Russia and Eurasia Studies Programme

A New Strategy for Russian Science
Game changer or more of the same?

Tomas Malmlöf

In February 2024, Russia adopted a new strategy for scientific and technological development, likely to shape its direction well into the 2030s. Against the backdrop of Russia's largest war effort since WWII, sweeping sanctions, and an intensifying technological race, this updated strategy reveals how it intends to pursue its ambitions amid isolation and rivalry. Although the strategy's language largely reflects continuity with the previous version, subtle shifts hint at Russia's ambition to redefine its global role within a new Cold War climate of its own creation. Through partnerships with select allies and a focus on self-sufficiency, the strategy presents a vision marked by both persistence and adaptation.

Russia's new strategy for scientific-technological development entered into force upon signature of presidential decree no. 145 on 28 February 2024.[1] On the same day, the strategic goals and objectives for the Russian Science Foundation (RSF) for the period up to 2030 were approved through decree, no. 146.[2] This is noteworthy as the purpose of the foundation is to support basic research and development in different fields of science.

The purpose of this memo is to compare Russia's new strategy within this area with the old, taking into account both the changes and the continuity between them. To this end, the text is divided into five principal sections. The initial section situates the strategy within Russia's strategic planning framework, delineating its function, timeline, and growing significance in the current wartime climate. The second section presents a comparative analysis of the two strategies, noting similarities and differences in the role assigned to science and technology, as well as in the approaches to post-Soviet development. The third section identifies key structural weaknesses and threats, discussing Russia's strategic outlook and the challenges it faces in advancing science and technology. The fourth section examines Russia's strategic priorities, detailing state policy principles for science and technology development, main policy objectives, directions, expected outcomes, and funding provisions. Finally, a fifth concluding section synthesises the findings to reflect on the strategic direction and implications of Russia's evolving approach to science and technology.

The strategy in Russia's planning system

Strategic planning is a fundamental concept in Russia's state administration and policy development. It has an evident connection to the Soviet model for state governance. Notwithstanding this legacy, the strategic planning system for a long time comprised of a relatively loosely joined entity, replete with internal contradictions and unclear responsibilities between different actors and administrative levels.

In June 2014, the planning system became somewhat more stringent and coherent with the adoption of the Federal Law on Strategic Planning, no. 172-FZ.[3] This law established a more intelligible legal basis, covering coordination of state and municipal strategic management and budgetary policies, instituting the powers and boundaries between all involved actors at the federal, regional, and municipal levels, as well as their interaction with other involved public and scientific entities. It also set forth the particular strategic planning documents to be prepared at the various administrative levels and by which organ. Specifically, at the federal level, they consisted of the president's annual address to parliament, the Strategy for Socio-Economic Development, documents in the domain of national security that are determined by the Russian president, the National Security Strategy, and the Strategy for Scientific-Technological Development.[4]

The original text of 172-FZ had not laid down any planning framework for scientific-technological development. It was subsequently incorporated into the legislation through the introduction of a new

FOI Memo 8674
Project no: A12401
Approved by: Mike Winnerstig

December 2024

paragraph, 18.1, via a supplementary law from July 2016.[5] The unconventional numbering of this paragraph, 18.1, was necessitated because the introduction of a wholly new paragraph 19 would have required the renumbering of all subsequent paragraphs. Such a change would otherwise have entailed a revision of references to 172-FZ in other legal acts. Following this amendment, Russia's inaugural strategy for science and technological development could thus be conceptualised and adopted six months later, on 1 December 2016.[6]

Defining the strategy's role and timeline

The strategy for scientific and technological development aims to define the purpose, principal tasks, and priorities for scientific and technological development in Russia at the federal level.[7]

172-FZ defines the term 'long-term period' as 'the period following the current year, lasting more than six years.'[8] The updating in February 2024 of the scientific-technological strategy was therefore fully in accordance with the stipulated time schedule. It seems reasonable to posit that, assuming the same timeline, this version of the strategy will determine the direction of Russia's scientific and technological development well into the 2030s. This means that, in all likelihood, it will characterise the framework for that development for the remainder of Vladimir Putin's foreseeable rule over Russia.

Increasing importance in times of war

The strategic planning system at the federal level is divided into two distinct tracks. The first prioritises national security, with the Presidential Administration and the Security Council assuming significant roles. The second track focuses on socio-economic matters, with the government shouldering primary responsibility.[9] The Strategy for Scientific and Technological Development fits in to this latter track, and it is thus the government that is responsible for the processes of drafting, amending, monitoring, and implementing the strategy.[10] The government furthermore works in conjunction with the Presidential Council for Science and Education to develop and approve an implementation action plan.[11]

However, as systems thinking is a pervasive feature of the Russian public administration model, none of these processes are carried out without regard for the other central planning instruments at the core of its strategic planning system. The strategy for scientific and technological development is therefore to be closely connected and interdependent with the strategies of national security from the first track and the strategy for socio-economic development from the second track.[12]

The importance that Russia's leadership attaches to strategic planning for scientific and technological development has even increased. To illustrate, one might cite the meeting of the Presidential Council for Science and Education on 8 February 2024, which discussed the penultimate version of the new strategy. In his opening remarks at the meeting, Vladimir Putin stated that the Council had previously reached a consensus on the importance of giving the strategy equal weight to that of the National Security Strategy.[13]

