

amount is less than Rb100,000. If such amount ranges from Rb100,000 to Rb1 mn, it has to be approved by the arbitration judge in a simplified manner, i.e. solely without a court hearing and without summoning parties participating in the bankruptcy case (unless there is a motivated motion to schedule a court hearing (p. 2 Article 60)). The amount exceeding Rb1 mn is subject to approval at a meeting of the arbitration court (p. 9 Article 20.6).<sup>1</sup> These innovations are aimed at reducing the burden on courts hearing bankruptcy cases, as previously any amount of interest was determined by the court in a judicial act issued at the conclusion of the relevant procedure (except for bankruptcy proceedings, where the amount was determined by a separate judicial act).

Other changes include (a) a ban on challenging certain transactions<sup>2</sup> in order to protect owners of mortgage bonds from risks associated with bankruptcy of credit institutions, to increase attractiveness of investments in mortgage-backed bonds<sup>3</sup> and (b) changes aimed at reducing terms of settlements with creditors of a credit organization by granting an indemnity, allowing to accelerate bankruptcy proceedings<sup>4</sup>.

### 5.3. The state of science and innovation<sup>5</sup>

In 2024, active lawmaking activities were carried out in the science and technology (S&T) studies, a set of long-term documents was adopted, including the Strategy for Scientific and Technological Development of the Russian Federation, and a list of priority areas and key knowledge-intensive technologies was approved. Changes were introduced in the system of S&T development governance, including the assignment of new functions to the Russian Academy of Sciences

1. In exceptional cases, the amount of interest on remuneration of an arbitration manager may be reduced by the court at the request of a party to the case, if it is clearly disproportionate to manager's contribution to achieve results of bankruptcy proceedings (p. 18 Article 20.6). This norm enshrines in the Bankruptcy Act the already existing legal opinion of the RF Supreme Court, whereby a decision on reduction of such amount shall be made by the arbitration court, if the court finds that the manager demonstrated negligence performing his duties or if the work was only partially performed. Thus, granting the arbitration manager the right to calculate the amount of interest on his own remuneration is subject to control. Refer, for example: Review of judicial practice on participation of an arbitration manager in a bankruptcy case (approved by Presidium of the RF Supreme Court on 11.10.2023) // Bulletin of the RF Supreme Court, No. 12, December, 2023.
2. Federal Law No. 409-FZ of 20.10.2022 "On Amendments to the Federal Law 'On Mortgage-Backed Securities' and Certain Legislative Acts of the Russian Federation" // RG, No. 240, 24.10.2022.
3. Explanatory Note to Draft Federal Law No. 1262116-7 "On Amending the Federal Law 'On Mortgage-Backed Securities' and Certain Legislative Acts of the Russian Federation" // SPS ConsultantPlus.
4. Federal Law of 22.07.2024 No. 208-FZ "On Amending Articles 61.17 and 189.96 of the Federal Law 'On Insolvency (Bankruptcy)' and Articles 19 and 39 of the Federal Law 'On Insuring Deposits in Banks of the Russian Federation' // RG, No. 167, 31.07.2024.
5. Author: *Dezhina I. G.*, Doctor of Economic Sciences, Leading Researcher, Gaidar Institute; Head of the Analytical Department on Science and Technology Development, Skolkovo Institute of Science and Technology.

concerning expertise, information support of research and training of highly qualified personnel. In accordance with the new goals and objectives, the structure of budget financing of research and development was changed, and the emphasis on support for young scholars was strengthened. This took place against the background of issues caused by sanction restrictions and their consequences, such as “brain drain” and reduction of international cooperation with traditional academic partners.

In the innovation sector, companies’ R&D expenditures began to grow, and their cooperation with Russian research institutes and universities started to expand. In general, difficult geopolitical conditions have had a more negative impact on the science sector than on the activities of high-tech companies in terms of their R&D investments.

### **5.3.1. New outlines of S&T policy: mobilization mode of science and technological sovereignty**

The approval of several key documents, including those of a strategic nature, defining the goals, priorities and principles of functioning of the sphere of science, became a peculiarity of 2024.

In February, an updated Strategy for Scientific and Technological Development of the Russian Federation<sup>1</sup> (hereinafter — the Strategy) was adopted. It enshrined the concept of technological sovereignty as the state’s ability to create and apply critical knowledge-intensive technologies and to be able to organize production in strategically important industries on their basis. The focus of the policy changes from the creation of technologies, goods and services that meet national interests and are in demand in the world to the priority provision of Russia’s domestic needs.

The Strategy sets out several key positions concerning the science governance system, namely:

- 1) It is stated that from 2022 the phase of “mobilization development of the scientific-technological sphere in the context of sanction pressure” has begun (p.10 b) of the Strategy). In this context, science serves as “the basis for the sovereign development of the state” (p.11 of the Strategy).
- 2) Accordingly, it is necessary to consolidate the efforts of all state and regional authorities in order to create a favorable environment for using the fruits of science (p.5 of the Strategy).
- 3) It is stated that in the coming 10 years the priority areas are to create domestic knowledge-intensive technologies (p. 21 of the Strategy), and at the same

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1. Executive Order of the President of the Russian Federation No. 145 of 28.02.2024 “On the Strategy of Scientific and Technological Development of the Russian Federation”. URL: <https://www.garant.ru/products/ipo/prime/doc/408518353/>

time it is emphasized that the value of basic science, which provides the generation of new knowledge, relying “on the internal logic of its development” (p. 19 of the Strategy), is preserved. At the same time, in comparison with the last Strategy (2016), there is no longer a clause on freedom of scientific and technical creativity, which generally corresponds to the mobilization mode of scientific activity.

- 4) It is decided that by 2030 the governance system in the field of science, technology and technological entrepreneurship should be restructured in the context of mobilization mode (p. 47 of the Strategy).
- 5) The parameters of international scientific cooperation are specified where the emphasis is now placed on the protection of national interests under external pressure. Priority is given to cooperation “with the member states of the Commonwealth of Independent States (taking into account the potential and specifics of each country) and friendly foreign countries, primarily within the BRICS interstate association, Shanghai Cooperation Organization, Eurasian Economic Union, while maintaining openness for mutually beneficial equal cooperation with all countries” (paragraph 32 of the Strategy).

