gorshkov-class), the new fifth-generation Su-57 multi-role fighter aircraft (initially designated as the PAK-FA, or *Perspektivnyi aviatsionnyi kompleks frontovoi aviatsii*), and the Ivan Gren-class (Project 11711, NATO: Ivan Gren-class) landing ships.

[14] Mil.ru (2017), 'Itogi deiatel'nosti Minoborony Rossii v 2017 godu' [Overview of Russian Defence Ministry activity in 2017], http://itogi2017.mil.ru/Results.html.
[15] Connolly, R. (2017), 'Towards a Dual Fleet? The Maritime Doctrine of the Russian Federation and the Modernisation of Russian Naval Capabilities', *Russian Studies*, 02/17, NATO Defense College, 7 June 2017, http://www.ndc.nato.int/news/news.php?icode=1061.
[16] Detailed analyses of defence-industrial performance up to 2015 are contained in Connolly, R. and Sendstad, C. (2016), 'Russian Rearmament: An Assessment of Defense-Industrial Performance', *Problems of Post-Communism*, 59, doi: 10.1080/10758216.2016.1236668; and Cooper (2016), *Russia's State Armament Programme to 2020*.

Encountering delays when developing advanced weaponry is not unusual in any country. Defence-industrial enterprises in the West and China experience similar problems. However, the Russian defence industry faced even larger obstacles than its counterparts because of the dearth of investment in the country in the 1990s and early 2000s. During this period, the stock of human capital (i.e. expertise) and physical capital (i.e. machinery and factories) deteriorated as the government slashed expenditure on defence procurement. R&D and weapons development, in particular, suffered during this period. As a result, the plans for procurement under GPV 2020 were perhaps excessively optimistic, because they did not factor in the extent to which new systems would need to be developed from scratch. This failure was recently acknowledged by Dmitry Rogozin, the deputy prime minister overseeing the defence industry, when he admitted that planners had not appreciated just how difficult it would be to develop new weapons systems after an extended hiatus in defence procurement. He pointed to delays in the delivery of the Admiral Gorshkov class of frigates as a prime example of how integrating large numbers of genuinely new systems (i.e. not based on Soviet-era designs) was a complex process that took longer than planners had envisaged.[17]

Third, the acquisition of hardware previously reliant upon foreign components, especially on parts previously supplied by Ukrainian enterprises, was delayed. These delays were caused by the imposition by the US and its allies of sanctions on the delivery of components used in military production, as well as by the suspension of most defence-industrial trade with Ukraine starting in 2014.[18] Deliveries of larger warships – the Admiral Grigorovich-class and Admiral Gorshkov-class frigates – were most affected, as were plans to acquire Gremyashchiy-class corvettes (Project 20385), the latter of which were intended to form the backbone of a modernized corvette fleet.[19]

Thus, while the allocation of significant funds to military modernization certainly boosted Russian defence-industrial capabilities, as well as the effectiveness of the Russian armed forces, it is clear that, as of early 2018, significant gaps continue to exist. This is not surprising given the extent to which the industry – as mentioned – was neglected in earlier decades. However, it should also be acknowledged that the seven years since the launch of GPV 2020 have coincided with the revitalization of sections of the defence industry. New capital stock has been installed, higher wages have attracted younger and better-qualified workers, and production lines have been reorganized to enable a shift towards serial production for the first time in the post-Soviet era. This bodes well for GPV 2027 because some of the initial problems Russia encountered in developing and introducing weapons systems under the previous programme are likely to be overcome by 2020. As a result, Russia's defence industry embarks on GPV 2027 from a much better position compared with where it was at the start of GPV 2020.

[17] Kramnik, I. (2017), 'V vyschei lige seichas tol'ko dva igroka' [There are only two players in the top league], *Izvestiia*, 29 December 2017, https://iz.ru/689562/ilia-kramnik/v-vysshei-lige-seichas-tolko-dva-igroka; and Safronov (2018), 'Luchshe odin dorogostoiashchii pritsel'nyi udar'.
[18] See Cooper (2016), *Russia's State Armament Programme to 2020*; Malmlöf, T. (2016), 'A Case Study of Russo-Ukrainian Defense Industrial Cooperation: Russian Dilemmas', *Journal of Slavic Military Studies,* 29 (1): 1–2; and Frolov, A. (2016), 'Svoy vmesto chuzhikh. Importozameshcheniye v OPK Rossii: opyt 2014–2016 godov' [Russian in place of foreign. Import substitution in Russia's military-industrial complex: the experience of 2014–2016], *Russia in Global Affairs*, No. 6, November/December 2016.
[19] Novosti VPK (2015), 'V Kolomne razrabotan dvigatel, kotoryi zamenit importnye analogi na korabliakh VMF RF' [In Kolomna an engine has been developed that will replace imported versions on Russian navy ships], 19 June 2015, https://vpk.name/news/134224_v_kolomne_razrabotan_dvigatel_kotoryii_zamenit_importnyie_analogi_na_korablyah_vmf_rf.html.

3. Financing GPV 2027

It has been widely reported that GPV 2027 will run from 2018 to 2027. The total sum allocated to GPV 2027 is around R20 trillion. Of this, the Ministry of Defence is expected to receive an allocation of around R19 trillion for the procurement of military equipment, its modernization and repair, and R&D. Additional funds of around R1 trillion are to be allocated to investment in storage infrastructure.[20]

The headline sum earmarked for GPV 2027 thus appears very close to that allocated to GPV 2020. However, as with GPV 2020, it is likely that the reported allocation has been expressed in current prices, unadjusted for historical or forecast inflation. As the value of the rouble has been eroded by inflation since 2011 – one rouble in 2018 buys roughly one-half of what it did seven years ago – GPV 2027 must be considered less ambitious than its predecessor.[21] That said, at around 3 per cent, the rate of annual inflation in Russia is currently at a post-Soviet low, which means that if this trend continues, the real value of the sums allocated to GPV 2027 may not be eroded by rising prices to the same degree as was the case under GPV 2020.

As yet, it has not been reported how expenditure will be distributed across the 10-year period. However, projections within the Russian federal budget for 2018–20 suggest that overall defence spending should stay roughly constant in nominal terms. Spending on the 'national defence' chapter of the federal budget is projected to rise slowly from R2.7 trillion in 2018 to R2.8 trillion in 2020.[22] According to calculations by Julian Cooper, total military expenditure – i.e. spending under the 'national defence' chapter of the federal budget, plus other items of military expenditure outside of this category – should rise from just over R3.8 trillion in 2018 to just under R3.9 trillion in 2020.[23] Of this, he estimates that just under R1.6 trillion will be allocated to spending on the state defence order in 2018, with this rising to just over R1.7 trillion in 2020.[24] At this rate, spending on the state defence order would need to accelerate after 2020 if the full scheduled amount is to be spent.

If, for simplicity's sake, we assume that around R1.9 trillion needs to be allocated to the state defence order annually over the period 2021–27, we have a starting point for considering the financial feasibility of GPV 2027. Two questions need to be answered in order to assess whether GPV 2027 is likely to be feasible in financial terms. First, what rate of economic growth will be needed to generate sufficient tax revenues to fund planned military expenditure, as well as other areas of federal government spending? Second, what share of total federal government tax revenues will need to be allocated to military expenditure to support the implementation of GPV 2027 in full?

[20] Safronov (2018), 'Ballisticheskaia ekonomika'.
[21] International Monetary Fund (2017), World Economic Outlook Database, April 2018, https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/weorept.aspx?sy=2010&ey=2023&scsm=1&ssd=1&sort=country&ds=.&br=1&pr1.x=56&pr1.y=14&c=922&s=PCPIPCH&grp=0&a (accessed 23 Apr. 2018).
[22] Government of the Russian Federation (2017), 'O federal'nom byudzhete na 2018 god i na planovyy period 2019 i 2020 godov. Prilozheniye No.7. [On the federal budget for 2018 and the planning period of 2019 and 2020. Appendix No.7], p. 4, http://sozd.parlament.gov.ru/bill/274618-7.
[23] Cooper, J. (2018), 'Military spending in Russia in 2017 and planned spending to 2020: a research note', unpublished, 3 February 2018, p. 5.
[24] Ibid., p. 5.

Different organizations within the Russian policy-making community have been developing competing strategies for the country's future economic development.[25] These organizations include the Centre for Strategic Research (CSR), led by Alexei Kudrin, the former finance minister; the Stolypin Club, a collection of business representatives and policy officials with an interest in stimulating a faster rate of economic growth; and the Russian Ministry for Economic Development (Minekon). Their respective strategies have been presented to the country's leadership in the hope that these might form the basis of economic policy between 2018 and 2024. Helpfully, each organization has drawn up projections of Russia's future economic performance, based on different assumptions about the direction of economic policy.

According to the projections developed by the CSR and the Stolypin Club, there are two broad scenarios for economic growth in Russia. Under the 'inertia' scenario – i.e. where no significant reforms to the current course of economic policy are made – real GDP growth will be unlikely to exceed an annual rate of 2 per cent. Under this scenario, the oil price will hover at around $45–55 per barrel (Urals oil benchmark), while domestic consumption and investment will each grow at a modest average rate of around 2 per cent in real terms. Because investment will not grow faster than the overall economy, the share of fixed capital investment in GDP is unlikely to exceed 20 per cent. This will result in Russia's current economic structure remaining largely unchanged, which in turn would mean that the country's economic fortunes will continue to be shaped to a large degree by fluctuations in hydrocarbon prices. Under this scenario, government spending would make a negative contribution to GDP growth over the next three years, due to the fact that current budget projections are based on reducing the size of the federal budget deficit and then maintaining a balanced budget thereafter.

By contrast, under a 'reform' or 'target' scenario, significant changes to economic policy would stimulate investment, non-natural resource exports and economic growth more widely. The CSR and Stolypin Club differ on the nature of the reforms they advocate. While both organizations aim to raise the rate of average annual GDP growth to at least 4 per cent in real terms over the course of the next decade, they articulate different paths to achieving this objective. The CSR's proposals are based on more orthodox liberal principles that emphasize a reduction in the size of the state, and in its role in directing economic activity. The Stolypin Club, on the other hand, offers a vision of a more interventionist state that uses monetary and fiscal policy instruments to promote investment in high-technology industries.

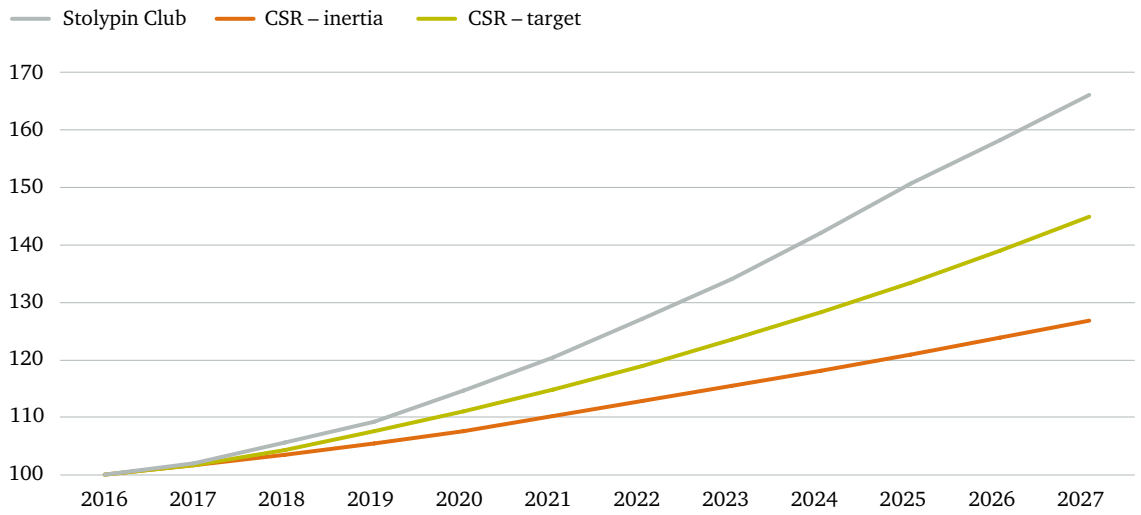
The rates of growth envisaged under each of the scenarios put forward by the CSR and Stolypin Club are illustrated in Figure 1. Several points stand out. First, in even the most pessimistic scenario, the Russian economy *should* continue to grow. Of course, recessions do happen. Russia has experienced two over the past decade. However, these tend to be caused by sudden downward changes in the price of oil. Second, even if the Russian economy does not grow as rapidly as a reform-based scenario would suggest, it should still rank as the sixth-largest economy in the world by 2027, if measured in purchasing-power-parity (PPP) terms.[26] This means that even a period of modest growth should, if sustained, make Russia the largest economy in Europe on a PPP basis by 2027. Third, because the Russian economy is likely to grow, albeit at a modest rate, it is plausible to suggest that the potential tax base will expand over the next decade. Fourth, the different growth projections also show that *if* – and it is a big if – policymakers

[25] Stolypin Club (2017), *Strategii rosta* [Growth strategies], Moscow: Stolypin Club, http://stolypinsky.club/strategiya-rosta-3/; Centre for Strategic Research (2017), *Ustoychivyy ekonomicheskiy rost: model' dlya Rossii* [Stable economic growth: a model for Russia], Moscow: Centre for Strategic Research, http://csr.ru/wp-content/uploads/2017/01/GF4.pdf.

[26] See, for instance, PWC (2017), *The Long View. How will the global economic order change by 2050?*, London: PWC, https://www.pwc.com/gx/en/world-2050/assets/pwc-world-in-2050-summary-report-feb-2017.pdf.

are able to generate an acceleration in the rate of economic growth to something approximating those in the reform-oriented scenarios, the Russian economy could be anything from roughly 45 per cent to 65 per cent larger in 2027 than it was in 2016 in real terms. This would give the country's leadership an even larger tax base from which to fund government expenditure.