Comparing the two strategies

There are significant similarities in both structure and content between the original and revised versions of the strategy, reflecting an obvious kinship. This is not surprising, as 172-FZ provides a detailed framework for the required elements of the strategy.[14]

Certain differences are nevertheless discernible. The newer text is divided into nine sections, whereas the previous version had only six. The additional sections touch on the role and significance of science and technology, financing, and programme monitoring. However, none of these subject matters is new to the strategy as such. In the older version, they were included as subordinate chapters, or parts of a chapter, that sorted under one of the other six sections. It is not known why the authors behind the new strategy have made these changes.[15] A plausible interpretation might be that Russia's decision-makers have preferred to further emphasise and make visible the importance of these subject matters.

It is also worth noting the effort by the authors of both versions to place Russian science and technology development within a broader context, emphasising their role in society, historical evolution, and global scientific and technological trends, and Russia's positioning in relation to these dynamics. In the new version, these discussions and analyses make up more than a quarter of the text.

The role of science and technology

A common point of departure for both strategies is that a high rate of gaining and absorbing new knowledge and the creation of high-technology products are key factors that determine the condition of a state's national economy and competitiveness.[16] Both versions also emphasise the scientific and technological legacies of the Russian Empire and the Soviet Union. The Russian self-image that emerges in both texts asserts that, historically, Russia was one of the scientific powers of the world. Apart from solving the problems of internal socioeconomic development and ensuring Russian (and

Soviet) security, it also made a significant contribution to the accumulation of scientific knowledge by mankind and the creation of advanced technologies.[17]

According to the common historiography for both texts, the accomplishments of the Russian Empire's science rested on the presence of a concentration of scientists and engineers in higher education. In the Soviet Union, the solution of large-scale research and engineering problems was ensured through the concentration of resources in the system of the Union of Soviet Socialist Republic's (USSR's) Academy of Sciences and in the industry branch institutes, the directive planning of scientific research and development carried out by the USSR State Committee for Science and Technology, and the USSR State Planning Committee.[18]

Beyond the oversimplifications in these descriptions of reality, they reveal a nationalistic ambition to set the historical record straight. It is therefore worth noting that this idealised image of the past is the foundation upon which Russia's decision-makers are modelling the orientation, structure, and organisation of the country's scientific and technological sector for the next decade.

Post-Soviet development

The two documents exhibit a substantial degree of consensus with regard to post-Soviet development. Given that the later document also encompasses the developments of recent years, this section focusses exclusively on this version of the strategy. Thus, as for modern Russia's scientific and technological developments, the 2024 strategy divides the period from the formation of the Russian Federation in 1991 until the present (early 2024) into three distinct stages. The first of these occurred in 1991–2001 and was all about survival and preservation. This stage's main strategic objective was to preserve Russia's scientific and technological potential. In order to achieve this objective, new institutional mechanisms adapted to market conditions were set up. Concurrently, targeted financing was allocated to leading scientific organisations, and Russia opened up for international cooperation.[19]

The second stage, from 2002 to 2021, coincided in its latter part with the implementation of the 2016 strategy. It was distinguished by a surge in the volume of funding allocated to scientific research. The authors of the 2024 strategy attribute this second stage to a transition to an innovative economy. They thus disregard the fact that this increase did not take place in terms of an increased share of GDP but was entirely in step with increased economic growth. The text further claims that robust infrastructures were created under this period for funding, organisation, and staffing. Concurrently, Russia launched several programmes and projects to create a national network of scientific installations of megascience class and to develop new research directions rapidly to respond to significant challenges.[20] One of the more well-known examples from this period is the establishment of the Skolkovo innovation centre outside Moscow in 2010.[21]

The authors of the 2024 strategy posit that a novel third stage characterised by mobilised development commenced in 2022. Interestingly enough, they have not attempted to identify the underlying, mostly self-inflicted, political causes for this negative shift in trajectory. Instead, they merely note that since 2022, the scientific-technological sphere has been characterised by mobilisation under the pressure of sanctions. They do allege, however, that this negative trend has been accompanied and implicitly mitigated by the consolidation of society and business entities to meet the challenges of scientific and technological development.[22]

Weaknesses and threats within Russian science

Both versions of the strategy incorporate a degree of introspection, despite the ostensible advancements within Russia's scientific and technological domains since 2002 and the restoration of their erstwhile prestige and standing, which had been eroded during the tumultuous 1990s. The 2016 strategy provides an analysis of "remaining unresolved problems," whereas the 2024 strategy addresses "persisting negative trends."[23]

In 2016, the strategy's authors saw significant potential in a number of fundamental research areas. Yet, they considered that the directions of research and development in Russia largely corresponded to those that had been relevant during the last decades of the 20th century. Despite its hundreds of scientific and educational centres spread all over the country, Russia's true research potential was concentrated in a few regions. It was evident that the number of scientific workers younger than 39 years had allegedly increased by 30 percent from 2004 to 2016. However, without access to absolute figures, it is impossible for an outside observer to assess the significance of this development. In any case, the authors continued to believe that the overall number of young people pursuing careers in science or engineering remained insufficient. In addition, Russia's brain drain was deemed far too high: in the global rating, Russia placed itself somewhere between the 50th and 60th place as a donor country for human talent in science and technology.[24]