The Strategy also outlines the main challenges of socio-economic development and identifies the technologies that are needed to solve the existing problems. Compared to the previous Strategy, two new technological directions have been added. The first is the assessment of emissions and absorption of climate hazardous substances and the second is the transition to the development of “*nature-like technologies*”. The development of the latter is driven by the Kurchatov Institute.<sup>1</sup> These technologies have become one of the most discussed, since the concept of “nature-like” is rather vague. According to experts’ estimates, methodology, criteria and principles of designing such production systems are required<sup>2</sup> that have not been explicitly described yet.

However, the main focus of the Strategy is not the list of directions, but rather the new principles of domestic and international functioning of the scientific sphere. These principles are repeated in varying degrees of detail in subsequent decrees and instructions.

The extent to which S&T has been able to meet its objectives will be assessed on the basis of several key indicators. Some of them were also present in previous strategic documents (for example, such as the share of young scholars in the total number of researchers or growth in the volume of domestic expenditure on R&D and increase in the share of extra-budgetary funding in such expenditures). The Strategy also introduces a new indicator oriented at assessing the degree

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1. Bykova N. Science targets have been adjusted to 2035 // Monocle, No. 13, 25.03.2024. URL: <https://monocle.ru/monocle/2024/13/nauke-skorrektirovali-tseli-do-2035-goda/>

2. Kulikov A. Will we be able to emulate Nature? // Stimul online, 01.03.2024. URL: <https://stimul.online/articles/tekhnosfera/sumeem-li-my-podrazhat-prirode/>

of achievement of technological sovereignty — “the ratio of sales of domestic knowledge-intensive products to the volume of purchases of similar foreign products, primarily originating from unfriendly foreign countries (including without the consent of the right holders)” (paragraph 59 c) of the Strategy).

The main quantitative benchmark is the resource indicator: by 2035, it is planned to increase total R&D expenditure to at least 2% of GDP, with the share of extra-budgetary sources to be no lower than public investment. It should be noted that the target of 2% by 2035 is a very low benchmark if we compare it with the current R&D expenditures in countries that are successfully developing new technologies. For example, in China they amount to 2.56% of GDP, in Germany — 3.13%, in Japan — 3.41%, in the USA — 3.59%, in South Korea — 5.21%.<sup>1</sup> At the same time, in Russia, according to data for 2023, expenditure on research and development have fallen to 0.96% of GDP, and thus the set target implies their doubling.

The Strategy’s provisions are developed in the President’s Address to the Federal Assembly<sup>2</sup> (hereinafter — the Address). It speaks about the importance of the technological base of development, repeats the strategic goal of doubling investments in R&D, as well as the argument about the permanent relevance of solving fundamental problems. In this context, the need to develop mega science facilities is emphasized. An important part of the Address is the development of the issue of priorities: it is announced that *national projects of technological sovereignty* will appear in the country. Their implementation should accelerate the modernization of industry and contribute to the economy reaching a new level of efficiency and competitiveness. Finally, the Address introduces a quantitative benchmark for assessing the degree of achievement of technological sovereignty: the share of domestic high-tech goods and services in the domestic market should increase by 1.5-fold over the next six years.

In early May, the Presidential Executive Order “On the National Development Goals of the Russian Federation for the period up to 2030 and in the perspective up to 2036”<sup>3</sup> was released. One of the goals is to achieve *technological leadership*. In addition to increasing R&D expenditures to 2% of GDP and increasing the share of domestic high-tech goods and services by 1.5-fold, leadership will be determined by such parameters as Russia’s entry into the top ten countries in the world in terms of research and development and a seven-fold increase in the revenue of small technology companies compared to the 2023 level.

In late May, a meeting of the Council for Strategic Development and National Projects and the State Council commissions on areas of socio-economic develop-

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1. Science. Technologies. Innovation: 2025: statistical summary. M.: ISSEK HSE, 2025. P.41.

2. Address of the President to the Federal Assembly. 29.02.2024. URL: <http://kremlin.ru/events/president/news/73585>

3. Executive Order of the President of the Russia Federation of 07.05.2024 No. 309 “On the National Development Goals of the Russian Federation for the period up to 2030 and in the perspective up to 2036”. URL: <http://www.kremlin.ru/acts/bank/50542>

ment<sup>1</sup> was held. At the meeting, the President of the Russian Federation stressed that a mobilization mode of development is being implemented, when “*everyone should work as on the front line, everyone should feel mobilized*”. And the results of national projects will be evaluated not by resource and process indicators (such as the amount of money invested and the number of activities carried out), but by “*how people’s lives are actually changing and, of course, how citizens themselves evaluate these changes*”. In fact, this means that it is necessary to develop a complex system of quantitative and qualitative assessment of the changes taking place.

In June, the meeting of the Council on Science and Education continued to discuss the topic of mobilization mode of science, including such aspects as the development of fundamental research, selection of priority areas and critical technologies.<sup>2</sup> The President of the Russian Federation noted the need to gather scientific, technological, educational and industrial potential “in a single fist” to solve current problems. However, science should prepare the basis for the creation of future promising technologies, and therefore fundamental research should be conducted on a *broad front*.

The Council meeting resulted in the Executive Order of the President of the Russian Federation “On Approving Priority Areas of Scientific and Technological Development and the List of Major Knowledge-Intensive Technologies”.<sup>3</sup> It lists 7 priority areas and 28 most important high-tech technologies, including 21 critical technologies and 7 cross-cutting technologies. The latter included nature-like technologies. By the end of the year, the government had formed 8 *national projects of technological leadership* to develop the selected areas, each of them envisaging the creation of new and recreation of existing critical technologies. For example, the national project “New Materials and Chemistry” is supposed to recreate 55 critical technological chains.<sup>4</sup> Since the level of technological independence differs in each area, the quantitative goals of each national project are different. For example, under the national project “New Nuclear and Energy Technologies” the level of technological sovereignty is estimated at 72% and the goal is to raise it to 90% by 2030, while under the national project “Unmanned Aviation Systems” it is planned to achieve 70% technological independence.<sup>5</sup>