Figure 1: Size of Russian economy under alternative scenarios, in real terms (2016=100)



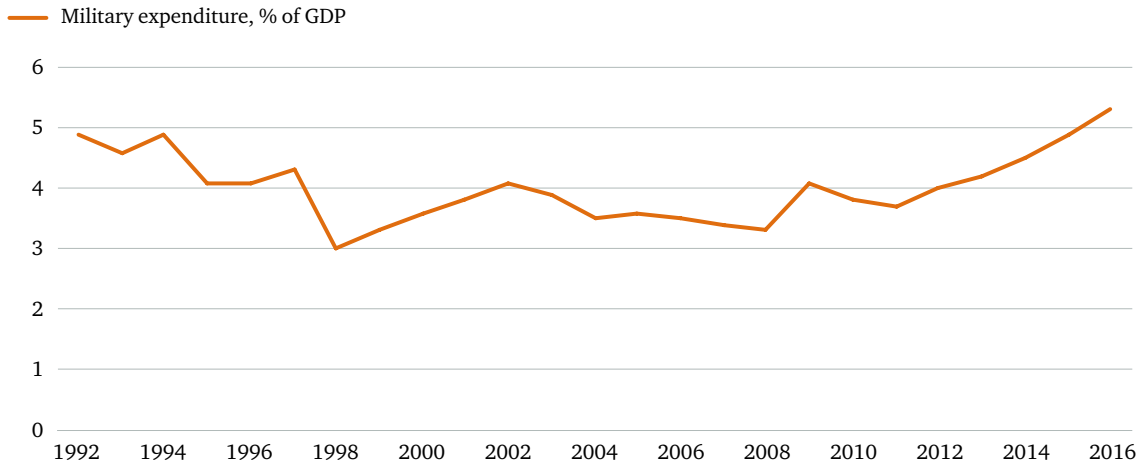
Sources: Stolypin Club (2017), *Strategii rosta* [Growth strategies], Moscow: Stolypin Club, http://stolypinsky.club/strategiya-rosta-3/; Centre for Strategic Research (2017), *Ustoychivyy ekonomicheskiy rost: model' dlya Rossii* [Stable economic growth: a model for Russia], Moscow: Centre for Strategic Research, http://csr.ru/wp-content/uploads/2017/01/GF4.pdf; authors' calculations.

The total value of defence expenditure (the 'defence effort') is determined by both the size of a country's economy and the proportion of total resources (e.g. the share of GDP, the share of total government expenditure, etc.) that its leadership chooses to allocate to defence expenditure (the 'defence burden'). Assuming that the Russian economy does grow over the next decade, the extent to which sufficient funds will be allocated to GPV 2027 will be determined by whether the political leadership chooses to accept a high enough defence burden to generate the funds needed for procurement.

As illustrated in Figure 2, the Russian defence burden – as expressed using the Stockholm Peace Research Institute (SIPRI)'s measure of total military expenditure – rose sharply after 2011.[27] This increase was, to a large extent, driven by the demands of GPV 2020, which caused the share of procurement in military expenditure to rise considerably. What is perhaps most interesting is that even during periods of economic hardship, as observed in the 1990s, total military expenditure never slipped under 3 per cent of GDP. This shows that military expenditure in Russia has historically been a priority for the country's leadership. Indeed, the defence burden for Russia has tended to be higher, on average, than that of the US (with an average of 3.8 per cent of GDP since 1992), China (1.9 per cent), and other large NATO countries such as the UK (2.4 per cent) and Germany (1.4 per cent).[28] This indicates that even if economic growth falters for any reason, Russia is still likely to accept a higher defence burden than most other rival powers.

[27] However, recent recalculations of GDP have reduced this figure.
[28] SIPRI (2018), Military Expenditure Database, Stockholm: SIPRI, https://www.sipri.org/databases/milex (accessed 23 Apr. 2018).

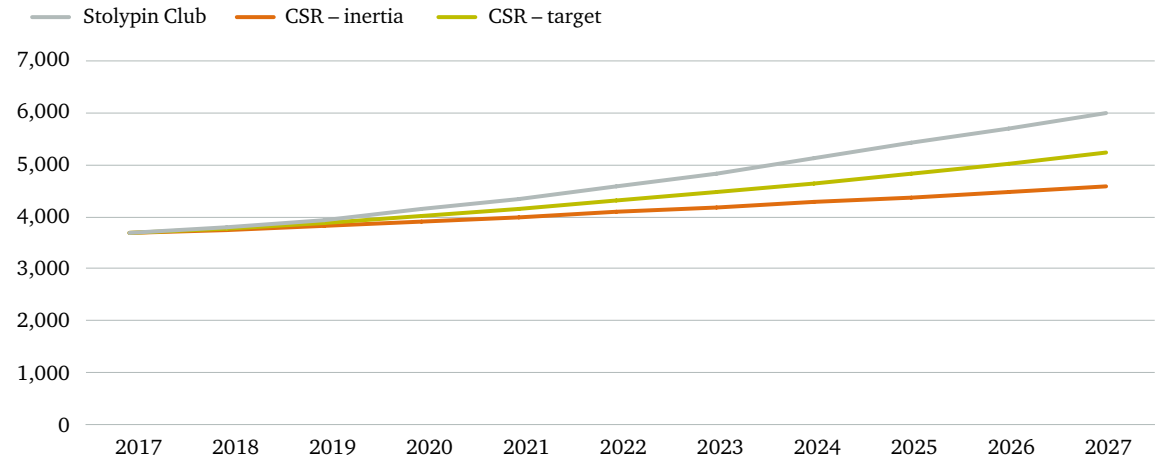
Figure 2: Russia's defence burden, 1992–2016 (per cent of GDP)



Source: SIPRI (2018), Military Expenditure Database, Stockholm: SIPRI, https://www.sipri.org/databases/milex.

If we assume that the Russian defence burden falls to its post-Soviet average of around 4 per cent over the next decade, it is possible to project an approximate nominal rouble value (i.e. not adjusted for inflation) for military expenditure for that period. As shown in Figure 3, even under the CSR's 'inertia' scenario, and with a defence burden of 4 per cent of GDP, the nominal value of the resources available to the Russian authorities would rise steadily over the decade. By 2027, each of the three scenarios presented here would yield a range of possible annual military expenditure estimates – from a low of just around R4.6 trillion under the CSR's 'inertia' scenario to just under R6 trillion under the Stolypin Club's 'reform' scenario. Of course, inflation would erode the real value of the sums calculated, although if the current low rate of inflation is maintained, this might be less damaging than was the case over the course of GPV 2020. It is also possible that policymakers might choose to accept a higher defence burden, which would increase the value of the funds available for defence procurement.

Figure 3: Rouble value of total defence expenditure under alternative projections, 2017–27 (nominal 2016 R billion)



Sources: Stolypin Club (2017), *Strategii rosta*; Centre for Strategic Research (2017), *Ustoychivyy ekonomicheskiy rost: model' dlya Rossii*; authors' calculations.

Only a certain proportion of military expenditure has been allocated to defence procurement. Between 2005 and 2016, federal budget expenditure on the state defence order (excluding SGCs) accounted for an average of 30 per cent of total military expenditure, although the share was much higher in the latter half of this period as procurement spending under GPV 2020 increased sharply after 2011. Indeed, according to calculations by Julian Cooper, the volume of funding assigned to the state defence order from the federal budget between 2011 and 2016 amounted to around 41 per cent of total military expenditure.[29] If we assume that spending on the state defence order remains at its existing level as a share of total military expenditure, then it is feasible that, even under the most pessimistic of the projections presented here, cumulative spending by 2027 on the new GPV would, at approximately R17 trillion, approach the stated objective of R19 trillion (see Figure 4). This would represent a fuller execution of the financial targets of the GPV than was the case under GPV 2020. Moreover, if Russian policymakers decided to increase the share of procurement in total military expenditure, then it is also possible that the financial objectives of GPV 2027 could be achieved, albeit at the expense of other areas of defence expenditure.

Figure 4: Cumulative spending on the state defence order under GPV 2027 under alternative growth projections, 2018–27 (nominal 2017 R billion)

Sources: Stolypin Club (2017), *Strategii rosta*; Centre for Strategic Research (2017), *Ustoychivyy ekonomicheskiy rost: model' dlya Rossii*; authors' calculations.

To sum up so far, even if the Russian economy only grows at a modest annual average rate of 2 per cent in real terms over the next decade, and even if the defence burden is reduced to the historic post-Soviet average level of 4 per cent of GDP, the authorities should be in a position to at least come close to allocating the required R19 trillion on military equipment. If GDP growth rates exceed the more pessimistic projections, it is possible that GPV 2027 might be fully funded without too much difficulty. This assertion is made with two caveats. First, recessions do happen, and they happen to Russia relatively frequently. Therefore, expecting a decade of even modest growth may prove to be an excessively optimistic assumption. Second, even if Russia is fortunate enough to enjoy a decade of uninterrupted growth, policy decisions by the leadership over how to allocate federal government spending may differ from those in the past. In particular, the challenge of a rapidly ageing population may leave a smaller volume of resources available to fund defence expenditure.

[29] Cooper, J. (2018), 'Military spending in Russia in 2017 and planned spending to 2020: a research note', p. 5. This figure is based on the broader military expenditure measure used by SIPRI. If the narrower 'national defence' category used by the Russian authorities is applied, the state defence order's share of defence spending is higher.

4. Military Procurement Plans Under GPV 2027

In this chapter, we consider the types of weapons systems likely to be procured by the Russian military over the course of GPV 2027. We base our analysis on reports of existing procurement contracts, as well as on observed defence-industrial capabilities and military hardware development, to build a picture of the probable shape of the Russian military by the mid-2020s.

GPV 2027 will determine the overall direction of defence-industrial procurement and modernization over the next decade. Systems that enhance force mobility and deployability, especially within Russia's Airborne Assault Troops (VDV) and Special Operations Forces (SSO), are expected to be emphasized, as are systems that improve logistics and the integration of different branches of the armed forces.[30] GPV 2027 will probably set a priority of strengthening command-and-control (C2) systems for the armed forces – including, notably, intelligence, surveillance and reconnaissance (ISR) capabilities – in order to achieve potential network-centric warfare capabilities. These goals were clearly outlined by the chief of staff of the Russian armed forces, Valeriy Gerasimov, in recent addresses and publications.[31]

> Procurement of higher-quality, upgraded and modernized systems is expected to dominate the new GPV. It is also rumoured that there will be an additional emphasis on the standardization and optimization of existing systems.

Procurement is likely to reflect what could arguably be described as a shift away from the Soviet-era logic of mass production, towards an emphasis on 'quality over quantity' for certain systems (for instance with Iskander missile systems or T-90 tanks). This is a shift that has been taking place in the Russian armed forces since the 2010s. As a result, procurement of higher-quality, upgraded and modernized systems is expected to dominate the new GPV. It is also rumoured that there will be an additional emphasis on the standardization and optimization of existing systems.[32] In addition, spending plans are likely to be informed by lessons learnt from recent combat experience in Ukraine and Syria. As a result, it is probable that Russia's ground forces and VDV will be allocated a larger share of the procurement budget than they received under GPV 2020. In contrast, the navy is expected to see its share of projected procurement spending decline.[33]

[30] Gressel, G. (2017), *Strategy and Challenges in Defence industries in Russia and China: players and strategies*, EUISS Report No. 38, https://www.iss.europa.eu/sites/default/files/EUISSFiles/Report_38_Defence-industries-in-Russia-and-China.pdf.
[31] Khudoleev, V. (2018), 'Voennaia nauka smotrit v budushchee' [Military science is looking to the future], *Krasnaya Zvezda*, 26 March 2018, http://redstar.ru/index.php/component/k2/item/36626-voennaya-nauka-smotrit-v-budushchee; TASS (2018), 'Genshtab: osobennost'yu konfliktov budushchego stanet primerenie robotov i kosmicheskikh sredstv' [General Staff: use of robots and space equipment will be features of war in the future], 24 March 2018, http://tass.ru/armiya-i-opk/5062463.
[32] Frolov A. (2017), *State Armament Program 2025: a Difficult Birth*, Moscow Defense Brief, Moscow: CAST, No. 6.
[33] It is unlikely that the navy ever received the volume of funds allocated to it under GPV 2020, due to industrial constraints in Russia's shipbuilding sector. The navy's reduced share of the procurement budget under GPV 2027 is likely to simply reflect this reality.

Strategic nuclear forces

The modernization of Russia's strategic nuclear triad is expected to remain a priority under GPV 2027.[34]

Naval component

It is likely that the general trend in naval procurement will be towards the completion of vessels currently under construction. Newer vessels are unlikely to be delivered until the following GPV. If so, this should result in the delivery of five Borei II-class (Project 955A, NATO: Dolgorukiy-class) strategic ballistic-missile submarines (SSBNs) by the early 2020s, although the development of these vessels has been delayed by problems with their diesel generators.[35] The new vessels are expected to complement the three Borei-class (Project 955) submarines that have already been delivered to the Russian fleet, as well as several older Delta IV-class (Project 667 BDRM, NATO: Delta II) submarines currently in service. The design stage for the development of the successor Borei B class of SSBNs is expected to begin in 2018, but production is not currently scheduled to get under way until at least 2026.[36] More broadly, construction of any newer designs of ship and submarine is unlikely to take place before 2025 at the earliest.[37]

Air component

If current trends continue under GPV 2027, the air component of Russia's strategic forces is likely to rely on a mix of Tupolev Tu-95MS (NATO: Bear) and Tu-160M2 (NATO: Blackjack) strategic bombers, at least until the mid-2030s. The fleet of Tu-95MS aircraft, which entered into service in 1956, is likely to receive new engines and weapons upgrades.