Another issue identified in 2016 was the low absorption rate of new research results and technology in the national economy. The share of innovative production in total output amounted to 8–9 percent; investments in intangible assets were 3–10 times lower than in leading countries, and the share of Russian high-tech products in exports was about 0.4 percent. There was also a lack of technology transfer from defence to civilian sectors of the economy. Likewise, in terms of efficiency and productivity, Russia allegedly lagged behind leading countries.[25]

The 2024 inventory of persisting negative trends was more concise, consisting of only four points. The first of these relates to the discrepancy between the priorities for scientific and technological development and the tools for implementation at the national, regional, industry, and corporate levels, a shortcoming that has also been identified by external observers.[26] The second trend is a rehash from the previous version of the strategy, recounting the low susceptibility of the economy to technological innovation and the weak interaction between the real sector and the research and development sector. The third trend is also a legacy from the preceding text and concerns the concentration of the scientific and technological potential to a limited number of regions in Russia. The fourth and final point asserts that Russian science adheres to global technological trends yet fails to consider the present and future demands of the Russian economy and society sufficiently in order to align with Russia's national interests. Consequently, modern Russian science and technology is more reactive than it is independently proactive.[27]

Despite their absence from the updated version, it seems probable that the other above-mentioned issues identified in the 2016 strategy persist, given their intrinsic structural character. Taken together, the negative factors and trends from both versions of the strategy are perceived to create the risk that Russia lags behind countries that are global technological leaders, thus reducing its competitiveness, which, in turn, jeopardises its independence, national security, and sovereignty.

A slightly updated strategic outlook

The two versions of the strategy also offer intriguing insights into Russia's official view on the development of science and technology. This is stated as one of Russia's key national priorities, which, in the view of the authors, is shaped by a multitude of external and internal factors. These factors, in turn, give rise collectively to a complex system of challenges, according to the texts. Such challenges create not only significant risks for society, the economy, and the system of public administration, but also new opportunities and prospects for scientific and technological development. The authors are convinced that in this regard, Russian science and technology play a crucial role not only in advancing Russian national interests but also in addressing global challenges facing humanity.[28] The entire approach is recognisable from the writings in the Russian national security strategy.[29]

Both texts identify seven significant challenges, with only minor differences in phrasing. The first of these concerns Russia's persistent dependence on extensive exploitation of raw materials for its economy. In parallel, a high-tech, data-driven economy has emerged, alongside a rising limited group of leading countries with advanced production technologies and oriented towards the use of renewable resources.

The remaining common challenges relate to demographic changes and population development; increasing anthropogenic environmental impact and climate change; Russian food security and food independence; qualitative changes in the nature of global and local energy systems; hybrid threats to national security; and a balanced and effective territorial development, as well as Russia's positioning in outer space and the upper atmosphere, the world's oceans, and the Arctic and the Antarctic.[30]

The sole challenge added to this list in the 2024 version of the text regards the transformation of the world order. As postulated by the authors, this transformation is accompanied by a restructuring of global financial, logistical, and production systems. It is also marked by growing geopolitical and economic instability, international competition and conflict, and systemic inequality. This occurs alongside weakening national state institutions and a decline in participation in increasingly complex international cooperation on scientific, technological, and innovation activities.[31]

What strikes an outside observer is the lack of comprehension within the text of Russia's own role in co-shaping what, from a Russian standpoint, is an unfavourable environment, and the complete avoidance of any analysis leading in that direction. The current ensuing geopolitical and economic instability, which includes Russia's increasing difficulty in participating in international scientific collaboration with Western countries, is largely attributable to its own domestic and foreign-policy decisions.

The avoidance of an in-depth discussion of Russia's own role is indicative of the political sensitivity of the issue. The need to couch the discussion in terms acceptable to Russian decision-makers has limited the

analysis and the measures to be taken that can be proposed under the current strategy.

Challenges for science and technology development

The two strategies also focus on global changes in the organisation of scientific and innovation activities. These changes have resulted in the emergence of a number of significant factors that, according to the authors' analysis, influence the development of science and technology. Apart from some minor linguistic revisions, the latter version does not elaborate further on this part of the strategy. The authors note the shortened time cycle for acquiring new knowledge, creating new technologies, and bringing them to market. Disciplinary and sectoral boundaries in research and development have become more blurred. There is also a growing complexity in the organisation, hardware, and software tools involved in scientific research and development. The role of international standards is becoming increasingly important. A smaller group of states now dominates research and development, while the scientific and technological periphery is losing its identity and increasingly serves as a talent pool for others.[32]

Although not explicitly stated in this section of the strategy, the overall impression from reading it is that Russia's decision-makers remain convinced that the science and technology sector are vulnerable to external forces, necessitating increased state planning and management. Although cooperation with society and businesses is acknowledged, there appears to be little desire to unleash the potential innovative power of private companies by allowing them to compete in a less state-controlled and regulated market.