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1. Meeting of the Council for Strategic Development and National Projects and the State Council commissions on areas of socioeconomic development of the Russian Federation. 29.05.2024. URL: <http://kremlin.ru/events/president/news/74162>

2. Council for science and education meeting. 13.06.2024. URL: <http://kremlin.ru/events/president/news/74277>

3. Executive Order of the President of the Russian Federation of 18.06.2024. No. 529 “On Approval of Priority Areas of Scientific and Technological Development and the List of Major Knowledge-Intensive Technologies”. URL: <https://www.garant.ru/products/ipo/prime/doc/409113212/>

4. Meeting with the First Deputy Prime Minister Denis Manturov 20.11.2024. URL: <http://kremlin.ru/events/president/news/75604>

5. Ibid.

Table 7

**Main strategic documents and activities for 2024 in the field  
of science and technology**

Document and event	Date of approval ("holding")	Main subjects
Strategy for Scientific and Technological Development of the Russian Federation	28.02	Science mobilization, technological sovereignty, place of basic science, parameters for international cooperation, priority technological areas, key indicators for achieving goals
Address of the President to the Federal Assembly	29.02	Repeating key provisions of the Strategy, announcing the development of national technological sovereignty projects, introducing an indicator for assessing the achievement of technological sovereignty
Executive Order of the President of the Russia Federation "On the National Development Goals of the Russian Federation for the period up to 2030 and in the perspective up to 2036"	07.05	The goal of achieving technological leadership is introduced, and a list of indicators for assessing its achievement is provided
Meeting of the Council for Strategic Development and National Projects and the State Council commissions on areas of socioeconomic development of the Russian Federation	29.05	Mobilization mode of science, evaluation of the outcome of national projects
Council for science and education meeting	13.06	Mobilization mode of science, development of fundamental research, selection of priority areas and critical technologies
Executive Order of the President of the Russian Federation "On Approving Priority Areas of Scientific and Technological Development and the List of Major Knowledge-Intensive Technologies"	18.06	List of 7 priority areas and 28 most important knowledge-intensive technologies

Source: Own compilation.

Finally, in September, the Ministry of Science and Higher Education of the Russian Federation specified the system for assessing the degree of progress towards technological sovereignty, having developed a draft that contains 14 criteria<sup>1</sup> divided into four groups. The first group includes two main target indicators of the Strategy for Scientific and Technological Development: the share of domestic R&D ex-

1. Petrova V. A report card for science and technology // Kommersant, No. 159, 03.09.2024, p. 2. URL: <https://www.kommersant.ru/doc/6932881>

penditure in GDP and the share of extra-budgetary sources. The second group of indicators assesses the competitiveness and efficiency of science according to four parameters: Russia's place in the world in terms of R&D, the ratio of sales of domestic and foreign knowledge-intensive products, the number of patent applications and publications in top "White List" journals.<sup>1</sup> The third group can be considered key in the context of ensuring technological sovereignty, since the subject of assessment is the impact of scientific achievements and developed technologies on the development of economic sectors. It comprises six indicators, including such indicators as the number of domestic technologies used by organizations of the real sector of the economy, the revenue of small technology companies, and the share of products of high-tech and knowledge-intensive industries in GDP. The fourth group of indicators should give some idea of the human and material support of science. It includes two indicators: the share of young scholars in the total number of researchers and the book value of machinery and equipment per researcher. Thus, the methodology takes into account all the indicators mentioned both in the Strategy and in other documents of scientific and technological development adopted in 2024.

Schematically, the strategic decisions taken in 2024 concerning S&T policy are presented in *Table 7*.

Thus, the main provisions of the new S&T policy in the context of technological sovereignty include the transition to a mobilization mode of science development while maintaining a broad front of basic research, new principles of international scientific cooperation, a plan to double R&D expenditure in GDP by 2035, approval of a new list of priority areas, critical and cross-cutting technologies, as well as the general framework of the system for assessing the achievement of not only technological sovereignty, but also technological leadership.

### 5.3.2. Budget financing of R&D

Budget financing of R&D in 2024 reflected the previous trends and priorities, and only from 2025 changes in the structure of R&D expenditure are introduced. An important event was the completion in 2024 of the National Project "Science and Universities", which is key for the sphere of science. Dmitry Chernyshenko, Deputy Prime Minister of the Russian Government, stated that the National Project was 100% implemented.<sup>2</sup> Since 2025, some programs and projects of the National Project "Science and Universities" will be funded under the new National Pro-

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1. For more information on the White List of journals, see. State of Science and Innovation//Russian Economy in 2023. Trends and Prospects. (Issue 45). Moscow, Gaidar Institute Press, 2024. P. 356–357.
  2. Petrova E. National project "Science and Universities" is fully implemented // Rossiyskaya Gazeta, 19.06.2024. URL: <https://rg.ru/2024/06/19/programma-maksimum.html>

ject “Youth and Children”. Science-related areas are mainly grouped in the Federal Project “Universities for the Leaders’ Generation”, where the emphasis is shifted towards supporting young scholars. The budget of the project for 2025 is approved at the amount of 44.1 billion rubles. For comparison, the funding, although not completely identical federal projects within the National Project “Science and Universities” amounted in 2024 Rb 41.8 bn. From the National Project “Science and Universities” the new program comprises the program to support universities “Priority-2030”; training of engineering personnel on the basis of advanced engineering schools; creation of a network of modern campuses, as well as measures to involve young people in science (youth laboratories, Congress of Young Scholars, personnel management reserve in the field of science, etc.).

In 2025, the Federal Project “Creation of Large Infrastructure Facilities for Science and Education”, which was previously part of the National Project “Science and Universities”, will be continued, with significantly more funding. In 2024 it amounted to Rb 23.1 bn, while in 2025 it is planned to come to Rb 36.5 bn, with further growth of expenditure up to Rb 78.6 bn in 2026 and Rb 73.7 bn in 2027. The significant increase is probably due to the fact that strategic documents point to the importance of developing mega science infrastructure, and in the context of shrinking international cooperation such projects have become more expensive.

In general, the funding of many science projects is becoming more part of the youth agenda than science itself as an independent sphere of the economy, and the number of measures and activities for young people is increasing.