The backbone of Russia's strategic aviation is expected to comprise a fleet of Tu-160M2 bombers. The decision to restart production and modernize the Tu-160 was made in May 2015.[38] Serial production is expected to resume in 2021, with three to four aircraft delivered to the armed forces every year starting in 2023.[39] The Tu-160M is currently undergoing test flights.[40] The Tu-160M2 will keep the same structure as the legacy bomber, but with completely revamped avionics and communication systems. It will also be equipped with the new NK-32.02 turbo-reactor from the Kuznetsov plant. What it will lose in stealth, the M2 will gain in speed and in the increased range of its new Kh-102 nuclear-capable air-launched missiles.

Drawing on combat experience from the Syrian campaign,[41] modernization of the fleet of 62 Tu-22M3 (NATO: Backfire) medium-range bombers should be completed by 2027; the aircraft are to be equipped with Kh-32 missiles.[42] The modernization, renovation and overhaul (hereafter 'MRO')

[34] Safronov (2018), 'Luchshe odin dorogostoiashchii pritsel'nyi udar'.
[35] Mil.Press Today (2018), 'SSBN Knyaz Oleg Stays Without Diesel Generator for Almost a Year', 1 February 2018, http://mil.today/2018/Weapons6/.
[36] TASS (2017), 'Russian Navy to receive improved Borei-class strategic submarine in 2026 — source', 25 December 2017, http://tass.com/defense/982864.
[37] RIA Novosti (2018), '"Admiral'skaia" seriia. Kak superfregaty proekta 22350 usiliat flot Rossii' [The "Admiral" series. How the super-frigates of the 22350 project will strengthen Russia's naval fleet], 17 February 2018, https://ria.ru/defense_safety/20180217/1514800355.html.
[38] Gady, F. (2017), 'Russia: Strategic Bomber Upgrade 'Top Priority'', *The Diplomat*, 8 August 2017, https://thediplomat.com/2017/08/russia-strategic-bomber-upgrade-top-priority/.
[39] Russian Aviation (2017), 'The upgraded Tu-160M2 strategic bomber planned for production in Russia will be 150% more efficient', 22 December 2017, https://www.ruaviation.com/news/2017/12/22/10451/?h.
[40] TASS (2018), 'Russia's upgraded Tu-160 strategic bomber started flight trials last week', 24 January 2018, http://tass.com/defense/986663.
[41] Majumdar, D. (2015), 'Russia's 'Carrier Killer' (Now ISIS Killer): The Tu-22M3 Supersonic Bomber', *The National Interest*, 19 November 2015, http://nationalinterest.org/blog/the-buzz/russias-carrier-killer-now-isis-killer-the-tu-22m3-14396.
[42] Gavrilov, Y. (2017), 'Tu-22M3 moderniziruyut pod krylatuyu rakety X-32' [Tu-22M3 being modernized under the wing missile X-32], *Russkoe Oruzhie*, 17 November 2017, https://rg.ru/2017/11/17/dalnij-bombardirovshchik-tu-22m3-moderniziruiut-pod-krylatuiu-raketu-h-32.html.

process will bring the Tu-22M3's characteristics closer to those of the Tu-160M2 in terms of avionics and communication systems. This should extend the Tu-22M3's service life by another 25–30 years.

Under GPV 2027, the programme for the next-generation PAK DA ('Prospective Aviation Complex for Long-Range Aviation') supersonic bomber will probably be nowhere near completion. Initially supposed to be a priority, the development of the PAK DA has been hampered by the decision to resume production of the Tu-160M2. The first real-scale design of the PAK DA was unveiled only in March 2017.[43] In order to speed up development and avoid duplication of effort and cost overruns for the radio-electronic producer KRET (Concern Radio-Electronic Technologies),[44] radio-electronic components for the PAK DA will largely repurpose those integrated in the Tu-160M2. Even so, in 2027 the Tu-160M2 will still offer a more affordable and adaptable solution than the PAK DA, at least until the 2030s and the next GPV.

New long-range cruise missiles will be deployed, especially the nuclear-capable Kh-102 Raduga missile, which will have an extended range of 4,500–5,000 km. The missile will equip both the Tu-160M2 and Tu-95MS. The Kh-47M2 Kinzhal hypersonic missile system, unveiled in March 2018, is currently in development and undergoing experimental trials in the Southern Military District. However, it is too early to say whether production will occur during GPV 2027. In its trial phase, the aeroballistic missile is currently mounted on MiG-31BM interceptors, but it will probably also be fitted to Su-57 fighters in the future.[45]

Land component

Under GPV 2027, the land component of the nuclear triad will likely consist of a mix of RS-24 Yars (Topol-MR, NATO: SS-27 Mod2) and RS-28 Sarmat (NATO: SS-X-30 Satan 2) intercontinental ballistic missiles (ICBMs), creating a comprehensive land-based ICBM system for nuclear deterrence.

The RS-24 Yars will replace the mobile, silo-based RT-2PM2 Topol-M (NATO: SS-27 Sickle B), which will be phased out and decommissioned.[46] In early 2017, the production of RS-24 Yars ICBMs was delayed after the Podolsk Electromechanical Factory (PEMZ) had financial difficulties and became unable to buy electrical components needed by its subcontractors for the production of hydraulic jacks for Yars launchers.[47] As a result, the entry into service of Yars systems has been postponed.

Under GPV 2027, the silo-based RS-28 Sarmat ICBM should overcome its deployment difficulties. If testing proceeds according to schedule in 2018,[48] the missile should enter active service by 2020, replacing the legacy R-36M2 Voevoda (NATO: SS-19 Satan). Sarmat systems, presented as a direct competitor to US Minuteman III missiles, are supposed to represent the backbone of Russia's strategic forces.[49]

[43] Hodarenok, M. and Solopov, M. (2017), 'Rossiia zapustila maket bombardirovshchika' [Russia releases model bomber], gazeta.ru, 1 March 2017, https://www.gazeta.ru/army/2017/03/01/10551047.shtml#page2.
[44] Ptichkin, S. (2017), 'Lovushka dlia chuzhikh' [A trap for enemies], *Rossiiskaia Gazeta*, 14 June 2017, https://rg.ru/2017/06/15/strategicheskij-bombardirovshchik-tu-160m2-poluchit-zashchitu-ot-vseh-raket.html.
[45] Malyasov, D. (2018), 'Top Russian general reveals secrets of new Kinzhal hypersonic complex', Defence Blog, 2 March 2018, http://defence-blog.com/news/top-russian-general-reveals-secrets-new-kinzhal-hypersonic-complex.html.
[46] RIA Novosti (2018), 'Po vsem napravleniiam: v Sovfede rasskazali o novoi programme vooruzhenii' [In all directions: new armament programme announce in the Federation Council], 10 January 2018, https://ria.ru/defense_safety/20180110/1512398181.html.
[47] Safronov, I. (2017), 'U "Iarsov" tormozit zavod' [Delays at the "Yars" factory], *Kommersant*, 10 January 2017, http://www.kommersant.ru/doc/3187370.
[48] Gady, F. (2018), 'Russia Is testing Its Most Powerful Intercontinental-Range Ballistic Missile', *The Diplomat*, 2 March 2018, https://thediplomat.com/2018/03/russia-is-testing-its-most-powerful-intercontinental-range-ballistic-missile/.
[49] *Korrespondent* (2016), 'Rossiia pokazala rakety Satanu-2' [Russia announces the Satanu-2 missile], 27 October 2016, http://korrespondent.net/world/russia/3763209-rossyia-pokazala-raketu-satana-2.

Development of the RS-26 Rubezh road-mobile ICBM has been crippled by testing and production delays, and its deployment was put on hold in March 2018. Its problems are to the advantage of the Avangard system, which consists of a hypersonic boost-glide manoeuvring nuclear-capable warhead mounted on a strategic ICBM. President Putin unveiled the system during his State of the Union speech on 1 March 2018.[50]

Part of the Avangard system, the 15Yu71 hypersonic vehicle is meant to penetrate air defences and deliver a nuclear or conventional warhead. Until the Sarmat ICBM is deployed, the primary means of delivery for the Avangard vehicle will be the legacy UR-100UTTKh (NATO: SS-19 Stiletto) ICBM. Financing issues for strategic systems have pushed the Ministry of Defence to prioritize the Avangard instead of the RS-26 Rubezh ICBM under GPV 2027.[51] A major caveat is that the Avangard will certainly not be ready to enter service by the officially reported scheduled date of 2019. Furthermore, outfitting UR-100UTTKh ICBMs and silos to host hypersonic vehicles is a costly option.[52] In short, the performance of hypersonic weapons (and the technological race that goes with this) seems to be of greater importance to Russian military planners than the means to deliver nuclear warheads.

The Barguzin ICBM railway-based mobile complex was not included in GPV 2027, and its construction was halted in December 2017.[53]

Aerospace Forces (VKS)

Russia's Aerospace Forces (VKS) accounted for around 25 per cent of procurement under GPV 2020, with massive acquisition and re-equipment undertaken during the programme period. The emphasis of GPV 2027 will probably be on filling remaining procurement gaps (especially with regard to transport aircraft), as well as on power-projection capabilities, force mobility, logistics and air-to-ground capabilities for combat aviation.

Fighter and bomber aircraft

Under GPV 2027, 4+ and 4++ fighter aircraft are expected to compose the bulk of Russia's combat aviation fleet, with most of these consisting of Sukhoi designs. The programme will involve the modernization of the Su-30SM (NATO: Flanker-C, a 4+ modernized version of the Su-30MKI) at a rate of 12–18 units a year, bringing the total number of aircraft in service to at least 186 by 2027.[54] About 200 Su-35S (NATO: Flanker-E) 4++ multi-role fighters should also be procured by 2027 under new and existing contracts.[55]

The politicization of MiG procurement will continue with the acquisition of at least 24 MiG-35 (NATO: Fulcrum-F) 4++ multi-role fighters. Even though there is a general lack of enthusiasm in

[50] Mk.ru (2018), '"Sarmat", "Knizhal" and "Avangard": Putin pokazal novye vidy oruzhiia' ["Sarmat", "Knizhal" and "Avangard": Putin reveals new types of weapons], 1 March 2018, http://www.mk.ru/politics/2018/03/01/sarmat-kinzhal-i-avangard-putin-pokazal-novye-vidy-oruzhiya.html.
[51] TASS (2018), 'Avangard hypersonic missiles replace Rubezh ICBMs in Russia's armament plan through 2027', 22 March 2018, http://tass.com/defense/995628.
[52] Trevithick, J. (2018), 'Russia Halts Years of Work on Ballistic Missile To Pay For Hypersonic Weapons', *The Drive*, 23 March 2018, http://www.thedrive.com/the-war-zone/19588/russia-halts-years-of-work-on-ballistic-missile-to-pay-for-hypersonic-weapons.
[53] Starchak, M. (2017), 'Russia Terminates Development of New Rail-Mobile Ballistic Missile', *Eurasia Daily Monitor*, 13 December 2017, https://jamestown.org/program/russia-terminates-development-new-rail-mobile-ballistic-missile/.
[54] Gorenburg, D. (2018), 'Russian Air Force procurement plans', Russian Military Reform blog, 24 January 2018, https://russiamil.wordpress.com/2018/01/24/russian-air-force-procurement-plans-2/.
[55] Novosti VPK (2018), 'Armiia RF v 2018 gody poluchit desiat' samoletov Su-35 I shest' Su-27CM3' [The Russian army will receive ten Su-35 and six Su-27CM3 in 2018], 9 February 2018, https://vpk.name/news/206181_armiya_rf_v_2018_godu_poluchit_desyat_samoletov_su35_i_shest_su27sm3.html.

the VKS for the MiG-35, the MiG corporation needs to be supported financially. Due to production delays for the MiG-35, the MiG-29SMT (NATO: Fulcrum-E) will replace older versions of the MiG-29 in the meantime. Finally, the legacy MiG-31 (NATO: Foxhound) will be modernized by 2027 in order to extend its service life into the 2030s.[56]

The current 'market-sharing' logic of Russian combat aviation, in which procurement is largely confined to Sukhoi and MiG aircraft, should increasingly move in a new direction. The market's existing segmentation (with Sukhoi supplying costly, heavy fighters and MiG simpler, lighter ones) is likely to give way to a more saturated field mostly comprised of heavy fighters[57] (notably Su-35s). This will increase MRO costs and fleet exploitation costs – especially since Su-25 Grach support aircraft (NATO: Frogfoot) are not supposed to be replaced with outright light fighters but with a mix of Su-34s (NATO: Fullback) and Su-57s (tentative NATO designation: Frazor) in the future.[58]

The market's existing segmentation (with Sukhoi supplying costly, heavy fighters and MiG simpler, lighter ones) is likely to give way to a more saturated field mostly comprised of heavy fighters.

Under GPV 2027, there is little chance that significant quantities of the fifth-generation Su-57 multi-role fighter (former T-50/PAK FA) will be operational or in active service. Despite ongoing tests on its weapons systems, the Su-57's production has been further delayed by the absence of a properly upgraded engine: the first batch of aircraft will probably enter service using the legacy NPO Saturn engine already installed on the Su-35. Eleven prototypes of the Su-57 have been built so far, but the number of aircraft to be delivered to the armed forces remains unknown. The current combination of Su-30s and Su-35s will leave even less room for the acquisition of Su-57s in the 2030s.

Russian strike aviation will increasingly count on the new Su-34 frontline fighter-bomber as a replacement for the Su-24M (NATO: Fencer). More than 200 Su-34 aircraft fitted with precision-guided missiles (PGMs) should be in service by 2027,[59] in addition to modernized legacy Su-25s.