Priorities and perspectives

The aforementioned analyses of the Russian science and technology sector and the external factors affecting it underpin the identification of priority areas in the 2024 strategy for the next ten years. Russia's leader, Vladimir Putin, justified the need to update the strategy during the annual meeting of the Presidential Council for Science and Education on 8 February 2023, stating that "the situation [had] changed."[33] However, irrespective of this authoritative starting point for the revision, there is a notable absence of substantial alterations in the priorities for scientific and technological development compared to the previous strategy. The main distinction between the two versions is that the 2024 strategy sometimes provides a more comprehensive account of certain aspects.

Consequently, both versions of the strategy first establish that the priorities of scientific and technological development should be those areas that facilitate notable outcomes and generate domestic knowledge-intensive technologies. They should also ensure the transitions to advanced production technologies such as intelligent manufacturing, robotics, high-performance computing, new materials, machine learning, and artificial intelligence; the development of an environmentally friendly energy industry; personalised medicine and high-tech healthcare solutions; and an environmentally friendly agri- and aquaculture. They should also counter man-made, biogenic, and sociocultural threats, including terrorism and extremist ideology, destructive foreign information-psychological influence, and cyber threats, at the same time as national defence capabilities and security against evolving hybrid threats are strengthened. Similarly, the priorities should focus on enhancing domestic connectivity in transport, energy, and telecommunications, while securing leadership in international logistics, space exploration, aviation, and the development of the world's oceans, the Arctic, and Antarctica. They should also improve Russia's ability to respond effectively to grand challenges by leveraging interdisciplinary research at the intersection of social sciences, humanities, and the ethics of scientific and technological development, along with shifts in societal, political, and economic relations.[34]

In addition, the 2024 version incorporates two new topics that it seeks to ensure are included in Russia's priorities. The first of these concerns the objective assessment of climate-active emissions and absorption, reducing their environmental impact, and improving the adaptation of ecosystems, populations, and the economy to climate change. The second regards transition to nature-like technologies that mimic natural systems and processes, integrating them into technical systems and natural resource cycles.[35]

Therefore, Russia's strategic priorities for its science and technology sector over the next ten years are ambitious, bordering on the impossible. What makes their achievement within the lifetime of the current strategy even more doubtful is that they are pointing in several different directions, while most of them are only being carried over from the previous strategy. The majority of the priorities also seem to be more reactive than proactive. The aim appears to be to counteract and, preferably, to reduce the existing technology gap between Russia and leading countries. However, in the realm of design and production of high-tech domestic products, Russia seems to be losing ground, as it has not

succeeded in breaking post-Soviet reliance on Western science and technology for its own production systems and advanced products.

Strengthening defence capability and national security are certainly legitimate priorities in their own right. The problem lies in how these concepts are interpreted by Russia's state leadership. Specifically, Russia's domestic and foreign policies are marked by increasing internal repression, a revanchist approach toward neighbouring states, and the pursuit of a prolonged, systemic conflict with Western and Western-aligned countries.

The last two priorities, those added in 2024, appear to be a concession to current global climate and environmental concerns driven largely by Western governments and environmental groups. Given the weak environmental records of both the Soviet Union and post-Soviet Russia, these topics seem somewhat superficial. The key concepts here are probably "objective assessment" and "enhancing adaption." Russia's decision-makers obviously seek to carve out an autonomous position for Russia on these issues. The question that looms under the surface then is whether Russia is a co-player or an opponent to those states and other actors that are pushing these issues in international fora. What supports the latter interpretation are, among other things, the statements in the national security strategy suggesting that climate policy and environmental threats are being used by other countries as a means to hinder Russian development and its conquest of the Arctic.[36]

Principles for science and technology development

The strategies' analyses that highlight persistent structural weaknesses, a changing world, and new conditions for conducting science and technology, are not particularly original, as such. The measures selected to counteract possible threats and dangers, on the other hand, are reflective of a more archetypal Russian approach. What the authors of the 2024 strategy suggest is a highly centralised approach, namely the establishment of "an effective, coherent and balanced system of strategic goal-setting, planning and forecasting of science and technology development."[37] The response to great challenges depends on the timely creation of knowledge-intensive technologies and production that meets Russian national interests and improves the quality of life of the population.[38] In all this, Russian basic science is envisaged as playing a key role as a generator of new knowledge.[39]

The implication is that the need that Russian decision-makers have to retain control remains at least as high as ever. A comparison between the two texts regarding the principles for state policy in the area of scientific and technological development is informative here. In the 2016 version, the opening subclause under its sole section, paragraph 30, in the chapter on "Principles of State Policy" affirms the freedom of scientific and technological creativity as a fundamental principle of Russian policy for scientific and technological development. State policy should provide opportunities for scientific teams and organisations to choose and combine forms of interaction, and methods for solving research and technological problems.[40] The remaining subclauses list another five principles. The first concerns systemic state support throughout the entire innovation cycle. The second emphasises the concentration of resources to support research, development, and the creation of products and services. The ensuing principle concerns balancing government research priorities with the intrinsic logic of research and its internal development. The final two principles regard openness to national and international research collaborations and the importance of targeted support, fair competition, and providing access to state support for the most productive research teams.[41]