In the area of support for basic research, a substantial increase<sup>1</sup> was announced compared to the actual allocations for 2024. At the same time, expenditures are decreasing when compared to the figures of the 2023 Budget Law No. 540-FZ<sup>2</sup> (Table 8). Taking into account inflation, expenditures on fundamental research become even less, which is also reflected in the parameters of financing of the Russian Science Foundation (RSF).

Compared to the Law of 27.11.2023 No. 540-FZ, the funding of the RSF for 2025 remains as planned, while in 2026 it slightly decreases (Rb 33.7 bn vs. the previously planned Rb 35.5 bn). In 2024, the RSF funding was cut by Rb 3.5 bn.<sup>3</sup> Therefore, it was necessary to refuse to extend the projects of individual scientific groups. The number of new projects that received support dropped by 35% compared to 2023.<sup>4</sup>

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1. In 2025, expenditure on science will grow by // TASS, 07.11.2024. URL: <https://tass.ru/ekonomika/22338541>

2. Federal Law “On the Federal Budget for 2024 and for the Planned Period of 2025 and 2026” of 27.11.2023 No. 540-FZ.

3. Waited in vain. RSF did not receive additional funding this year // Poisk, No. 39, 27.09.2024. P. 6.

4. *Volchkova N.* You’ve had enough! According to the trade union, the Ministry of Finance is not going to execute the instruction of the President of the Russian Federation // Poisk, No. 21, 24.05.2024. P.4. URL: <https://poisknews.ru/science-politic/s-vas-hvatit-po-mneniyu-profsoyuz-a-minfin-ne-sobi-raetsya-vypolnyat-poruchenie-prezidenta-rf/>



*Table 8*

**Budget allocations of fundamental research (Rb bn)**

	2024	2025	2026	2027
Law No. 540-FZ (2023)	260.8	234.5	277.0	–
Law No. 419-FZ (2024)	188.1 (actual)	226.5	218.2	225.3

Sources: Federal Law “On the Federal Budget for 2024 and for the Planned Period of 2025 and 2026” of 27.11.2023 No. 540-FZ; Federal Law of 30.11.2024 No. 419-FZ “On the Federal Budget for 2025 and for the Planned Period of 2026 and 2027.”

*Table 9*

**Budget allocations to support the Russian Science Foundation, Rb bn.**

Type of spending	2025	2026	2027
<b>Asset contribution of the Russian Federation for the performance of fundamental scientific research</b>	<b>35.2</b>	<b>33.7</b>	<b>33.7</b>
<i>Funding of applied and targeted projects by area:</i>			
Radio electronics	3.0	–	–
Transportation mobility	0.608	–	–
New materials and chemistry	0.5	0.5	0.5
Means of production and automation	0.19	0.38	0.64
<b>Total on applied projects</b>	<b>4.298</b>	<b>0.88</b>	<b>1.14</b>

Source: Federal Law No. 419-FZ dated 30.11.2024 “On the Federal Budget for 2025 and for the planning period of 2026 and 2027”.

The RNF’s functionality was clarified in the Presidential Executive Order “On the Strategic Goals and Objectives of the Russian Science Foundation for the Period until 2030”.<sup>1</sup> The Executive Order establishes a new function of the Foundation to finance applied projects in the interests of external customers and technological partners. Such projects are called “scientific, scientific-technical programs and projects of the full scientific-technological cycle, which are characterized by an end-to-end system of planning, financing and management, in order to develop and use in sectors of the economy of priority knowledge-intensive technologies” (paragraph 7 c) of the Decree). In this case, according to the terms of RSF competitions, the customer is obliged to implement the development at his enterprise.<sup>2</sup> The sources of funding for these projects will be both the federal budget and extra-budgetary funds attracted by the Fund.

1. Executive Order of the President of the Russian Federation of 28.02.2024 No. 146 “On strategic goals and objectives of the development of the Russian Science Foundation for the period up to 2030”. URL: [https://www.consultant.ru/document/cons\\_doc\\_LAW\\_470976/](https://www.consultant.ru/document/cons_doc_LAW_470976/)
2. Ponarina E. Bring that, I know what. Or how science and business achieve their goals today // Poisk, No. 40, 4.10.2024. P. 6–7.

In the next three years, the RSF budget will be replenished by state co-financing of applied research for the radio-electronic industry, creation of production and automation equipment, transportation mobile systems, new materials and chemistry in the amount of Rb4.3 bn rubles in 2025, Rb0.88 bn in 2026 and Rb1.14 bn in 2027 (*Table 9*).

Thus, the structure of budget allocations indicates that expenditures on fundamental research will increase in current prices compared to the level of 2024, as well as investments in the development of scientific infrastructure. Expenditure on applied research, on the contrary, are slightly decreasing, apparently in anticipation of increased funding from industry and businesses. Despite the fact that youth issues are not mentioned as fundamental in strategic documents, support for young researchers is becoming one of the priorities of budget financing.

### 5.3.3. Changes in the system of science governance

In line with the new goals and priorities, the system of research and development management began to change in the direction of increasing centralization, coordination and strengthening the role of RAS, which is beginning to play a significant role not only in the expertise of projects, but also in the field of information support of research, as well as the system of thesis defense. In general, these changes correspond to the objectives of mobilization mode of science.

Firstly, the government expanded the powers<sup>1</sup> of the Commission for Scientific and Technological Development (hereinafter referred to as the Commission) in connection with the task of forming technological sovereignty. The Commission was established in 2021 to coordinate the activities of different levels of government, state academies of sciences, and scientific support funds. Now it will also coordinate the activities of federal and regional executive authorities and scientific organizations in the preparation of lists of priority areas of scientific and technological development and the most important high-tech technologies. It is assumed that this expansion of the Commission's powers will allow to strengthen the interrelations between the main state actors involved in the implementation of S&T policy.<sup>2</sup>

By the beginning of 2025, the Commission was granted additional powers, which significantly expanded its functionality: now it will be in charge of coordinating the allocation and redistribution of budgetary funds for civil R&D, as well as assessing the effectiveness of measures and instruments of state policy in the field of scientific and technological development.<sup>3</sup>