Combat helicopters

Under GPV 2027, the fleet of combat helicopters is likely to rely on procurement contracts dating back to GPV 2020. For instance, Mi-28N/NM (NATO: Havoc) and Kamov Ka-52 Katran/Alligator (NATO: Hokum-B) helicopters are to replace the legacy Ka-50 (NATO: Hokum-A). Serial production of the Ka-52K Katran naval variant should begin in 2020.[60] Combat proven in Syria, the Mi-28NM will enter into service in late 2018, despite having encountered testing problems in 2015.[61]

It is expected that the defence industry should slowly overcome its current difficulties replacing the VK-2500 engine, built by the Russian company Klimov and fitted on the Mi-28N and Ka-52.

[56] Gorenburg (2018), 'Russian Air Force procurement plans'.
[57] Makienko, K. (2017), 'L'aéronautique militaire russe face à de nouvelles incertitudes', *Revue Défense Nationale*, Summer 2017, No. 802.
[58] *Izvestiia* (2017), 'Dolgozhdannye "Supergrachi" stanoviatsia v stroi' [Long-awaited production of "Supergrachi" to begin], 14 September 2017, https://iz.ru/641881/aleksei-ramm-evgenii-dmitriev-evgenii-andreev/dolgozhdannye-super-grachi-stanoviatsia-v-stroi.
[59] bmpd (2018), 'Shest' novykh bombardirovshchikov Su-34 postroeny dlia perevooruzheniia 2-go bombardirovochnogo polka' [Six new Su-34 bombers have been built for rearmament for the second bomber regiment], bmpd blog, 1 January 2018, https://bmpd.livejournal.com/3030360.html.
[60] TsAMTO (2017), 'Seriinoe proizvodstvo korabel'nykh vertoletov Ka-52K ("Kartan") v interesakh VMF Rossii planiruetsia nachat' v 2020 gody' [Production of Ka-25K ("Kartan") helicopters for the Russian Naval Fleet set to being in 2020], 5 May 2017, http://www.armstrade.org/includes/periodics/news/2017/0505/115540875/detail.shtml.
[61] TASS (2017), 'Armiia Rossii nachnet poluchat' novyi vertolet Mi-28HM v kontse 2018 goda' [Russia's Army to start receiving the new Mi-28NM helicopter at the end of 2018], 4 December 2017, http://tass.ru/armiya-i-opk/4781775.

Nonetheless, boosting production to match annual demand for 300 engines will be difficult, and this will undoubtedly delay the entry into service of attack helicopters in the coming years.

Military transport aircraft

Military transport and refuelling aircraft are likely to be an absolute procurement priority under GPV 2027, since GPV 2020 did not provide for the supply of enough transport planes, especially for the VDV. The defence industry is also affected by the breakdown of Russia's relationship with the Ukrainian firm Antonov.

The armed forces will therefore have to procure locally made planes, as extending the service life of existing legacy systems is not feasible anymore. The jointly produced An-70, An-124 and An-140 (NATO: Condor) will be increasingly replaced by the Ilyushin Il-476, Il-76MD (NATO: Candid) and Il-106 Yermak. This will require a boost in production capabilities that are currently lacking. Serial production of the heavy Il-76MD started in early 2018,[62] with a total of about 40 aircraft scheduled for procurement by 2027.[63]

It is probable that transport aviation will remain a weakness under GPV 2027, hampering efforts to give priority to the mobility and deployability of the armed forces. The absence of modern transport aircraft will limit Russia's ability to sustain military operations beyond its periphery.

Navy

In contrast to GPV 2020, in which the navy was reportedly allocated a quarter of the procurement budget, Russia's navy is likely to receive a smaller share of funding under the new state armament programme. The Russian leadership appears to have made a strategic decision to base naval construction around developing a 'dual fleet': combining potent new 'green-water' capabilities – i.e. new weapons systems focused on the protection of coastal areas and on preventing enemy forces from accessing Russian territory – with long-range blue-water capabilities based around the Soviet-era legacy fleet of modernized Kirov-class and Slava-class cruisers, Sovremennyi-class and Udaloy-class destroyers, and nuclear-powered submarines (SSNs and SSGNs).[64]

Instead of seeking to develop new large vessels, the Russian authorities are giving priority to the procurement, modernization and service-life extension of smaller, adaptable ships such as frigates and Karakurt-class corvettes. These will be equipped with modern stand-off missile systems, such as the Kalibr-NK land-attack cruise missile (NATO: SS-N-Sizzler) and the P-800 Oniks anti-ship cruise missile (NATO: SS-N-26 Strobile). Naval aviation and coastal missile systems will also be modernized. All this will come at the expense of larger surface vessels (such as destroyers or amphibious assault ships), as virtually none will be procured.

[62] TASS (2018), 'Pervyi seriinyi Il-76MD-M budet peredan Minoborony do kontsa ianvaria' [First Il-76MD-M to be handed over to Defence Ministry by the end of January], 13 January 2018, http://tass.ru/armiya-i-opk/4871545.
[63] Ilyushin (2017), 'Alexey Rogozin Takes Part in Discussion on Future of Military and Transport Aviation at Aviastar-SP', 2 November 2017, http://www.ilyushin.org/en/press/news/ev6868/.
[64] Kabanenko I. (2017), 'Russian Blue Water Ambitions: Betting on Multi-Purpose Frigates', *Eurasia Daily Monitor*, 12 May 2017, https://jamestown.org/program/russian-blue-water-ambitions-betting-multi-purpose-frigates/; Defense Intelligence Agency (2017), *Russia Military Power: Building a Military to Support Great Power Aspirations*, Defense Intelligence Agency, 23 June 2017, https://publicintelligence.net/dia-russia-military-power-2017/.

Surface vessels

By 2027, Russia's surface fleet will consist of a disparate array of large legacy ships going through constant MRO and new, adaptable, smaller frigates and corvettes. For the larger surface vessels, MRO for the service-life extension of the two Kirov-class battle cruisers (Project 1144) and the Sovremennyi-class destroyers (Project 956) will have taken place. However, Sovremennyi- and Udaloy-class destroyers (Project 1155) are unlikely to be replaced with the much-vaunted Lider-class destroyer (Project 23560E). Given the limitations of the Russian shipbuilding industry, such large-scale projects are unlikely to take place over the next decade. Instead, it is more likely that production of an augmented Gorshkov-class frigate – a 'Super Gorshkov' – will begin as shipbuilders adapt existing designs. Larger vessels will be equipped with Poliment-Redut surface-to-air missiles, still in testing and experiencing integration issues.[65]

The *Admiral Kuznetsov* aircraft carrier will have undergone a quick-fix round of MRO and should be back into active service in 2021. Its modernization, which started in May 2018, focuses on non-critical systems such as the flight deck, arresting gear, radar components and weaponry (notably a Pantsir-SM upgrade). By 2027, Russia is highly unlikely to have built the new heavy aircraft carriers that were announced in September 2017.[66]

For smaller surface vessels, the fleet will comprise a mix of modernized legacy ships (such as Krivak-class frigates) and new ships equipped with modern weapons systems. These will include Gremyashchiy-class corvettes (Project 20385), equipped with new 1DDA-12000 diesel turbines from the Kolomna plant that Russia has developed as part of a high-profile import-substitution programme, and armed with long-range Kalibr-NK missile systems. The Gremyashchiy-class corvettes should enter into service in 2018,[67] while six Admiral Grigorovich-class frigates (Project 11356R) are likely to have entered active service by the early 2020s. However, only three such frigates have been commissioned so far following the breakdown of Russian defence-industrial cooperation with Ukraine.

Finally, at least six multi-purpose Admiral Gorshkov-class frigates (Project 22350) should be deployed by 2027, after a decade of construction, long delays, and many problems reported during the testing phase of the Poliment-Redut anti-aircraft missile systems.[68] Gorshkov-class frigates will also be equipped with Oniks and Kalibr complexes, therefore extending their range and interdiction capabilities. M90FR diesel-electric turbines produced by Saturn will replace the originally planned Ukrainian turbines from Zorya-Mashproyekt – however, production of the Saturn turbine started only in April 2017.[69] The first Gorshkov-class frigate was commissioned in late 2017.[70]

[65] Navy Recognition (2017), 'Poliment-Redut Issues Delay Delivery of 1st Project 22350 Gorshkov-class Frigate to Russian Navy', 1 December 2017, https://www.navyrecognition.com/index.php/news/defence-news/2017/december-2017-navy-naval-forces-defense-industry-technology-maritime-security-global-news/5766-poliment-redut-issues-delay-delivery-of-1st-project-22350-gorshkov-class-frigate-to-russian-navy.html.
[66] Novosti VPK (2017), 'Rossiya k 2020 godu smozhet proizvodit' avianoctsy vodoizmrshcheniem 110-115 tys. T' [By 2020, Russia will be able to produce 110–115-thousand-tonne naval air carriers], 6 September 2017, https://vpk.name/news/191460_rossiya_k_2020_godu_smozhet_proizvodit_avianoscyi_vodoizmesheniem_110115_tyis_t.html.
[67] *Izvestiia* (2018), 'Korvet "Gremiashchii" peredadut VMF v 2018 gody' [Russian Navy to receive "Gremiashchii" corvette in 2018], 5 February 2018, https://iz.ru/704377/2018-02-05/korvet-gremiashchii-peredadut-vmf-v-2018-godu.
[68] Gady, F. (2016), 'Russia to Receive 12 New Warships in 2016', *The Diplomat*, 4 August 2016, http://thediplomat.com/2016/08/russia-to-receive-12-new-warships-in-2016/.
[69] RIA Novosti (2017), 'Fregat "Admiral Flota Kasatonov" mozhet vyti na khodovye icpytaniia letom' [The "Admiral Kastonov" frigate may begin exercises in the summer], 8 November 2017, https://ria.ru/arms/20171108/1508421766.html.
[70] Brimelow, B. (2018), 'Russia launched a powerful new frigate', *Business Insider*, 18 January 2018, http://www.businessinsider.fr/us/russia-powerful-new-frigate-problems-uncertainty-2018-1.

Submarine fleet

By 2027, Russia's navy will still concentrate on strategic deterrence and status projection.[71] It will therefore prioritize the modernization of its submarine fleet in order to increase anti-access/area-denial (A2/AD) capabilities.

Despite numerous production and testing delays, it is also likely that several of the expensive Yasen-M (Project 855-M, NATO: Severodvinsk) nuclear attack submarines (SSNs) will be delivered to the armed forces over the next few years.[72] The lead Yasen-M submarine – the *Kazan* – is expected to be delivered to the navy in 2018, while a further five have been laid down and are in various stages of production.

In addition to the procurement of new Yasen-M submarines, Russian shipyards will continue to modernize older Soviet-era Antey-class (Project 949A, NATO: Oscar 2-class) and Shchuka-B-class (Project 971, NATO: Akula-class) SSNs. This modernization programme should equip the submarines with Kalibr and P-800 Oniks missile systems. Production of a new fifth-generation class of nuclear attack submarine, reportedly designated the Husky class, is unlikely to begin until the next GPV.[73]

> The submarine fleet of the navy will focus on modernizing nuclear-powered guided-missile and attack submarines, as well as on producing modernized versions of legacy diesel-electric submarines that will carry advanced weaponry.

The submarine fleet of the navy will focus on modernizing nuclear-powered guided-missile submarines (SSGNs) and SSNs, as well as on producing modernized versions of legacy diesel-electric submarines that will carry advanced weaponry. About 10 modified Shchuka-B-class (Project 971M, NATO: Akula III) SSNs will have gone through MRO by 2020, while the fleet of diesel-electric submarines will be strengthened by the production of more Varshavyanka-class (improved Kilo-class from Project 636.3) vessels equipped with Kalibr missiles. The first six Varshavyankas have been deployed to the Black Sea Fleet since late 2016, and an additional six should be added to the Pacific Fleet, starting in 2019 at the earliest.[74] The navy is also expected to receive at least two Lada-class diesel-electric submarines (Project 677, NATO: St Petersburg-class), although these are unlikely to be equipped with air-independent propulsion systems. The Lada-class submarines are expected to enter service in the Northern Fleet.[75]

The design and construction of the fifth-generation Kalina-class diesel-electric submarine is included in GPV 2027. Although it is unlikely that it will be produced by 2027, the Kalina class should replace Varshavyanka- and Lada-class vessels throughout the 2030s and beyond.[76]

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[71] Gressel (2017), *Strategy and Challenges in Defence industries in Russia and China*.
[72] Majumdar, D. (2016), 'Russia's New Attack Submarines: Menace or Simply a Mirage?', *The National Interest*, 5 August 2016, http://nationalinterest.org/blog/the-buzz/russias-new-attack-submarines-menace-or-simply-mirage-17256.
[73] Majumdar, D. (2017), 'Russia's New Husky-Class Submarine: Everything We Know (And Want to Know)', *The National Interest*, 26 December 2017, http://nationalinterest.org/blog/the-buzz/russias-new-husky-class-submarine-everything-we-know-want-23804.
[74] RIA Novosti (2017), 'Pervye dve podlodki proekta 636.3 voidut v sostav TOF v 2019 gody' [First two submarines of the 636.3 project will join Russia's Pacific Fleet in 2019], 21 April 2017, https://ria.ru/defense_safety/20170421/1492817503.html?inj=1.
[75] *Izvestiia* (2018), 'Maloshumnye submariny usiliat Severnyi flot' [Low-noise submarines to strengthen the Northern fleet], 29 March 2018, https://iz.ru/export/google/amp/723444.
[76] Pravda.ru (2017), 'Russia ready to start building fifth-generation submarines', 3 July 2017, http://www.pravdareport.com/news/russia/economics/03-07-2017/138081-russia_fifth_generation_submarines-0/.