In contrast to the previous version of the text, the "Principles of State Policy" chapter in the new version is comprised of three paragraphs. The initial paragraph posits that scientific and technological advancement hinges upon a tailored agenda with the primary objective of safeguarding national technological autonomy. The objective of such an agenda is twofold. It should facilitate a balanced development of the fundamental technologies that are essential for reducing the critical dependence on foreign institutions, while simultaneously fostering the development of unique Russian technologies that are competitive at the global level.[42] The paragraph that follows postulates that implementation of the aforementioned agenda requires a set of measures designed to enhance the efficiency of expenditure on research and development, to reinforce interdepartmental interaction, and to establish effective public-private partnerships.[43]

The enumeration of the fundamental principles of the state's policy for scientific and technological development has now been relegated to the chapter's third and final paragraph. It is a heavily edited text that has been cut by more than a third. There are now five subclauses, which are a mix of old and new principles. The first fundamental principle of Russian state policy is now the indissoluble link between the scientific and industrial potential of the country and the interdependence of their development.[44]

The second principle regards the concentration of resources to support science and technology development. The wording and meaning are similar to the corresponding subclause in the previous version, with one important exception. The earlier text justified this concentration as necessary to address the great challenges facing Russia. In the new version, it is not only necessary to meet the great challenges but also to ensure the independence and competitiveness of the state.[45]

The third principle of state policy is state and public support for fundamental scientific research as a tool for Russia's long-term development.[46]

The fourth principle introduces patriotic education of Russian scientists and increases their responsibility for achieving results significant for the independence and competitiveness of the state. Within these frameworks, Russian scientists enjoy the same ability to choose and combine orientation, interaction, and methods for their work as in the previous strategy.[47]

The fifth principle regards state support for the most productive research teams and resembles the corresponding subclause in the previous version.[48]

Main objectives and directions of state policy

Putting all the pieces together now, paragraph 23 in the 2024 version outlines the purpose of science and technological development in Russia. The purpose, as outlined, is to ensure the independence and competitiveness of the state, achieve national development goals, and realise strategic national priorities by creating an effective system to utilise the intellectual potential of the nation.[49] This paragraph is more detailed than the corresponding paragraph 28 in the 2016 version, which, it should be noted, took as its starting point the independence of the country rather than the state. Furthermore, the 2016 version did not refer to national development goals and priorities.[50]

Both versions of the strategy have five objectives that underpin the purpose. They are very similar in content, although their exact wording and internal order differ. These objectives focus on fostering effective interaction between science, technology, and production to make the economy and society more receptive to new technologies. They also include developing infrastructure for research and development and promoting a model of international scientific cooperation that safeguards Russia's national interests, preserves the identity of its science, and enhances its effectiveness through global collaboration.[51] The texts create the impression that international cooperation is of continued interest to Russia, insofar as it is controlled by the state.

The 2024 strategy outlines 32 tasks — key directions and measures — required to achieve its objectives, forming the core of Russia's state policy in this field. While this paper does not cover these tasks in detail, it is worth noting some of the key differences from the 31 tasks listed in the previous version. Certain tasks have been eliminated, the sequence of objectives and tasks has been reorganised, and the language is generally more concise in outlining the tasks without excessive technical minutiae.

Compared to the previous version, the updated version's subparagraphs outlining the tasks considered necessary to foster effective interaction between science, technology, industry, and societal openness to new technologies have undergone the least change. Indeed, they emphasise even more clearly the necessity of engaging society and the national economy in the scientific process and promoting a technological culture. The new strategy also adds an entirely new task that further reinforces this point; this is the establishment of a "qualified customer institution," which aims to foster partnership between the state, industry, and academia.[52] The institution's primary role appears to be technology brokering, bridging the gap between research and development on one side and commercial markets on the other.[53]

In contrast, the subparagraph outlining the tasks related to the infrastructure and organisation of the science and technological sector have undergone considerably deeper changes. The task aimed at reducing excessive bureaucracy and simplifying procurement rules has been eliminated, along with the task focused on developing network-based forms of organisation, such as consortia or cluster-based models. The authors have elaborated on the task that aims to create unique shared-use scientific facilities for high-end technological equipment. Three other tasks not included in the previous version concern the creation and support of the storage of unique information and data; the integration of artificial intelligence in research and development; and the implementation of measures to strengthen and expand the presence of Russian-language scientific literature in the global information space.[54]

In the 2024 version, the tasks related to the objective of nurturing talent, personnel, and human capital specifically targeted at young researchers have been slightly toned down. In their place, two new tasks have been introduced: the first addresses improvements to the system for training and retraining personnel, while the second focuses on implementing measures to ensure continuity in the intellectual and value-based development of scientific personnel, attract talented youth,

and promote their retention in careers in science and technology.[55]

When it comes to the objective of improving management efficiency, the novelties in the new version affirm the changes in government policy that have steered the sector towards an increased degree of centralisation and government control, which has taken place since 2018.[56] Three new tasks include a coordinated legal framework between the scientific, technological, and industrial sectors; institutionalisation of "independent" leadership under key scientific organisations; and a digital infrastructure for monitoring and control of implementation of managerial decisions and maintaining information systems.[57]