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1. Government Decree of 22.07.2024. No. 995 "On Amendments to the Decree of the Government of the Russian Federation of 30.04.2021 No. 689". URL: <http://government.ru/docs/all/154423/>

2. Petrova V. Scientific and technological project office // Kommersant, No. 132 of 26.07.2024, P. 2. URL: [https://www.kommersant.ru/doc/6852588?from=doc\\_vrez](https://www.kommersant.ru/doc/6852588?from=doc_vrez)

3. Executive Order of the President of the Russian Federation of 16.01.2025 No. 30 "On Amendments to Executive Order of the President of the Russian Federation of 15.03.2021 No. 143 'On Measures

However, experts from VEB.RF, the Institute of National Economic Forecasting of the Russian Academy of Sciences, St. Petersburg Polytechnic University (SPbPU) and the Kurchatov Institute have proposed to further strengthen the centralization of governance through the creation of the Bureau for Science and Technology, which will act as an apparatus of the Government Commission for Scientific and Technological Development. The Bureau proposed to be organized on the model of the USSR State Committee on Science and Technology (GKNT USSR).<sup>1</sup> According to the experts, the purpose of recreating the Soviet element of science governance is to establish a partnership between the civilian and defense sectors of the economy.

Secondly, the role of RAS in the system of goal setting, organization of research and evaluation of the results obtained has increased. In February, the celebration of the 300th anniversary of the RAS took place, following the results of which the President of the Russian Federation approved a list of instructions.<sup>2</sup> Among them, it is determined that RAS will provide general supervision of the activities of the Higher Attestation Commission (HAC). The first step was the appointment of RAS Vice-President Academician V. Panchenko as the head of the HAC.<sup>3</sup> Then the Government Decree was adopted,<sup>4</sup> which stipulates that the composition of the HAC is formed by the Ministry of Science and Higher Education on the recommendation of RAS.<sup>5</sup> Thus, now it is mainly the Academy of Sciences that determines who will become a member of the Commission.

In addition, the role of RAS in regulating the information support of scientific research is increasing. For this purpose, the Russian Center for Scientific Information was transferred to the subordination of RAS.

The transfer of HAC under the leadership of RAS raised many questions. For such management, the Academy should have a sufficient number of experts in all major areas of thesis preparation. Today the situation is as follows. For example, a significant number of theses are defended in the field of economics, and the corresponding section of RAS is relatively small. In some areas, such as architectu-

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to Increase the Effectiveness of the State Science and Technology Policy', Executive Order of the President of the Russian Federation of 15.03.2021 No. 144 'On Certain Issues of the Presidential Council for Science and Education' and to the Regulations Approved by this Executive Order". URL: <http://publication.pravo.gov.ru/document/0001202501160041>

1. Glazycheva A., Vinogradova E. Experts have proposed creating a science governance body in Russia, as in the USSR // RBC, 23.04.2024. URL: [https://www.rbc.ru/economics/23/04/2024/662622be9a79471728714a8e?from=share\\_footer](https://www.rbc.ru/economics/23/04/2024/662622be9a79471728714a8e?from=share_footer)
2. List of instructions on the results of the event dedicated to the 300th anniversary of the Russian Academy of Sciences. 06.05.2024. URL: <http://www.kremlin.ru/acts/assignments/orders/73987>
3. Yachmennikova P. Dissertations have come closer to science // Kommersant, 17.06.2024. URL: <https://www.kommersant.ru/doc/6773425>
4. Decree of the Government of the Russian Federation of 17.01.2025 No. 8 "On Amendments to the Decree of the Government of the Russian Federation of 26.03.2016 No. 237". URL: [https://www.consultant.ru/document/cons\\_doc\\_LAW\\_496319/](https://www.consultant.ru/document/cons_doc_LAW_496319/)
5. Previously, the Ministry of Education and Science independently determined the composition of the HAC.

re and construction, RAS has no experts at all. In addition, universities account for almost 80% of all thesis defenses, which means that it will be necessary to develop the principles of work between RAS and universities. The number of universities that have the right to independently award academic degrees has been increasing in recent years, so the question is also whether they will continue to be granted this right.

RAS expanded the area of expertise by strengthening its participation in the development of defense topics and in the formation of the list of civilian priority areas and knowledge-intensive technologies. The President of RAS was included in the Security Council, and now the Academy should more closely participate in the work to ensure the country's defense capability.<sup>1</sup> On the importance of the expert work carried out by RAS, the President of RAS said the following: we "want the expertise of RAS to be final and not subject to revision by other agencies."<sup>2</sup> In essence, this means promoting the idea of centralization and monopolization of scientific expertise.

Along with compiling the list of priority directions, RAS assessed the current topics on which scientific institutes work. It was concluded that the profile of institutes is blurred, and adjustment is required.<sup>3</sup> The changes are planned to be carried out through a new procedure for approving state assignments. The main goal is to ensure that research is carried out on a broad front (now they are fragmented) and at the same time to eliminate duplication. If duplicate subjects are found, it is planned to allocate those institutes that will continue to deal with them, and the rest will have to change their activity profile. At the same time, a "data bank of sought after scientific works"<sup>4</sup> will be formed with the participation of departments, scientific councils of the Russian Academy of Sciences and high-tech companies. Apparently, this is the realization of the long-discussed problem of "qualified customer". A part of institutes will have to switch to the topics from this "bank".

In order to choose those who will continue their research, and who should be retrained, the President of the Russian Academy of Sciences proposed to introduce rating of scientific institutions.<sup>5</sup> Assessment to determine the place in the rating

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1. *Mischenko E.* "We want the expertise of RAS to be final and not subject to revision": Gennady Krasnikov at the General Meeting of RAS // Indicator, 28.05.2024. URL: <https://indicator.ru/humanitarian-science/my-khotim-chtoby-ekspertiza-ran-by-la-okonchatelnoi-i-ne-podlezhalo-peresmotru-gennadii-krasnikov-na-obshem-sobranii-ran.htm>

2. Ibid.

3. Council of Science and Education meeting, 13.06.2024. URL: <http://kremlin.ru/events/president/news/74277>

4. *Khimshiashvili G., Sirotkin K.* Head of RAS — RBC: "Competencies and technological chains have been lost" // RBC, 03.06.2024. URL: <https://www.rbc.ru/interview/society/03/06/2024/6654ab5f9a7947b005c73c7b>