Ground forces

The ground forces obtained 14 per cent of the allocation under GPV 2020. They are potentially looking to obtain a larger share of funding under the new GPV, with the army and VDV likely to receive almost a quarter of the allocation (R4.25 trillion of R19 trillion). This partly reflects recognition of gaps in capability exposed by recent combat experience in Syria and Donbas in eastern Ukraine, and of the need to improve the mobility of the ground forces. Under GPV 2027, the ground forces are expected to obtain a fully operational tactical automated C2 system with modern ISR and electronic warfare (EW) components for artillery. This is in line with GPV priorities concerning force mobility, force deployability and strengthened C2. Tank units have also recently been formed within VDV troops and naval infantry units, with T-72B3s and T-80BVs to be procured.[77]

Under GPV 2027, Russia's approach to land warfare will not change substantially. It will still depend heavily on artillery-enabled massed indirect fire across numerous platforms.[78] And it will continue to emphasize the Soviet-era logic of quantity over quality,[79] contrary to the Russian military's wider ongoing drive towards increased quality and emphasis on precision-fire solutions.

Main battle tanks

Under GPV 2027, procurement of main battle tanks (MBTs) is expected to revolve around the modernization of existing platforms rather than on the acquisition of next-generation ones. The order of battle should mostly rely on a combination of T-72B3M obr 2016 (for mid-range capabilities) tanks, T-90Ms (for heavy fire and strong survivability), and T-80BVMs (for massing fire and expendability).[80] In August 2017, the Ministry of Defence and UralVagonZavod (UVZ), a Rostec subsidiary, signed a contract for the procurement of modernized T-90s, T-72s and T-80s. These tanks will constitute the backbone of the Russian MBT force at least until the late 2020s.

MRO of the T-90M was enacted in order to cope with production delays with the T-14 Armata MBT. Smaller and cheaper than the T-14 Armata, and also benefiting from an existing production line, the T-90M is thus a more convenient and cost-effective option.[81] The initial procurement contract was for 400 tanks: the MRO will add new weapons systems, modern protection systems (Relikt and Malakhit explosive reactive armour) and a new engine.

The order for 150 upgraded T-72B3M obr 2016 tanks was made in March 2016, and delivered in late 2017.[82] By 2027, a total of about 600 T-72B3 tanks should have undergone MRO to B3M obr 2016 standards. These improved models are fitted with a new engine, the Relikt explosive reactive armour and new weaponry, bringing the characteristics of the B3M obr 2016 series closer to those of the T-90M. Further improvements to the T-72, potentially leading to the development of a B4 version of the tank, could possibly be anticipated under GPV 2027.

[77] Elfving, J. (2018), 'The Tanks Are Coming: Russia Introduces Tank Units to Airborne Forces and Naval Infantry', *Eurasia Daily Monitor*, 4 April 2018, https://jamestown.org/program/the-tanks-are-coming-russia-introduces-tank-units-to-airborne-forces-and-naval-infantry/.
[78] Boston, S. and Massicot, D. (2017), *The Russian Way of Warfare, A Primer*, RAND Corporation, https://www.rand.org/pubs/perspectives/PE231.html.
[79] Discussions during the Russian Modernisation Workshop, International Institute for Strategic Studies (IISS), London, 11–12 December 2017.
[80] Hawkes, J. (2017), 'Rolling on regardless: Russian AFV developments', *Jane's Defence Weekly*, vol. 54, issue 39, 27 September 2017.
[81] Zvezda (2017), 'T-90 mozhet poluchit' pushky ot "Armaty": osnovnomy rossiiskomy tanku dobaviat udarnoi sily' [T-90 may receive guns from "Armaty": this will add impact power to the basic Russian tank], 19 January 2017, https://tvzvezda.ru/news/opk/content/201701190755-4f9m.htm?utm_source=m.tvzvezda&utm_medium=rubrikpagelinks&utm_campaign=glavnaya&utm_term=v1.
[82] TASS (2017), 'First armored army in west Russia receives modernized T-72B3 tanks', 15 May 2017, http://tass.com/defense/945978.

In November 2016, the Ministry of Defence announced its intention to modernize legacy T-80 MBTs and return them to active service.[83] These tanks should otherwise have been decommissioned and dismantled. Modernization of the T-80 into its T-80BVM version helps to support production at UVZ, but it also addresses Russia's pressing need to procure more tanks.[84] Some of the modernized T-80s will be upgraded to operate in Arctic conditions.

The provision for increased spending on interim solutions comes at the expense of resourcing for the next-generation T-14 Armata MBT. A small quantity of T-14s is expected to enter active service during the GPV 2027 period, leaving planners in the armed forces in a potential quandary over the merits of serial production in the future. About 20 T-14 prototypes are undergoing testing with the ground forces, with serial production currently officially planned for 2019–20.[85] However, the T-14 is considered too expensive to produce, partly because of its dedicated assembly line at UVZ and recurring issues around design flaws, and is increasingly shunned by the army. The initial volume of orders is likely to be small,[86] but at least enough to equip one brigade.

Armoured fighting vehicles

When it comes to procurement of armoured fighting vehicles (AFVs), Russia's ground forces will probably still rely on a mix of older proven designs and new systems. Procurement of modern AFVs is expected to be a priority, despite issues with the cost of the platforms and the difficulty of increasing the capacity of production lines.

In October 2017, Deputy Defence Minister Yuri Borisov announced that 540 legacy BMP-2 and BMD-2 infantry fighting vehicles (IFVs) would go into MRO for systems and weapons upgrades under GPV 2027;[87] this was another telling sign that modern systems might turn out to be more expensive to produce, and that planners might therefore prefer to modernize legacy platforms.

The ground forces will probably receive a few Kurganets-25 IFVs throughout the 2020s. However, the systems will not be procured before 2020 at the earliest, given delayed state trials in 2017 and development issues.[88] Several variants of the Kurganets might emerge by 2027.

BMP-3 Dragoon IFVs will be procured under a 2017 contract, with production at the KurganMashZavod (KMZ) factory expected by 2019. The Dragoon will be close to the Kurganets-25 and K-17 Boomerang IFVs in terms of capabilities[89] and standardized hardware. Under GPV 2027, however, the T-15 Armata-family IFV will probably not get anywhere near serial production.

[83] Cazalet, M. and Cranny-Evans, S. (2017), 'Russian plans to upgrade T-80 and T-90 jeopardise Armata programme', *Jane's 360*, 21 September 2017, http://www.janes.com/article/74263/russian-plans-to-upgrade-t-80-and-t-90-jeopardise-armata-programme.
[84] *Vedomosti* (2018), 'UralVagonZavod raskril detail kontrakta s Minabaronii na 24 mlrd rublei' [UralVagonZavod disclosed details of the contract with the Ministry of Defence for 24 billion rubles], 19 February 2018, https://www.vedomosti.ru/politics/articles/2018/02/19/751479-uralvagonzavod-raskril-detali-kontrakta-minoboroni-na-mlrd-roublei.
[85] TASS (2018), 'Serial production of Armata tanks to begin in 2020 – source', 24 January 2018, http://tass.com/defense/986598.
[86] TASS (2016), 'Pervye 100 tankov "Armata" planiruetsia postavit' v voiska v 2017-2018 godakh' [First 100 "Armata" tanks to be put into action in 2017–2018], 25 April 2016, http://tass.ru/armiya-i-opk/3238018; and TASS (2017), 'Russian Defense Ministry to get 100 Armata tanks', 24 August 2017, http://tass.com/defense/961838.
[87] Novichkov, N. (2017), 'Russia upgrades BMP-2 and BMD-2 IFVs', *Jane's 360*, 4 October 2017, http://www.janes.com/article/74619/russia-upgrades-bmp-2-and-bmd-2-ifvs.
[88] Roblin, S. (2016), 'Russia Hopes Its New Super Combat Vehicle Will Rule the Battlefield', *The National Interest*, 30 July 2016, http://nationalinterest.org/feature/russia-hopes-its-new-super-combat-vehicle-will-rule-the-17192.
[89] *Izvestiia* (2017), '"Super-BMP" sdala ekzameny' ["Super-BMP" passed its exams], 11 October 2017, https://iz.ru/632639/dmitrii-litovkin-aleksei-ramm/super-bmp-sdala-ekzameny.

The ground forces will likely acquire K-16 Boomerang medium-heavy armoured personnel carriers (APCs), as well as some costly BMPT Terminator 2 fire-support vehicles – the BMPT obtained invaluable combat experience in Syria.

A key priority is the procurement of new AFVs for the VDV – which would fill a gap that GPV 2020 failed to address. Under GPV 2027, the VDV should deploy some 1,500 BMD-4M Sadovnits IFVs and 2,500 BTR-MDM Rakushka APCs.[90] Both AFVs are based on the same BMD-3 chassis and will replace the legacy BMD-2, BMD-3 and BTR-D models. They were tested for the first time in simulated combat situations during the Zapad 2017 military exercise in September 2017.

Artillery

Under GPV 2027, the ground forces will probably acquire modernized, battle-hardened systems but only little genuinely modern hardware. A large-scale reform of artillery units is currently taking place, with the new arrangements expected to become operational during the GPV 2027 period. The main element of this reorganization consists of the procurement of Uragan-M1 and Tornado-S multiple-launch rocket systems (MLRS), and unmanned aerial vehicles (UAVs) for artillery regiments and brigades.[91] The reform aims to expand the range of combat missions which artillery capabilities can handle, and to boost firepower among combined-arms divisions and brigades. The ground forces will also seek to rely increasingly on PGMs for higher precision and targeting, as well as on large-calibre artillery systems such as SS7M Malka and 2S4 Tulpan mortars for large-target destruction.[92]

GPV 2027 will undoubtedly emphasize improving artillery fire solutions, digitalized fire direction, and target-acquisition capabilities. The goal is to achieve a joint automated control system for reconnaissance and strike.[93] This is why the Ministry of Defence considers the procurement of ISTAR ('intelligence, surveillance, target acquisition and reconnaissance') UAVs for artillery brigades a priority.

The priority given to developing a modern reconnaissance/strike system for the artillery is currently reflected in the production of 2S35 Koalitsiya-SV self-propelled howitzers equipped with the new 2A88 152-mm cannons. This system has been undergoing testing with a new chassis since 2014, but the initial batch of 12 guns will not complete acceptance trials before 2020 at the earliest.[94] The 2S35 tracked artillery gun and its wheeled version, the 2S35-1 Koalitsiya-SV-KSh (based on a Kamaz chassis), are produced by UralTransMash (a UVZ subsidiary). The guns will include automatic-fire solutions, fire-control systems and better target-acquisition solutions.[95]

The Koalitsiya is supposed to replace the ageing 2S19 Msta-S (NATO: M1990 Farm) system and various legacy 152-mm artillery guns. Meanwhile, modernized Msta-S 2S19M2 systems equipped with 2A65 guns will keep entering service in the ground forces,[96] before being replaced (in principle) by Koalitsiya systems throughout the 2020s.

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[90] Novosti VPK (2017), 'Polk VDV na Stavropol'e k 2020 gody poluchit BMD-4M i BTR-MDM' [VDV Regiment at Stavropol will receive BMD-4M and BTR-MDM by 2020], 2 October 2017, https://vpk.name/news/193777_polk_vdv_na_stavropole_k_2020_godu_poluchit_bmd4m_i_btrmdm.html.
[91] *Izvestiia* (2017), 'Artilleriia narashchivaet moshch" [Artillery breeds power], 14 December 2016, https://iz.ru/675176/evgenii-andreev-bogdan-stepovoi-aleksei-ramm/artilleriia-narashchivaet-moshch.
[92] Kirillov, V. (2018), *Russian Artillery: Clear Progress Since 2010*, Moscow Defense Brief, Moscow: CAST, No. 1.
[93] Ibid.
[94] Army Recognition (2018), 'Russia: 2S35 Koalitsia-SV self-propelled gun to complete trials in 2020', 13 February 2018, http://www.armyrecognition.com/february_2018_global_defense_security_army_news_industry/russia_koalitsia-sv_self-propelled_gun_to_complete_trials_in_2020.html.
[95] Majumdar, D. (2017), 'The Russian Army Will Soon Have Some New Big 'Guns", *The National Interest*, 15 June 2017, http://nationalinterest.org/blog/the-buzz/the-russian-army-will-soon-have-some-new-big-guns-21178.
[96] Mil.ru (2017), '1st tank army adopted a new self-propelled howitzer Msta-S', 14 June 2017, http://eng.mil.ru/en/news_page/country/more.htm?id=12128509%40egNews; and Shephard News (2018), 'Russia receives modernized howitzers', 25 January 2018, https://www.shephardmedia.com/news/landwarfareintl/russia-receives-modernised-howitzers/.

Anti-access/area-denial capabilities

Air defence systems are the cornerstone of Russia's approach to modern warfare, honing deterrence and anti-access/area-denial (A2/AD) capabilities for the armed forces. The armed forces will probably keep relying on a network of modernized and advanced air defence systems, in line with previous planning under GPV 2020 that will be carried forth under GPV 2027.

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This network looks set to be composed of a combination of S-300 (NATO: SA-10 Grumble) and S-400 (NATO: SA-21 Growler) systems at long range; Iskander-M surface-to-surface ballistic and cruise missile systems (NATO: SS-26 Stone) at medium range; and Pantsir-SM (NATO: SA-22 Greyhound) and Buk-M3 (NATO: SA-17 Grizzly) systems at short range. Existing platforms are increasingly adapted to Arctic conditions, notably the S-300V4 (NATO: SA-23 Gladiator/Giant) and Tor-M2 (NATO: SA-15 Gauntlet) anti-aircraft surface-to-air missiles (SAMs).