The objective of fostering international cooperation and integration has also undergone notable adjustments. In the old version, international cooperation was meant *to allow for* protection of the Russian scientific sphere and state interests under the prevailing conditions of the internationalisation of science. In the new version, however, cooperation is primarily *aimed at* protection of Russia's national interests under the prevailing conditions of external pressure and, secondary, preservation of Russia's scientific identity. The tasks associated with this objective also reflect the sharpening of the purpose of international cooperation and the shift in the internal order between national interests and scientific identity. For instance, coordinated support measures are now to ensure, instead of facilitate, the entry of Russian scientific, educational, and manufacturing companies into global knowledge and technology markets.[58] The main difference from the old version is otherwise the new task of accelerating cooperation within the union state with Belarus, participating states in the Commonwealth of Independent States, as well as with other friendly foreign states, primarily within the intergovernmental associations BRICS, the Shanghai Cooperation Organisation.[59]

However, this radical reorientation of Russian science and technology largely confirms changes that had already occurred in 2022 following Russia's full-scale invasion of Ukraine. Western economic sanctions have complicated the purchase of high-tech equipment and materials. The additional sanctions aimed at isolating Russian science from its Western counterparts by severing institutional ties, halting joint projects, restricting Russian participation in scientific conferences, and limiting opportunities for publishing scientific articles. Specific universities were also targeted.[60]

In response, the Russian government had accordingly already begun reorienting Russia's international scientific cooperation towards friendly countries that had not imposed sanctions. This shift was one of its countermeasures, undertaken long before the adoption of the revised strategy. Enhanced cooperation with China has been perceived as promising, although the Chinese point of view is that Russia is not the most prioritised country. Russia also finds countries such as India and Iran promising, at least within certain research fields.[61]

Beyond these countries, Russia's list of friendly countries offers limited opportunities for expanded research cooperation. For instance, while relations with the new countries in the enlarged BRICS+ group — Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates — are possible within certain areas of mutual interest, they are unlikely to strengthen Russia's science and technology sphere.[62] Countries contemplating collaboration with Russia also need to consider the potential for secondary sanctions from Western powers, given the heightened risk of such measures being imposed on those who engage too closely with Russia.

Expected results

Given the need for a high level of abstraction in a strategy document, neither version of the strategy specifies any tangible results with quantifiable targets. Instead, the expected outcomes remain broad in both texts, although there are some important distinctions to be made.

The development of the strategy marks a shift in priorities, moving from a broader, more detailed, and ambitious view on how the strategy will reshape the role of science and technology in the advancement of society, the economy, and the state. It lists specific outcomes, such as competitiveness, innovation, and global influence to equip the country to take on major challenges.[63] In contrast, the 2024 version is more abstract, conservative, and internally focused, reflecting concerns about maintaining national security, technological sovereignty, sustainable development, and economic growth.[64]

According to the 2024 version, measures included in the first stage (2017–2019) of the old strategy were carried out in 2017–2021. However, the text does not explain the criteria on which the authors base their claim, nor does it provide a detailed account of how they arrived at this conclusion. At this level, it is therefore impossible for an outside observer to know, for instance, whether the authors have been able to establish a clear connection between effort and intended outcome, have considered any possible side effects, or had any regard for the stakeholder perspective. Many underlying plans and programmes do contain key figures that could be helpful in this regard, but data on the extent to which these quantified goals have been achieved and within

the original time frames are typically unavailable. Moreover, previous studies have demonstrated that such key figures may be unrealistic to achieve or vaguely defined, leading to goal achievement that becomes what the goal-setter wants it to be.[65]

If the retrospective view seems unconvincing, the forward-looking perspective comes across more as a wish list. In 2016, this wish list for 2020–2025 and beyond requested active commercialisation of new intellectual property results, as well as an increase in exports of technology and high-tech products.[66]

According to the updated strategy, until 2030 and beyond, its implementation envisions a restructuring of the sectoral management system under a mobilisation regime, caused by the long-term nature of the political, economic, and technological sanctions. Furthermore, the strategy incorporates the alignment of scientific and technological forecasts with decision-making and strategic-planning processes, a transition to a new system for training qualified personnel for high-tech sectors, and the accelerated development and localisation of import-independent technologies. Finally, it emphasises the necessity to replace outdated technologies, boost exports of high-tech products, and advance fundamentally new scientific and technological solutions to enhance Russia's global competitiveness.[67] In comparison, the 2024 list of expected results is thus longer, more detailed, and introspective. While Russia's international ambitions in science and technology persist, they have been deprioritised to make way for more introspective actions in response to external sanctions. Notably, the strategy's authors anticipate that these sanctions will remain in place for the foreseeable future.

Financing

When it comes to financing the strategy, the biggest surprise is that there are practically no surprises. Both versions outline the same financial framework, maintaining the same overarching goals and approach. However, the earlier version is more general, while the updated version offers greater specificity regarding funding sources and the link between performance and financial support.