5. *Plamenev I.* The head of the Russian Academy of Sciences proposed to limit access to priority scientific works // RBC, 11.04.2024. URL: <https://www.rbc.ru/rbcfreenews/6618ff269a79475bdfc58dec>

will be carried out not only by bibliometric indicators, but also taking into account the level of readiness of the findings for practical use. For this purpose it is planned to conduct field inspections of institutes once in 3–5 years.<sup>1</sup>

In the logic of this approach, it turns out that the transition to new subjects from the “databank” will have to be made by the weaker institutes, which will also have to master new areas of work. At the same time, the monopolization of topics by individual scientific institutions will begin, which will lead to a decrease in competition and, consequently, in scientific performance. It is still unknown how to deal with possible negative effects. Pilot testing of this approach will begin in 2025 in four scientific areas where it is possible to quickly obtain applied results: Arctic research, aerospace research, development of the mineral resource base and low-tonnage chemistry.<sup>2</sup>

Last year RAS could strengthen its influence on former academic institutes through scientific and methodological management of National Research Center the “Kurchatov Institute”. National Research Center (NRC) already comprises 30 institutes, but the president of NRC has requested from the President of the Russian Federation 7 more institutes<sup>3</sup> for ownership, explaining it by the necessity “to close technological chains created in NRC”.<sup>4</sup> The administrations of the institutes scheduled to join the SIC promptly held Scientific Councils, at which they unanimously decided to refuse to move to the Kurchatov Institute. There were cited convincing arguments, such as NRC being under sanctions, which in case of accession will mean the spread of sanctions on these institutes as well; reduction of the possibility to receive grant funding for research in case of accession; risks of social tension development in the teams, which will entail the outflow of highly qualified personnel.<sup>5</sup> In view of the wide negative resonance in the scientific community, the RAS leadership did not support the NRC request, making a statement that there are no

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1. *Volchkova N.* How to tune an instrument? The RAS discussed methods for assessing scientific results // Poisk, No. 24–25, 21.06.2024. P. 6–7. URL: <https://poisknews.ru/science-politic/kak-nastroit-instrument-v-ran-obsudili-metody-ocenki-nauchnyh-rezultatov/>
  2. *Volchkova N.* For now, it's on our own. State assignment 2.0 will be financed within the allocated limits // Poisk, No. 52, 27.12.2024. P. 4–5. URL: <https://poisknews.ru/releases/poka-za-svoi/>
  3. The request was received for an affiliation of the Institute of Nuclear Research RAS (Troitsk), the Gorbатов Federal Scientific Center of Food Systems RAS, the Shirshov Institute of Oceanology RAS. Gorbатов RAS, the Shirshov Institute of Oceanology RAS, the Crimean VNI of Viticulture and Winemaking “Magarach” RAS, the North Caucasus Federal Scientific Center of Horticulture Viticulture and Winemaking, the Federal Rostov Agrarian National Center and the Institute of Microelectronics Technology Problems and Highly Pure Materials RAS.
  4. *Vedeneva N.* Kovalchuk asked Putin for ownership of seven more scientific organizations // MKRU, 08.07.2024. URL: <https://www.mk.ru/science/2024/07/08/kovalchuk-zaprosil-u-putina-v-sobstvennost-eshhe-sem-nauchnykh-organizatsiy.html>
  5. *Vedeneva N.* An emergency Scientific Council was held at the Institute of Oceanology: Researchers are against the transition to Kovalchuk // MKRU, 10.07.2024. URL: <https://www.mk.ru/science/2024/07/10/v-institute-okeanologii-sostoyalsya-ekstrennyy-uchenny-sovet-sotrudniki-protiv-perekhoda-k-kovalchuku.html>

plans to re-subordinate the institutes.<sup>1</sup> It may well turn out that the plan of joining is only postponed.

The main organizational change in the RAS structure, which is at the approval stage, is related to the formation of the Board of Trustees, which the academicians suggested to be headed by the President of Russia. According to the RAS leaders, such a Board will “facilitate the resolution of many issues” and will “contribute to faster decision-making”.<sup>2</sup> In November 2024, the President of the Russian Federation submitted to the State Duma a draft federal law “On Amendments to the Federal Law ‘On the Russian Academy of Sciences, Reorganization of State Academies of Sciences and Amendments to Certain Legislative Acts of the Russian Federation’”<sup>3</sup> for consideration and the draft law was adopted in the first reading in December.<sup>4</sup>

The main innovations introduced into the Law on RAS concern the creation of the Board of Trustees of the Russian Academy of Sciences (Art. 11). It is specified that the Board is headed by the President of Russia. One of the members of the Board will be the President of the Academy. The other members will be chosen by the head of state taking into account the wishes of the Presidium of RAS. Part of the decisions of the general meeting of RAS and the Presidium will be coordinated in the Board of Trustees. Among other things, the Council will deal with issues related to priority directions of RAS activities, creation, reorganization and liquidation of its regional branches of the Academy, the maximum number of its members.

Thus, in the general logic of mobilization mode of science, RAS is built into the main decision-making processes and expands the scope of its responsibility by acquiring new functions and forming the Board of Trustees, which can really contribute to a faster promotion of the ideas of the Academy leadership.