The NPO Almaz SAM systems of the S series will represent the core of Russia's long- and medium-range air defence capabilities. Under GPV 2027, it can be expected that S-400 battalions will be deployed throughout Russian territory, with a minimum of two regiments deployed every year and 56 divisions procured up to 2020.[97] Likewise, medium-range S-300V systems will be replaced by S-300V4s, and the S-350E Vityaz should also become operational. There is little likelihood, however, that the S-500 Prometheus anti-aircraft missile system will go into production during the GPV 2027 period, although a prototype is scheduled for 2020.[98]

The deployment of Iskander missiles is expected to continue, alongside the Iskander-M modernization by 2020.[99] Iskander systems will increasingly replace legacy Tochka-U systems (NATO: SS-21 Scarab). Short-range Pantsir-SM missiles are likely to be deployed massively under GPV 2027, starting in 2019,[100] with better detection range and target-acquisition capabilities. The armed forces can also be expected to rely on Buk-M3 systems, whose capabilities are deemed superior to those of the S-300 in terms of target acquisition and which are more hardened against EW.[101] This process will be accompanied by modernization of the Buk-M2 system, with the potential first designs for the Buk-M4 also appearing.

As for coastal defence systems, the navy is expected to rely on a combination of K-300P Bastion (NATO: SSC-5 Stooge) anti-ship missile systems and shorter-range BAL systems (NATO: SSC-6 Sennight).

[97] Bryen, S. (2018), 'Russia's S-400 Is Way More Dangerous Than You Think', *The National Interest*, 18 January 2018, http://nationalinterest.org/blog/the-buzz/russias-s-400-way-more-dangerous-you-think-24116.
[98] Sputnik News (2017), 'Russia's Next Gen S-500 Prototype Launch Date Announced', 19 February 2017, https://sputniknews.com/russia/201702191050842903-russia-missile-prototype/.
[99] Defense World.net (2017), 'Russia to Modernize Iskander-M Missile System By 2020', 11 April 2017, http://www.defenseworld.net/news/18987/Russia_To_Modernize_Iskander_M_Missile_System_By_2020#.WuMvB9PwZyp.
[100] Army Recognition (2017), 'New Russian Pantsir-SM air defense missile-gun system ready for 2019', 14 November 2017, http://www.armyrecognition.com/weapons_defence_industry_military_technology_uk/new_russian_pantsir-sm_air_defense_missile-gun_system_ready_for_2019.html.
[101] bmpd (2016), 'Sukhoputnye voiska Rossii poluchili pervyi divizion zenitnogo raketnogo kompleksa "Buk-M3"' [Russian ground forces received the first division of the anti-aircraft missile "Buk-M3"], bmpd blog, 24 October 2016, http://bmpd.livejournal.com/2202900.html.

5. Constraining Factors for the Defence Industry Under GPV 2027

Following the relatively successful implementation of GPV 2020, the new state armament programme should allow Russia's defence industry to streamline priority technological developments for the armed forces. Yet implementation of GPV 2027 will be complicated by external and internal factors,[102] which will present abundant challenges and issues for the industry in terms of production capabilities, adaptation and technological development throughout the 2020s. In this chapter, we present the key external and internal trends likely to affect implementation of GPV 2027.

External factors

Lessons from recent deployments

The conflicts in Syria and Ukraine represent two highly different battle experiences for Russian forces in terms of tactics applied, and are informing Moscow's thinking about capabilities and needs in complementary ways. Whereas Syria is a high-intensity war involving modern equipment and large troop displacements, the more covert operations in Ukraine have reflected a low-intensity conflict with limited weaponry. The lessons that Russia's defence industry and armed forces have learned from the military campaigns in Syria and Ukraine since 2014–15 are driving plans for technological and tactical adaptations expected to feature prominently in GPV 2027, and thus to some extent to shape procurement policy in terms of acquisitions and development priorities.

Operational experience from Syria and Ukraine is constantly feeding into military exercises on Russian territory. This was evidenced by the Zapad 2017 drills, in which assessments drawn from Syria and Ukraine were incorporated directly into the exercise. Further lessons from these theatres will undoubtedly be incorporated into training during upcoming military drills in the months to come. Both campaigns have already led to tactical adjustments within the armed forces, especially for training and improving artillery forces.[103]

The campaign in Syria, which started in late September 2015, is considered by some experts as a form of 'Russian Revolution in Military Affairs (RMA)'[104] for troops deployed there – just as the war in Afghanistan was for the Soviet army. Military planners shifted their main focus to the operational aspects of war rather than just strategic planning, and have concentrated on modern tactical systems such as military robotics and PGMs.

In Russian military planners' eyes, the bombardment campaign in Syria underlined the need for increased air–land integration and coordination – an issue that procurement decisions under GPV 2027 will potentially reflect. The integration of naval platforms, both submarines and surface vessels, in combat operations in Syria is also noteworthy for the use of precision-guided systems. The armed

[102] Frolov (2017), *State Armament Program 2025*.
[103] This regularly shows up in the military literature such as *Voyenno-promyshlennyy kur'yer* (VPK) or *Krasnaya Zvezda*.
[104] Discussions during the Russian Modernisation Workshop, International Institute for Strategic Studies (IISS), London, 11–12 December 2017.

forces have acknowledged the need for better force mobility and urban warfare capabilities, especially for SSO troops and elite ground forces.[105] The Syrian campaign also revealed the limits of naval aviation and current PGMs.[106]

Meanwhile, the war in Ukraine tested the effectiveness of former defence minister Anatoliy Serdyukov's 'New Look' military reforms. In Ukraine, Russian troops deployed ISTAR UAVs for the first time in combat and tested new EW systems. The armed forces honed their anti-UAV defence skills with a combination of EW and short-range missile systems. Finally, the armed forces increased artillery capabilities in respect of automated-fire solutions and target acquisition assisted by ISTAR UAVs. The massing of Russian troops on the Ukrainian border also highlighted the need for increased force mobility, permanent-readiness brigades, and pre-positioned forces and equipment.[107] In eastern Ukraine, Russian forces focused on limiting the scope of land and air combat operations in order to conceal the nominally covert nature of the military intervention.

Both campaigns offered the armed forces the opportunity to test and showcase new systems in combat situations. For instance, Kalibr-NK sea-launched missiles were fired for the first time in active combat from Buyan-M-class corvettes in the Caspian Sea and Mediterranean Sea, as well as from a Varshavyanka-class submarine in the Mediterranean. 9K121 Vikhr missiles (NATO: AT-16 Scallion) mounted on Ka-52 attack helicopters were also used for the first time in combat. The Uran-6 demining unmanned ground vehicle (UGV) carried out its first mission in Syria during demining operations.

> Both campaigns – Syria and Ukraine – offered the armed forces the opportunity to test and showcase new systems in combat situations.

Rosoboronexport, Russia's main arms export agency, actively promotes this 'combat-proven' label in order to boost its exports and weapons sales, especially in tactical aviation (MiG-29s, Su-30SMs and Su-34s) and UAVs.[108]

In Syria and Ukraine, for the first time, teams of experts and technicians from military-industrial companies were deployed on the ground alongside the armed forces to test new equipment in combat situations, as well as to carry out repairs directly on the battlefield.[109] This new approach was incorporated in training activities during the Zapad 2017 exercise.

Operational experience is fed directly back to military-industrial companies, thus leading to better upgrades and MRO of military hardware. This has been particularly notable in the case of modifications to the Mi-28N helicopter to equip it for night-time operations; upcoming modifications to the Tu-22 (NATO: Backfire) and Tu-160M2 strategic bombers are also reportedly informed by active service duty in Syria.

GPV 2027 will undoubtedly seek to draw on operational experience in Ukraine and Syria. This will probably mean that the state defence order is adapted to focus on PGMs, UAVs, EW and military

[105] Nikolsky, A. (2017), *Russian Special Operations Forces in Syria*, Moscow Defense Brief, Moscow: CAST, No. 2.
[106] *Izvestiia* (2017), 'Voina, kotoruyu Rossiia vyigrala' [The war that Russia won], 13 October 2017, https://iz.ru/652856/ruslan-pukhov/voina-kotoruiu-rossiia-vyigrala.
[107] Lavrov, A. (2015), *New Russian military infrastructure on the border with Ukraine*, Moscow Defense Brief, Moscow: CAST, No. 5.
[108] CAST (2016), *Russia's military operations in Syria*, Moscow Defense Brief, Moscow: CAST, No. 1; and Kofman, M. (2015), 'Why the U.S. Should Be Paying Attention to Russia's Latest Strikes in Syria', *War on the Rocks*, 19 November 2015, https://warontherocks.com/2015/11/why-the-u-s-should-be-paying-attention-to-russias-latest-strikes-in-syria/.
[109] Safronov (2018), 'Luchshe odin dorogostoiashchii pritsel'nyi udar'.

robotics[110] – potentially shaping the future of Russian warfare capabilities into the 2020s and beyond. Already, operational combat experience has informed the streamlining of strike-drone programmes currently under way in Russia, and has played a role in the modernization and expansion of the existing fleet of ISTAR drones (such feedback has highlighted, in particular, the need for real-time data links).

A similar feedback process applies to EW capabilities. EW systems tested on the battlefield were incorporated in the Zapad 2017 training drills. These systems will be further assimilated into operational practice by the armed forces in the future, especially for counter-IED (improvised explosive device) operations and protection against MANPADS (man-portable air defence systems). This will accelerate the creation of an automated C2 system within the newly created EW brigades.[111]

The impact of economic sanctions and import substitution

GPV 2027 is expected to prioritize mitigation of the impact on defence-industrial firms of international sanctions and the breakdown of Russian military cooperation with Ukraine since 2014. The industry experienced a wake-up call in 2014 after several Military-Industrial Commission (VPK) meetings assessed that both developments had had a negative impact on military capabilities.

The imposition of targeted international sanctions and the end of military cooperation with Ukraine initially led to delays in state defence order fulfilment. As mentioned, for instance, delivery of gas turbines from a Ukrainian supplier, Zorya-Mashproyekt, aimed at equipping Admiral Grigorovich-class and Admiral Gorshkov-class frigates, was affected. Before the 2014 crisis, Russian dependence on Ukrainian-made military equipment had reached critically high levels, especially for ICBM components, helicopters (made by the Progress design bureau), aircraft engines (Motor Sich), gas turbines for ships (Zorya-Mashproyekt), and transport aircraft (Antonov).

Although international sanctions were initially met with some optimism in Russia, on the grounds that they might stimulate domestic production and boost the country's independence from foreign suppliers, by 2016 they were reported as posing a 'serious challenge' for the military industry.[112] Indeed as early as 2014, the industry had created two import-substitution programmes that aimed to replace imported components (from NATO members and Ukraine) with locally produced ones.[113]

The official targets require 85 per cent of substituted military components and equipment to be produced domestically by 2025.[114] Both import-substitution programmes, however, are running into delays; their full implementation was postponed until 2021.[115] Implementation is also constrained by the absence of a comprehensive and integrated nomenclature for substituted components.

The defence industry is experiencing critical shortages of hardware and components, despite the import-substitution programmes. These problems will have to be addressed throughout the course of GPV 2027.

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[110] Bendett, S. (2018), 'Russia Is Poised to Surprise the US in Battlefield Robotics', *Defense One*, 25 January 2018, https://www.defenseone.com/ideas/2018/01/russia-poised-surprise-us-battlefield-robotics/145439/?oref=d-river.
[111] Sukhankin, S. (2017), 'Russia Introduces EW Spetsnaz to Western Military District', *Eurasia Daily Monitor*, 7 November 2017, https://jamestown.org/program/russia-introduces-ew-spetsnaz-western-military-district/.
[112] Regiony Online (2016), 'Importozameshchenie – "blesk I nishcheta" rossiiskogo oboronno-promyshlennogo kompleksa' [Import sanctions – the "rise and fall" of the Russian military-industrial complex], 18 January 2016, http://www.gosrf.ru/news/21738/.
[113] The import-substitution programme for Ukrainian components and subcomponents was created in July 2014 to replace about 3,000 parts produced by some 160 Ukrainian defence companies. The second import-substitution programme, for components from NATO and EU countries and aimed at countering Western sanctions, was adopted in May 2014 and enacted in January 2015. See *Moscow Times* (2015), 'Russia to Pay in Advance for Military Import Substitution Drive', 8 July 2015, https://themoscowtimes.com/articles/russia-to-pay-in-advance-for-military-import-substitution-drive-47995.
[114] TASS (2017), 'Putin postavil zadachu sokhranit' tempy perevooruzheniia armii i flota RF' [Putin is aiming to maintain the rearmament rate for the Russian Navy], 12 April 2017, http://tass.ru/armiya-i-opk/4176307.
[115] RBC (2015), 'Rogozin nazval datu polnogo importozameshcheniia v oboronke' [Rogozin gave a date for the full phasing out of imports in the military industrial sector], 4 December 2015, https://www.rbc.ru/politics/04/12/2015/5660b5679a79473f88734f85.

One of the main issues will be boosting the supply of machine-tools and microelectronic components. Shortages in these areas have been described by Deputy Prime Minister Rogozin as the two 'Achilles' heels' of the military industry.[116] The lack of machine-building tools is particularly problematic, since Russia has no capacity to produce them domestically[117] and cannot buy them off the shelf from India or China as such equipment does not meet Russian technical standards. Microelectronic components are also critical for all aspects of defence-industrial activity, especially shipbuilding.

Overall, Russia's domestic defence production today is simply unable to cope with demand or to meet the technological challenges presented by the local manufacture of materiel that was previously imported. The industry has struggled to procure the necessary technology to enhance domestic manufacturing capabilities, and has also had difficulty adapting production lines for the manufacture of products under the import-substitution programmes.

The industry is doing its best to cope with the task at hand: a special division of the VPK was recently created[118] to assess the impact of sanctions. Many issues remain, the first relating to cost control for substituted production. With the import-substitution programmes, self-sufficiency now comes at the expense of cost-effectiveness.[119] The authorities have therefore had to accept, whether they like it not, that sanctions will inevitably increase development and production costs for substituted equipment. This will continue to weigh heavily on the implementation of GPV 2027, especially as import-substitution issues will persist throughout the 2020s.