Both versions emphasise a gradual increase in research and development expenditures to at least 2 percent of GDP by 2035. Given their assessment of a worsening external environment, one might have expected the authors of the new strategy to advocate for an even higher share of GDP, reflecting the increased urgency. In fact, Russia invests significantly less in research and development, both in absolute terms and as a percentage of GDP, compared to the US and China.[68] Even if Russia were to achieve the target of 2 percent of GDP by 2035, this share would still probably fall below the OECD average, which stood at 2.7 percent in 2021.[69]

Financing relies on a combination of budgetary allocations from federal, regional, and state programme budgets, contributions from state corporations and public-law companies, and funds from entities such as the Russian Science Fund. Additionally, extra-budgetary sources, including public-private partnerships, will contribute to the funding. The new version explicitly states that, by 2035, private investment should not be lower than public investment, while the older version simply notes that private investment should be proportional to public investment.[70]

Conclusions

Considering the results achieved during the Year of Science and Technology in Russia in 2021, Vladimir Putin declared the years 2022–2031 the Decade of Science and Technology in April 2022. The main goals of the Decade are to attract talented youth to science, to involve researchers and developers in addressing essential tasks to develop society and the country, and to make information on the achievements and prospects of Russian science more accessible for citizens of Russia.[71] This presidential decree reflects a characteristic Russian top-down approach to addressing sectoral structural issues. The state will not only set market rules but also actively pursue sector policies that encompass development programmes, action plans, financial support, and long-term strategic goals. A close examination of both versions of Russia's strategy for scientific and technological development demonstrates that, in this domain, Russia is not poised to change its approach, but rather to entrench it further.

A detailed reading of the strategy reveals this: the evolving outlook of the state and its identification of strategic challenges are founded on an intensification of the prevailing mindset within the ruling elite. The latest version of the strategy adopts a more isolationist approach, driven by a deliberate ambition to minimise dependence on Western states and mitigate the impact of sanctions that currently exclude Russia from international research contexts involving Western states. Instead, the new strategy prioritises expanded cooperation with friendly states where Russia perceives itself as capable of taking a leading role.

This shift has several implications. For Russia, the current level of conflict with the West represents a new Cold War, one it expects to persist for a long time, if not permanently. Under these circumstances, the new

strategy becomes another tool for Russia's current leadership to build the "multipolar world" it envisions.

Another important aspect of the new strategy is the increased securitisation of the entire science and technology sector, in other words, the transformation from being a regular political issue to becoming a matter of national security. The new document places even greater emphasis on the sector's role in building and strengthening state security. For the state, it is no longer enough to harness the intellect of Russia's scientists; with the introduction of patriotic education, it now also aims to capture their loyalty and ideals.

Thus, the science and technology sector appears set to fall into the pattern of a traditional Russian planning curse, rooted in the Soviet command economy with its high need for control. Both versions of the strategy reveal a lack of understanding within the system regarding the nature of a modern information economy and the allocation of responsibilities among the state, financing institutions, the scientific community, and technological entrepreneurs. Russia might still become prominent within certain prioritised segments of technology, but it is unlikely to become the technology leader across the board.[72] However, Russia's ambition to close the technological gap with more advanced countries is not reflected in its research and development investments, which fall short compared to those nations it seeks to emulate. Unaddressed, this gap may even widen.

Cooperation with friendly countries might alleviate the situation, but only so far. With China as a clear exception, most of Russia's friends do not have much to offer in technological expertise. Should Russia's technology gap with more advanced countries continue to widen, it may even risk losing its current leverage in technology diplomacy.

Russia's designated adversaries — Ukraine, the United States, NATO members, the European Union member states and their allies — have much to gain from extending their technological edge over Russia. Nonetheless, Russia's ability to excel in certain prioritised knowledge areas and research fields, particularly those with military significance, means it would be unwise to dismiss Russia outright as a nation of continued technological relevance and scientific influence. Given that the science and technology strategy only provides overall direction, it will be important to follow how it is operationalised through plans and concrete goals, in particular within these areas. ■

Tomas Malmlöf, M.Sc., is a senior analyst at the Swedish Defence Research Agency; his focus is on the Russian military industry complex

Endnotes

1 Presidential decree On Strategy for Scientific and Technological Development of the Russian Federation, no.145, 28 February 2024. Hereafter referred to as SST (2024).

2 Presidential decree On the Strategic Goals and Objectives of the Development of the Russian Science Foundation for the Period Until 2030, no.146, 28 February 2024.

3 Federal law On Strategic Planning in the Russian Federation, no. 172-FZ, 28 June 2014. Hereafter referred to as Federal Law, no. 172-FZ.

4 For a more detailed and critical review of Russia's entire strategic-planning system for science and prioritised technologies, see Chapter 3 (in Swedish) in Engvall, J., Gustafsson, P., and Vendil Pallin, C., *Framtid med förhinder: Rysk teknisk FoU till 2030* [Trouble Looming: Russian Technical R&D up to 2030], FOI-R--5204--SE, October 2021, *https://www.foi.se/en/foi/reports/report-summary.html?reportNo=FOI-R--5204--SE*.

5 Federal Law On Amendments to the Federal Law On the Protection of the Rights of Legal Entities and Individual Entrepreneurs in the Exercise of State Control (Supervision) and Municipal Control, and the Federal Law On Strategic Planning in the Russian Federation, no. 277-FZ, 3 July 2016.

6 Presidential decree On Strategy for Scientific and Technological Development of the Russian Federation, no.642, 1 December 2016. From here on referred to as SST (2016).

7 SST (2024) para. 1.

8 Federal Law, no. 172-FZ, art. 18.1, para. 1; art. 3, para. 20.

9 Engvall et al., (2021), p. 18.

10 Federal Law, no. 172-FZ, art. 18.1, para. 2; Engvall et al., (2021), p. 19.

11 Decree no. 145, para. 43.

12 Federal Law, no. 172-FZ, art. 18.1, para. 5.

13 Meeting of the presidential council for science and education, 8 February 2023, *http://kremlin.ru/events/president/news/73407* (accessed 15 April 2024).