#### 5.3.4. Staffing situation in science and technology

The structure of budget allocations indicates a growing emphasis on supporting young researchers, although their share of the total scientific workforce has already reached the critical value of almost 44%. This means that the number of middle-

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1. RAS denied the transfer of the Academy’s institutes to the jurisdiction of NRS the “Kurchatov Institute” // Nauka. TASS. 11.07.2024. URL: <https://nauka.tass.ru/nauka/21337825>

2. *Grosheva M., Martynova P.* Academicians suggested that Putin should head a new body of the Russian Academy of Sciences // RBC, 28.05.2024. URL: <https://www.rbc.ru/politics/28/05/2024/6655981d9a794728022e877b>

3. Feedback on Draft Federal Law No. 775386-8 “On Amendments to the Federal Law ‘On the Russian Academy of Sciences, Reorganization of State Academies of Sciences and Amendments to Certain Legislative Acts of the Russian Federation’”. 04.12.2024. URL: <http://budget.council.gov.ru/activity/legislation/review/162669/>

4. *Tiazhlov I.* The State Duma approved the creation of the RAS Board of Trustees // Kommersant, 11.12.2024. URL: <https://www.kommersant.ru/doc/7365019>

generation scientists is relatively modest (indeed, those aged 40–59 is only 33%<sup>1</sup>), which disturbs the intergenerational balance and complicates knowledge transfer. Apparently, some young researchers leave the field of science after the end of specific “youth” support, as well as after the defense of a thesis. At the same time, the outflow occurs both within the country and abroad. Domestically, the competitors to the sphere of civil science are the enterprises of the military-industrial complex, which offer young specialists salaries much higher than those that can be obtained in an academic research institute or university.<sup>2</sup>

As for the outflow of scientific personnel abroad, according to surveys, emigration sentiments are strongest among those under 39 years of age. However, in 2024, a decrease in the number of young scholars who are ready to leave was noted. Only 6% of the surveyed young scientists (the sample amounted to 831 people)<sup>3</sup> have concrete plans to emigrate, and another 55% admit the possibility of leaving, but do not yet have a clear idea of where they will go. Thus, the actual potential for emigration is not critical, and this can be partly explained by the reduction in international contacts with countries that have been Russia’s main scientific partners for many years. Indeed, 81% of young scholars stated that they had no experience of studying or working abroad.

Comparison with the results of surveys of previous years shows that in the previous two years emigration sentiments were stronger. In 2022, 52% of young scientists had an increased emigration sentiment,<sup>4</sup> and in 2023 48.3% of scientists<sup>5</sup> had emigration sentiments of varying degree against the backdrop of the collapse of foreign contacts.<sup>6</sup> Thus, a generation of young researchers has begun to form for whom international cooperation is not an integral component of their scientific work. This being said, contacts were reduced at the initiative of foreign partners (organizations) in 79% of cases and only 21% noted that the initiative came from the Russian side (the share of answers “due to the ban of the Russian organization” was 68.9%).<sup>7</sup>

1. Science. Technologies. Innovation: 2025: statistical summary. M.: ISSEK HSE, 2025. P.32.
2. *Volchkova N.* You’ve had enough! According to the trade union, the Ministry of Finance is not going to execute the instruction of the President of the Russian Federation // *Poisk*, No. 21, 24.05.2024. P.4. URL: <https://poisknews.ru/science-politic/s-vas-hvatit-po-mneniyu-profsoyuza-minfin-ne-sobi-raetsya-vypolnyat-poruchenie-prezidenta-rf/>
3. *Rozmirovich S.* Is it easy to be a young scholar? // *Stimul* online, 06.12.2024. URL: <https://stimul.online/articles/sreda/legko-li-byt-molodym-uchenym/>
4. *Gusev A. B., Yurevich M. A.* Science Policy of Russia — 2022: Profession is not dearer than motherland. M.: Pero Publishers, 2022. P.10.
5. In this survey the data were not presented by age of respondents, but usually emigration sentiments are higher in the youth group. Therefore, the given data can be considered as the lower boundary of the estimation. Source: *Gusev A. B., Yurevich M. A.* Science Policy of Russia — 2022: Profession is not dearer than motherland. M.: Pero Publishers, 2022. P.14.
6. For 55% of scientists, overseas collaborations have declined, and 13.9% said they had no one left to keep in contact with. Source: *Gusev A. B., Yurevich M. A.* Science Policy of Russia — 2022: Profession is not dearer than motherland. M.: Pero Publishers, 2022. P.16.
7. *Ibid*, p. 17.

It should be noted that the surveys were conducted on different samples, so the results are not directly comparable, and we can only assess some trends.

Estimates of the number of those who left differ by order of magnitude, as different calculation methods are used. For example, the figure of 2,500 scientists who left in the last three years, which was obtained by analyzing the metadata of authors of scientific articles (ORCID), allowing to trace the change of affiliation, is widespread.<sup>1</sup> The estimate of 2500 people in this case shows not the actual number of emigrated scientists, but the number of those who left and managed to find a scientific job abroad. Finally, the President of RAS noted that he did not see a problem of “brain drain”, arguing that only 4 people out of 1900 members of RAS have emigrated.<sup>2</sup>

A more noticeable feature of 2024 was not a decrease in emigration, but the beginning of the process of return of a number of specialists who left. Those whose skills are in demand in Russia and those who have been offered good working conditions, often better than they were before leaving, have started to return.<sup>3</sup> In addition to scientists, this includes IT specialists of whom an estimated 16% of those who left in 2022 have returned.<sup>4</sup> Scientists who worked at CERN and had to stop working at the facility as of November 30, 2024, when the contract with Russia ended, have also returned. It is estimated that this is about 400 people.<sup>5</sup> Of course, this is not in the full sense of a return, since the scientists worked in Russian scientific institutions, but they stopped long-term travel to work on the unique scientific infrastructure.

The head of the Ministry of Education and Science said that foreign specialists<sup>6</sup> have also shown interest in working in Russia, which can be seen from the results of the mega grants competition, summarized in 2024. The terms of the competition have been enhanced in regard to the time that a foreign specialist must spend in Russia: during the first year of the project, he or she must stay in the country for at least 3 months, in the second year — for at least six months, and in subsequent years work in Russia on a permanent basis. At the same time, the funding is generous and for a long period of time: grants of up to Rb500 mn for a period of up to five years with the possibility of extension for another three years. As a result, the com-

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1. Robinson J. Estimates suggest at least 2500 scientists have left Russia since the beginning of the war // Chemistry World. 29.02.2024. URL: <https://www.chemistryworld.com/news/estimates-suggest-at-least-2500-scientists-have-left-russia-since-the-beginning-of-the-war/4019068.article>

2. Khimiashvili G., Sirotkin K. Head of RAS — RBC: “Competencies and technological chains have been lost” // RBC, 03.06.2024. URL: <https://www.rbc.ru/interview/society/03/06/2024/6654ab5f9a7947b005c73c7b>