Internal factors

The struggle for modernization

Russia's armed forces are on a long-term modernization trend. GPV 2020 provides for the modernization of 70 per cent of all military systems currently in service in the armed forces. That means that by 2020, the share of equipment classified as 'modern' should reach at least 70 per cent of the total across all branches of the military. In mid-2017, it was estimated that 60 per cent of overall systems had been upgraded. As mentioned, the modernization rate achieved by each branch of the military has varied, with 79 per cent for the Strategic Rocket Forces, 45 per cent for the ground forces, 73 per cent for the VKS and 53 per cent for the navy.[120]

Most Russian systems in service in the armed forces are based on legacy Soviet designs dating back to the 1980s and 1990s. For instance, Iskander missiles, Ka-52 attack helicopters and Su-35 fighters were all designed in the 1990s and are built on relatively old platforms. Much the same is true of the most advanced systems, however, such as the Armata family of tanks and the Borei-class SSBNs.

In this context, it is important to examine what the term 'modernization' truly entails. The authorities, concealing meaningful data under the seal of classification, understand military modernization as

[116] Ibid.
[117] Bukkvoll, T., Malmlöf, T. and Makienko, K. (2016), 'The defence industry as locomotive for technological renewal in Russia: Are the conditions in place?', *Post-Communist Economies*, 29:2, pp. 232–49, doi: 10.1080/14631377.2016.1267967; and Krasnova, V. (2014), 'Kak sdelat rossiiskii stanok' [How to make a Russian tool], *Expert Online*, 12 May 2014, http://expert.ru/expert/2014/20/kak-sdelat-rossijskij-stanok/.
[118] Twitter account of Dmitry Rogozin, https://twitter.com/Rogozin/status/950310028082368512.
[119] Malmlöf, T. (2016), 'A Case Study of Russo-Ukrainian Defense Industrial Cooperation: Russian Dilemmas', *Journal of Slavic Military Studies*, 29:1, pp. 1–22, doi: 10.1080/13518046.2015.1094941.
[120] TsAMTO (2017), 'Vladimir Putin provel soveshchanie s rukovodstvom Minoborony i oboronno-promyshlennogo kompleksa' [Vladimir Putin held a session with the leadership of the Defence Ministry and the military-industrial complex], 16 May 2017, http://www.armstrade.org/includes/periodics/news/2017/0516/170041009/detail.shtml.

a combination of procuring new systems and upgrading existing platforms (i.e. textbook MRO). In that sense, in the words of one commentator, 'new doesn't always mean modern'.[121]

Modernization also encompasses efforts to maximize the active service life of most legacy systems across all army branches. This approach allows the armed forces to obtain what are in effect 'modern' standards on old, proven platforms. The work under way on the *Admiral Kuznetsov* aircraft carrier, currently in MRO, falls into this category, as do the planned upgrades to the two existing Kirov-class battle cruisers. Service-life extension is also a viable approach for Iskander missiles, set to be deployed for another 25–30 years; and for Antey-class (NATO: Oscar 2) submarines, which are likely to kept in service for another 15–20 years before being decommissioned. The recent decision to modernize the obsolete T-80 MBT reflects the same logic.

Modernization also encompasses efforts to maximize the active service life of most legacy systems across all army branches. This approach allows the armed forces to obtain what are in effect 'modern' standards on old, proven platforms.

Under GPV 2027, Russia will keep relying on an increasingly outdated industrial base for the production of modernized legacy designs. Defence enterprises will also continue to repair and upgrade quasi-obsolete systems to maintain them in an operational state. The industry will probably be limited in its capacity to build *genuinely* new and technologically advanced systems.[122] Rather, the bulk of production under GPV 2027 is expected to rely on upgrading Soviet-era systems. The effect will generally be a move towards advanced, but not truly modern, standards. Moreover, under GPV 2027 the defence industry will probably struggle to reach serial production of next-generation advanced systems such as the S-500, the Su-57 or the PAK DA.[123]

One of the priorities of GPV 2027 could be to prepare for surges in serial and uninterrupted production of military hardware.[124] However, limited investment capital is available for financing the expansion of production lines and their adaptation to the construction of the more advanced weapons systems. Military hardware manufacturers will be under pressure to prepare for potentially rapid increases in production volumes and to modernize their production lines accordingly.[125] The need for big rises in production, however, could lead the Ministry of Defence to prioritize certain systems in preference to others, and therefore to make politicized procurement choices to the detriment of certain other defence-industrial segments. In a context of limited budgets and continuing import-substitution programmes, this could present an even greater challenge for companies already stretched both technologically and financially.[126]

[121] Russian Defense Policy blog (2017), 'What Does Modern Mean?', 18 November 2017, https://russiandefpolicy.blog/2017/11/18/what-does-modern-mean/.
[122] Mills, C. (2017), *Russia's rearmament programme*, House of Commons, Briefing Paper Number 7877, 24 January 2017, https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7877.
[123] Swedish Defence Research Agency (2016), *Russian Military Capability in a Ten-Year Perspective – 2016*, Stockholm: Swedish Defence Research Agency, https://foi.se/en/pressroom/news/news-archive/2016-12-08-russian-military-capability-is-strengthened-and-increasing.html.
[124] President of Russia (2017), 'Soveshchanie s rukovodstvom Minoborony, oboronno-promyshlennogo kompleksa, glavami ministerstv i regionov' [Session with the leadership of the Defence Ministry, military-industrial complex, and heads of ministries and regions], 22 November 2017, http://kremlin.ru/events/president/news/56150.
[125] Boulègue, M. (2017), 'Russia's New State Armament Programme Offers a Glimpse at Military Priorities', Chatham House Expert Comment, 27 November 2017, https://www.chathamhouse.org/expert/comment/russia-s-new-state-armament-programme-offers-glimpse-military-priorities.
[126] Novosti VPK (2017), 'Putin o vozmozhnykh vneshnikh ogranicheniiakh dliia OPK: nyzhno produmat' mery' [Putin on possible external restrictions for the military-industrial complex: it is essential to consider measures], 24 November 2017, https://vpk.name/news/199208_putin_o_vozmozhnyih_vneshnih_ogranicheniyah_dlya_opk_nuzhno_produmat_meryi.html.

Russia's modernization drive also further increases the risk of overspecialization. After testing new designs during GPV 2020, the armed forces will concentrate on procuring proven systems that match their requirements in the context of GPV 2027. Due to financial constraints and the decline in the value of the state defence order (see Chapter 3), the armed forces have fostered the emergence of 'industrial champions' in each segment and have favoured repetitive production of proven designs. The industrial fabric of Russia's defence manufacturing sector will suffer as a result of this, as some companies will prosper while others will struggle to fill their order books.

This approach will not drive the industry to create modern hardware, nor will it force it to invest in R&D; rather, it will encourage firms to concentrate on producing exactly what the armed forces currently need and nothing more.

Military science and R&D

We expect GPV 2027 to seek a balance between procurement of military hardware and increasing the share of spending on military R&D, so that the development of next-generation systems can anticipate future capability requirements. Military robotics, PGMs and autonomous systems are thus likely to play a prominent role in GPV 2027. However, a technological leap will be needed to bring capabilities to the level required for the manufacture of advanced materiel; among other things, this will entail training military scientists and engineers to support R&D in the relevant areas.[127]

Military R&D is supervised directly by the VPK, under the technical and scientific oversight of the Foundation for Advanced Research.[128] The Foundation was established in 2012, modelled on the US's Defense Advanced Research Projects Agency (DARPA), and has about 100 employees. Its aim is to outline the technological and scientific feasibility of future defence projects, as well as to bridge the gap between Russia and the West in advanced research within 20 years. With an operational budget of $1.5 billion to 2020, this will be no easy task.

The Foundation also concentrates on breakthrough research such as in nanotechnology, intelligent weapons, quantum computing, etc.[129] Six years after its creation, the Foundation is scaling up in a bid to become the driver of technological development in the armed forces by 2025–30. However, bureaucratic hurdles and entrenched corruption in the defence industry suggest that there is little chance of the Foundation achieving this goal, and that the promised revolution in military R&D will remain elusive.

The Foundation is complemented by – and to some extent in competition with – 12 special research centres that have been created within the Ministry of Defence. These units were set up by presidential decree in April 2013 and their operations established between 2013 and 2015.[130] They have different R&D priorities, depending on their comparative advantages and specialty areas of expertise, and are spread across all branches of the armed forces (navy, air force, ground forces, communication and data management, EW, etc.). It is too early to judge their genuine efficiency, but by 2027 initial designs from these centres might lead to advanced MRO of existing systems or the development of new equipment.[131]

[127] Nezavisimoe Voennoe Obozrenie (2017), 'Iadernye Sily – glavnyi element sderzhivaniia' [Nuclear powers – the main element of deterrence], 8 December 2017, http://nvo.ng.ru/armament/2017-12-08/2_976_red.html.
[128] Federal Law of the Russian Federation 'On the Foundation of Advanced Research', N 174-FZ, 12 October 2012.
[129] Official website of the Foundation available at http://fpi.gov.ru/.
[130] Presidential decree Pr-864 of 17 April 2013 and General Staff directive 315/4/1781 of 13 April 2013.
[131] Boltenkov, D. (2017*), Russian MoD's "Science Companies"*, Moscow Defense Brief, Moscow: CAST, No. 6.

Despite these targets, the defence industry will probably struggle to deliver advanced military R&D under GPV 2027. By some accounts, Russian military R&D today can be characterized as 'degraded science', meaning that the quality and quantity of military science undertaken has significantly deteriorated since the 1990s.[132] A shortage of human capital is a key issue, reflecting the fact that very few young engineers and scientists see their career of choice in the military world, preferring to work for the civilian sector or simply to go abroad. On top of this 'brain drain', military science is weakened by the high average age of scientists in most design bureaus.

Weaknesses in military R&D are compounded by a lack of innovation: the defence-industrial establishment is no longer the leader in innovation that it was during Soviet times. Furthermore, the quality of higher scientific education has diminished, adding to the constraints on recruitment of a qualified workforce.[133] As mentioned above, most of Russia's military hardware was designed in the 1980s and 1990s. Manufacturing is no longer innovation-led, as there are virtually no benefits to be gained from investment in pure R&D, especially since the state defence order does not require it. This has led to a collapse in the number of R&D patents for weapons and military equipment since the 1990s.[134]

Finally, military science is limited by the absence of collaboration and spin-offs with the civilian world. Although Russia's political leadership deems 'civilianization' of the defence industry a priority,[135] convergence between military and civilian production is barely possible.[136] Successful interactions with civilian research seldom happen in the Russian military, as the armed forces maintain a certain disdain for all things civilian and often refuse to collaborate on innovative projects or technology transfers.[137]

These critical shortcomings – and notably the issue of human capital as well as the general lack of innovation – will persist through to 2027. They will worsen if funding for pure R&D does not increase under GPV 2027.

Long-term hurdles within the Russian OPK

GPV 2027 will undoubtedly be affected by long-term, unresolved issues relating to the internal workings of the defence industry and its interactions with the armed forces. These issues include the following:

Instability resulting from restructuring

The state-led decision to restructure and consolidate the defence industry around consortiums and state corporations in the 2000s did not entirely produce the expected results. Initially aimed at minimizing the duplication of production and consolidating production skills,[138] the vertical

[132] Rakhmanov, A. (2017), 'Razzhalovannaia nauka' [Degraded science], *Voyenno-Promyshlennyy Kur'yer*, 29 May 2017, http://vpk-news.ru/articles/37000.
[133] Swedish Defence Research Agency (2016), *Russian Military Capability in a Ten-Year Perspective – 2016*.
[134] Rakhmanov (2017), 'Razzhalovannaia nauka'.
[135] Boulègue, M. (2017), 'Disentangling the Ups & Downs of Russia's Military-Industrial Complex', *The National Interest*, 27 June 2017, http://nationalinterest.org/blog/the-buzz/entangling-the-ups-downs-russias-military-industrial-complex-21348.
[136] Eremin, B. M. (2008), 'Transfer tekhnologii OPK v TEK' [Transfer of military technologies to the energy sector], UAV.ru; Koshovets, O. and Ganichev N. (2015), 'Eksport rossiiskikh vooruzhenii kak osobyi factor razvitiia vysokotekhnologichnoi promyshlennosti Rossii' [Export of Russian arms as a key factor in the development of technological industry in Russia], *Problemy prognozirovaniia*, 2015:2, pp. 121–134, https://ecfor.ru/nauchnye-izdaniya/problemy-prognozirovaniya/arhiv-nomerov/problemy-prognozirovaniya-2015-2/.
[137] Adamsky, D. (2014), 'Defense Innovation in Russia: The Current State and Prospects for Revival', *IGCC Defense Innovation Briefs*, 2014(5), https://escholarship.org/uc/item/0s99052x; and Bukkvoll, Malmlöf and Makienko (2016), 'The defence industry as locomotive for technological renewal in Russia'.
[138] Solov'eva, O. (2016), 'Goszakazy dliia voennykh predpriiatii budut sokrashchat'sia' [State orders for military enterprises will decrease], *Nezavisimaia Gazeta*, 20 April 2016, http://www.ng.ru/economics/2016-04-20/4_mashino.html.

integration of the industry actually increased operational costs. Moreover, consortiums are now in competition with one another for funding and attention within the VPK, thus increasing corruption, nepotism and bureaucratic hurdles.[139]

Under GPV 2027, the restructuring of several consortiums will continue: for instance, the planned merger of MiG and Sukhoi into United Aircraft Corporation (OAK);[140] and the creation of a common entity between Sukhoi and Irkut, announced in September 2017.[141] Rumours of consolidation have also abounded after Rostec's CEO, Sergey Chemezov, hinted in 2017 that the inclusion of OAK into Rostec would 'make sense'.[142] More such rumours surfaced in early 2018 around the potential absorption of United Shipbuilding Corporation (OSK) by Rostec.[143]

Lack of economic efficiency and labour productivity

Labour productivity in the defence industry is likely to stay low under GPV 2027. This can be explained by the absence of real competition between military-industrial companies, which does not help increase productivity growth;[144] and by the fact that the industry has always been labour-intensive, known since the Soviet days for employing large numbers of staff.[145] Economic inefficiencies will continue to be compounded by increased production costs, for the simple fact that industry revenues are directly indexed to such costs. Cost reductions thus cannot be made without reductions in output (and, inevitably, in quality), so any attempt to control costs could result in lower production volumes for state defence order fulfilment. Prospects are further worsened by the shortage of skilled workers in OPK firms and the absence of a well-developed managerial culture.