14 Federal Law, no. 172-FZ, art. 18.1, para. 1

15 The term "authors" refers here to the collective of natural persons as well as institutions, authorities and other relevant entities that have been involved in the process of producing the two strategy documents.

16 SST (2016, 2024) para. 8

17 SST (2016, 2024) para. 9.

18 SST (2016, 2024) para. 9.

19 SST (2024) para. 10a. The alphabetic enumerations of subparagraphs in this text are in accordance with the Russian alphabet, if not stated otherwise.

20 SST (2024) para. 10b.

21 Engvall et al., (2021), p.33.

22 SST (2024) para. 10v.

23 SST (2016, 2024) para. 11.

24 SST (2016) para. 11 subpara. a–v.

25 SST (2016) para. 11 subpara. g–zh.

26 See Bukkvoll, Tor, Malmlöf, Tomas, and Makienko, Konstantin (2017), "The Defence Industry as a Locomotive for Technological renewal in Russia: Are the Conditions in Place?" *Post-Communist Economies* 29 (2), pp. 232–249; Chapter 3 (in Swedish) in Engvall et al., (2021).

27 SST (2024) para. 11 subpara. a–g.

28 SST (2016, 2024) para. 13–14.

29 See Russian National Security Strategy (2021), section II, Russia in the modern world: Tendencies and opportunities, *www.kremlin.ru/acts/bank/47046*

30 SST (2024) para. 15, subpara. b–z.

31 SST (2024) para. 15, subpara. a.

32 SST (2024) para. 16, subpara. a–d.

33 Meeting of the Presidential Council for Science and Education, 8 February 2023, *http://kremlin.ru/events/president/news/70473*, (accessed 19 April 2024).

34 SST (2024) para. 21, subpara. a–zh.

35 SST (2024) para. 21, subpara. z–i.

36 Russian National Security Strategy (2021) para. 16, *www.kremlin.ru/acts/bank/47046*.

37 SST (2024) para. 17.

38 SST (2024) para. 18.

39 SST (2024) para. 19.

40 SST (2016) para. 30, subpara. a.

41 SST (2016) para. 30, subpara. b–e.

42 SST (2024) para. 25.

43 SST (2024) para. 26.

44 SST (2024) para. 27, subpara. a.

45 SST (2024) para. 27, subpara. b.

46 SST (2024) para. 27, subpara. v.

47 SST (2024) para. 27, subpara. g.

48 SST (2024) para. 27, subpara. d.

49 SST (2024) para. 23.

50 SST (2016) para. 28.

51 SST (2024) para. 24, subpara. a–d.

52 SST (2024) para. 28.

53 See further in Bukkvoll, T., Malmlöf, T., & Makienko, K. (2017). The defence industry as a locomotive for technological renewal in Russia: are the conditions in place? *Post-Communist Economies*, 29(2), 232–249. *https://doi.org/10.1080/14631377.2016.1267967*

54 SST (2024) para. 29, subpara. a–zh.

55 SST (2024) para. 30.

56 See Dezhina, Irina (2023) "Russia's Science Policy 2018–2022: Mixed Signals," *Social Sciences*, vol. 54, no. 3, 2023, doi: 10.21557/SSC.87929010.

57 SST (2024) para. 31.

58 SST (2024) para. 32.

59 SST (2024) para. 32, subpara. b.

60 Dezhina, Irina (2023) "The state of science and innovation in Russia in 2022', *Russian Economy in 2022 — Trends and outlooks*, Issue 44, pp. 395–422, Gaidar Institute for Economic Policy, Moscow, 2023, *https://www.iep.ru/files/text/trends/2022eng/5.pdf.*

61 Dezhina, Irina (2023) 'The state of science and innovation in Russia in 2022," Russian Economy in 2022 — Trends and outlooks, Issue 44, pp. 395–422, Gaidar Institute for Economic Policy, Moscow, 2023, *https://www.iep.ru/files/text/trends/2022eng/5.pdf.*

62 Dezhina, Irina (2024) "Russia and the New BRICS Countries — Potentials and Limitations," *Ifri Papers No. 136*, Ifri, September 2024, p. 22, *https://www.ifri.org/en/papers/russia-and-new-brics-countries-potentials-and-limitations-scientific-and-technological*, (accessed 01 October 2024).

63 SST (2016) para. 36–37.

64 SST (2024) para. 43–44.

65 See chapter 5 (in Swedish) in Engvall et al., (2021).

66 SST (2016) para. 40.

67 SST (2024) para. 47.

68 Engvall et al., (2021), pp. 28–31.

69 OECD (2024), *Gross Domestic Spending on R&D* [online], available at *https://www.oecd.org/en/data/indicators/gross-domestic-spending-on-r-d.html* (accessed 17 October 2024).

70 SST (2024) para. 56.

71 President of Russia (2022) "2022–2031 declared Decade of Science and Technology in Russia" [online], available at *http://en.kremlin.ru/acts/news/68278* (accessed 21 October 2024).

72 Engvall et al., (2021), p. 5.