Economic inefficiencies will continue to be compounded by increased production costs, for the simple fact that industry revenues are directly indexed to such costs.

By 2027, the issues of low labour productivity and economic inefficiency will probably not have been addressed, further constraining the positive evolution of the industry. This will last as long as state defence order procurement is based on production costs and not on product costs.

Price-formation issues with the state defence order

Procurement under the state defence order is notable for its lack of transparency, with price formation traditionally determined not by fixed, standard pricing formulas but by lengthy negotiation between manufacturers and the Ministry of Defence.[146] Former defence minister Anatoliy Serdyukov tried to increase the armed forces' influence over price formation, but he faced heavy resistance from within

[139] Connolly and Sendstad (2016), 'Russian Rearmament'.
[140] Defense World.net (2017), 'Russia's UAC Plans Merger Of MiG, Sukhoi Fighter Jet Manufacturing Companies', 6 June 2017, http://www.defenseworld.net/news/19492/Russia___s_UAC_Plans_Merger_Of_MiG__Sukhoi_Fighter_Jet_Manufacturing_Companies#.WuMuDtPwZyq.
[141] United Aircraft Corporation (2017), 'Key decisions made to form a new Corporate center and Civil Aviation Division of the United Aircraft Corporation', 1 September 2017, http://uacrussia.ru/en/press-center/news/prinyaty-resheniya-o-nachale-formirovaniya-novogo-korporativnogo-tsentra-i-grazhdanskogo-diviziona-p.
[142] Lenta.ru (2017), 'Chemezov nazval tselesoobraznym vozmozhnoe vkliuchenie OAK v sostav "Rostekha"' [Chemezov calls the possible inclusion of OAK in "Rostec" an efficient move], 14 March 2017, https://lenta.ru/news/2017/03/14/vse_v_dom/.
[143] Safronov, I. and Vedeneeva, A. (2018), 'V kabinety zakhodili korabli' [Ships made a visit to the offices], *Kommersant*, 14 February 2018, https://www.kommersant.ru/doc/3548012.
[144] Connolly and Sendstad (2016), 'Russian Rearmament'.
[145] Oxenstierna, S. and Westerlund, F. (2013), 'Arms Procurement and the Russian Defense Industry: Challenges Up to 2020', *Journal of Slavic Military Studies*, 26:1, pp. 1–24, doi: 10.1080/13518046.2013.757135.
[146] Oxenstierna, S. (2013), 'Defence spending', in Hedenskog, J. and Vendil Pallin, C. (eds) (2013), *Russia's Military Capability in a Ten-Year Perspective – 2013*, Stockholm: Swedish Defence Research Agency.

the defence industry, which ultimately led to his demotion in November 2012. Consequently, Defence Minister Sergey Shoigu opted for a less confrontational approach to dealing with suppliers.

By 2027, a new price-formation formula enacted in early 2018[147] will have had its first results. Created by the Federal Antimonopoly Service (FAS) to regulate state defence order prices, the new pricing formula will seek to reduce production costs and improve the efficiency of procurement.

Quality control and production volumes

Quality control was never the strong suit of Russia's defence industry, and this is expected to stay the case under GPV 2027. As during Soviet times, military inspectors still routinely carry out random quality-control audits in defence enterprises. The number of embedded agents of the Military Representation Bureau (*Voenpriyemka*) was increased at the request of Defence Minister Shoigu, in an effort to improve quality control and compliance with technical requirements. The actual level of quality control, however, does not seem to have changed drastically – reportedly because of corruption among Military Representation Bureau inspectors (*voenpredy*) embedded in the companies.[148]

There is also a general lack of coordination between systems integrators and their subcontractors, the latter of which routinely fail to meet delivery obligations. This negatively affects the quality of output and impedes timely state defence order fulfilment, especially since the centralized Soviet system of industrial coordination has not yet been replaced by a streamlined system.

Problems in achieving timely fulfilment of targeted armament volumes for the state defence order will probably persist under GPV 2027. As GPV 2020 was already ambitious in terms of production cycles, its successor programme might suffer the same shortcomings, aggravated by low labour productivity. Despite encouraging official figures, state defence order fulfilment targets are seldom met.

[147] Novosti VPK (2017), 'Zakupki v OPK-2017: standartizatsiia, motivatsiia, kooperatsiia' [Purchases in the 2017 OPK: standardization, motivation, cooperation], 24 November 2017, https://vpk.name/news/199237_zakupki_v_opk2017_standartizaciya_motivaciya_kooperaciya.html.
[148] Ekho Moskvy (2012), 'Voennyi Sovet' [War Council], 18 February 2012, https://echo.msk.ru/programs/voensovet/859113-echo/; and Novosti VPK (2011), 'Voennye predstavitel'stva opiat' rezhut po zhivomy' [Military representatives prove to be harsh once again], 15 June 2011, http://vpk.name/news/53830_voennyie_predstavitelstva_opyat_rezhut_po_zhivomu.html.

6. Conclusion

In this paper we have highlighted some of the publicly available details of Russia's new state armament programme (GPV 2027). First, we identified patterns of performance from the previous state armament programme – GPV 2020. We argued that implementation of GPV 2020 revealed serious deficiencies in shipbuilding and in the development of a number of new-generation weapons systems. Western sanctions and the breakdown of defence-industrial trade with Ukraine exacerbated some of these deficiencies.

However, GPV 2020 also showed that the Russian defence industry was well positioned to produce significant quantities of equipment based on existing designs. Moreover, in some areas – Iskander short-range ballistic missiles, air defence systems, for example – the industry was able to perform particularly well, further reflecting defence priorities. Thus, defence-industrial performance was decidedly mixed. This should come as no surprise. This was the first state armament programme in the post-Soviet period to receive significant funding. As a result, the development and production of new weapons systems only really began in any meaningful way after 2011. Many of the obstacles encountered during this period may be removed in the early stages of the new programme's implementation. There is thus a possibility that the production of larger quantities of newer types of equipment may prove easier under GPV 2027.

Second, we examined whether the new programme will prove to be financially feasible given Russia's relatively modest economic growth prospects. We argued that even if real GDP grows at a relatively slow annual average rate of 2 per cent over the next decade, and even if the burden of defence spending declines from about 5 per cent of GDP – the level it has hovered around in recent years – to the historic post-Soviet average of 4 per cent, it is still conceivable that the Russian government might come close to allocating the R19 trillion in funding stipulated. Furthermore, if economic growth rates exceed the more pessimistic projections, it is possible that the Russian government might be able to fund GPV 2027 quite comfortably.

Third, we examined the types of equipment likely to be procured over the course of the new armament programme. According to the available information, the new programme will be somewhat more balanced in its objectives than its predecessor. Whereas GPV 2020 emphasized the development of shipbuilding, largely at the expense of re-equipping Russia's ground forces, the new programme is expected to allocate spending more evenly across each branch of the armed forces. Some of the new weapons systems that were hoped for as part of GPV 2020 are likely to enter production at some point in the new programme period, although exact delivery dates remain largely unknown. For example, serial production of the first T-14 Armata tanks, the Su-57 fifth-generation fighter aircraft and Admiral Gorshkov-class frigates might begin in the 2020s. Alongside production of larger quantities of older, established weapons systems, such as fighter aircraft based on the Su-27 Flanker series or the T-72B3M obr 2016 tank, these expected deliveries imply that the combat capabilities of Russia's armed forces will continue to rise over the next decade. The items procured under GPV 2027 will also incorporate lessons from combat experience acquired in Syria and Ukraine, especially in the sphere of autonomous systems and EW capabilities.

Fourth, we outlined the existence of external and internal factors likely to affect the successful implementation of GPV 2027. The external factors include lessons from recent operational experience in Syria and Ukraine, as well as the negative impact of international sanctions targeting the defence industry. Internal trends – such as problems with modernization initiatives, the decline in military R&D in terms of both spending and quality, and structural hurdles such as low labour productivity and quality-control issues – are all likely to remain unresolved throughout the 2020s. We can also anticipate increased internal rivalry over military procurement, not only between defence companies to secure contracts[149] but also between branches of the army within the Ministry of Defence as competition over hardware commitments and budgets intensifies.[150]

> By 2027 the Russian armed forces should be considerably better equipped than they are today. While we should not overstate the pace of probable modernization – defence-industrial production will continue to lag in certain areas – significant progress should be expected in the development of new-generation equipment.

What does all this mean for the future trajectory of the Russian armed forces? On a most basic level, by 2027 the Russian armed forces should be considerably better equipped than they are today. While we should not overstate the pace of probable modernization – defence-industrial production will continue to lag in certain areas – significant progress should be expected in the development of new-generation equipment. As a result, in a decade's time we will probably see the armed forces relying on a mix of legacy hardware, modernized Soviet systems and fully modern designs. GPV 2027 will bring an increased focus on command and control, giving impetus to efforts to renew ageing structures, as the 'New Look' reforms started under former defence minister Serdyukov will continue bearing fruit. GPV 2027 will also help facilitate the Russian vision of modern warfare. Although over-reliance on land platforms and artillery will persist, capabilities will be strengthened by adaptable strike and tactical air wings, autonomous systems and air defence capabilities. Bringing the Russian armed forces into the 21st century and adapting them to modern challenges, however, will require sustained investment.

That Russia should be in a position to achieve these objectives without imposing an excessive burden on the wider economy is also significant. As is well documented, the Soviet Union suffered from a hypermilitarized economic structure that allocated the highest-quality resources to military production. While the modern Russian economy certainly has its problems, excessive militarization is not one of them. Indeed, those defence spending plans that are in the public domain suggest that military expenditure peaked in 2015 and is likely to shrink as a share of GDP over the next few years; moreover, the decline is likely to happen at a faster rate than has been suggested by liberal economists such as Alexei Kudrin.

We are therefore presented with an apparent paradox: on the one hand, senior Russian officials, including President Putin, are publicly declaring the existence of a range of new weapons systems; on the other hand, spending plans suggest that the defence burden is likely to decline going into the early 2020s. In fact, resolving these apparently contradictory positions is not too difficult. While

[149] Frolov (2017), *State Armament Program 2025*.
[150] Gorenburg, D. (2017), 'Russia's Military Modernization Plans: 2018–2027', PONARS Eurasia Policy Memo No. 495, November 2017, http://www.ponarseurasia.org/sites/default/files/policy-memos-pdf/Pepm495_Gorenburg_Nov2017.pdf.

official rhetoric in relation to military modernization – in particular, in relation to the development of advanced new weapons systems – might appear alarming to some observers, a detailed examination of what Russia is able to produce suggests that its true ambitions are more modest.[151]

The creation of relatively small quantities of new weapons systems does not signal Russia's desire or capacity to enter a new arms race. Given existing economic constraints and the leadership's desire to avoid the costs associated with an excessive military build-up, defence-industrial production on a scale commensurate with heightened global ambition is simply out of the question. But the flipside of Russia's more modest aspirations is that its objectives should be more feasible. Western observers should be prepared to see the Russian armed forces become more capable over the next decade. However, they should avoid exaggerating the threat posed by these developments. While Russia is likely to feel more confident in its ability to defend itself, to assert its interests near its own borders, and to deploy relatively small-scale forces abroad, it will remain a long way from possessing the ability to overwhelm larger, better-equipped peer competitors.

While official rhetoric in relation to military modernization – in particular, in relation to the development of advanced new weapons systems – might appear alarming to some observers, a detailed examination of what Russia is able to produce suggests that its true ambitions are more modest.

[151] Khudoleev (2018), 'Voennaia nauka smotrit v budushchee'.

Acronyms and Abbreviations

A2/AD	anti-access/area-denial
AFV	armoured fighting vehicle
APC	armoured personnel carrier
C2	command and control
EW	electronic warfare
FAS	Federal Antimonopoly Service
GPV	state armament programme
ICBM	intercontinental ballistic missile
IED	improvised explosive device
IFV	infantry fighting vehicle
ISR	intelligence, surveillance and reconnaissance
ISTAR	intelligence, surveillance, target acquisition and reconnaissance
KMZ	KurganMashZavod
MANPADS	man-portable air defence system(s)
MBT	main battle tank
MLRS	multiple-launch rocket system(s)
MRO	modernization, renovation and overhaul
OAK	United Aircraft Corporation
OPK	Russian defence-industrial complex
PAK DA	Prospective Aviation Complex for Long-Range Aviation
PEMZ	Podolsk Electromechanical Factory
PGM	precision-guided missile or munition
SAM	surface-to-air missile
SGC	state-guaranteed credit
SLBM	submarine-launched ballistic missile
SSBN	strategic ballistic-missile submarine
SSGN	nuclear-powered guided-missile submarine
SSN	nuclear-powered general-purpose attack submarine
SSO	Special Operations Forces
UAV	unmanned aerial vehicle
UGV	unmanned ground vehicle
UVZ	UralVagonZavod
VDV	Airborne Assault Troops
VKS	Aerospace Forces
VPK	Military-Industrial Commission

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Cover image: A BMP-2 amphibious infantry fighting vehicle moves along a pontoon bridge during Russian military exercises, July 2017.

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