3. Russians Who Fled Abroad Return in Boost for Putin’s War Economy // Bloomberg News, May 1, 2024. URL: <https://www.bloomberg.com/news/articles/2024-05-02/russians-who-fled-war-return-in-boost-for-putin-s-war-economy>

4. Kuzmenko K. Relocation of IT professionals after 2022. // NewHR, May 2024. URL: <https://newhr.org/data/it relocation22-24>

5. Scientists from Russian institutes have lost access to CERN // RIA Novosti, 01.12.2024. URL: [https://ria.ru/20241201/tsern-1986675556.html?rcmd\\_alg=slotter](https://ria.ru/20241201/tsern-1986675556.html?rcmd_alg=slotter)

6. There is growing interest among scientists to move to Russia — the head of the Ministry of Education and Science // IA Krasnaya Vesna, 01.11.2024. URL: <https://rossaprimavera.ru/news/0994d398>



petition received 102 applications from 36 countries; only 8 projects were supported, and among the winners there are representatives of such countries as Great Britain, Germany, Italy, the Netherlands, France, Sweden, Switzerland and Japan.<sup>1</sup>

### 5.3.5. International scientific cooperation

In the field of international scientific cooperation, the reorientation towards new partners, primarily from the BRICS countries, continued, i.e. the actual situation was generally in line with the priorities of the Strategy for Scientific and Technological Development of the Russian Federation. Officials emphasized the openness of Russian science, which also corresponds to the ideology of the new Strategy. Thus, at the St. Petersburg International Economic Forum, Andrey Fursenko, Assistant to the President of the Russian Federation for Science, noted that international cooperation in science should continue despite geopolitical differences and that Russia demonstrates openness and readiness for cooperation.<sup>2</sup> In practice, these words are confirmed by Russia's position on cooperation in mega science.

A high-profile event of the past year was CERN's decision to terminate the work of Russian researchers at the Large Hadron Collider (LHC). The agreement on access of Russian scientific institutions to the LHC was due to expire on November 30. About 500 scientists from Russian scientific institutions were working at the facility.<sup>3</sup> CERN has stopped receiving funding from Russia and previously the Russian side contributed about 4.5% to the total budget of experiments at the LHC.<sup>4</sup> In addition, unique Russian-made equipment was installed there. Since December 1, the access of Russian institutes to the facility has been closed.<sup>5</sup>

The termination of cooperation has negative consequences for all parties. The replacement of such a large number of people cannot go unnoticed by CERN, and only Russian specialists are familiar with the specifics of the equipment supplied there. In turn, Russian scientists who worked at the LHC have no opportunity to continue their research, since Russian mega science facilities do not replace but supplement what can be done at CERN. As a result, Russian research in these areas will either cease or lag behind.

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1. The winners of the tenth competition of the mega grants program were chosen. 15.05.2024. URL: <https://megagrant.ru/media/news/opredeleny-pobediteli-desyatogo-konkursa-programmy-megagrantov/>
  2. New horizons of science diplomacy discussed at SPIEF // Challenge Foundation. 07.06.2024. URL: [https://fondvyzov.ru/novosti/na\\_pmef\\_obsudili\\_novye\\_gorizonty\\_nauchnoi\\_diplomatii](https://fondvyzov.ru/novosti/na_pmef_obsudili_novye_gorizonty_nauchnoi_diplomatii)
  3. CERN to terminate nearly 500 specialists linked to Russia. RIA Novosti. 19.03.2024. URL: <https://ria.ru/20240319/tsern-1934136457.html>
  4. Gibney E. CERN prepares to expel Russian scientists — but won't completely cut ties // Nature, September 18, 2024. DOI: <https://doi.org/10.1038/d41586-024-02982-6>
  5. Scientists from Russian institutes have lost access to CERN // RIA Novosti, 01.12.2024. URL: [https://ria.ru/20241201/tsern-1986675556.html?rcmd\\_alg=slotter](https://ria.ru/20241201/tsern-1986675556.html?rcmd_alg=slotter)

One channel of communication remains: in late June, CERN decided to continue its cooperation with the Joint Institute for Nuclear Research (JINR) in Dubna. This means that some 270 JINR-affiliated scientists will be working at the mega-installation.<sup>1</sup> In this case, the CERN leadership stated that JINR is an international organization similar to CERN and conducts only peaceful research, ignoring the fact that representatives of other Russian institutes working at the LHC were also engaged in peaceful fundamental research.<sup>2</sup> Russian scientists who worked at the LHC and were not related to JINR were offered to find an opportunity to move to the jurisdiction of other countries, which would allow them to continue their research. It is estimated that about 100 scientists did so.<sup>3</sup>

The CERN precedent with respect to JINR is not an isolated case of double standards, when simultaneously with the termination of cooperation, exceptions important for the foreign party are made. First of all, this applies to mega science facilities. For example, Russia continues to participate in the work of ITER, the world's largest nuclear fusion facility located in France, because the country's contribution to its creation is significant and cannot be replaced by other institutions, at least operationally. The European X-ray free-electron laser XFEL in Germany has temporarily banned the use of the facility by Russian scientists but has maintained an official partnership with Russia.

In this situation, the Russian government has not resorted to a “symmetric response” and international access to Russian mega science facilities, both operating and under construction, is open.<sup>4</sup> Support for mega science facilities remains a priority, as can be seen from the structure of budget expenditures on R&D. However, the commissioning of new facilities is delayed: the commissioning of the Siberian Ring Photon Source (SKIF) center under construction, as well as the modernization of the Kurchatov Specialized Synchrotron Radiation Source (KISR) and nine more stations (out of 20) of the International Center for Neutron Research based on the PIK high-flow reactor (Gatchina) is postponed for 1–2 years.<sup>5</sup> The reason is that the construction of infrastructure facilities began before the sanctions were imposed, and critical elements for the facilities were planned to be purchased abroad. Now components are either developed in-house or analogs are sought in friendly countries.

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1. Scientists from Russian institutes have lost access to CERN // RIA Novosti, 01.12.2024. URL: [https://ria.ru/20241201/tsern-1986675556.html?rcmd\\_alg=slotter](https://ria.ru/20241201/tsern-1986675556.html?rcmd_alg=slotter)

2. CERN continues cooperation with the Joint Institute for Nuclear Research // Atomic Energy, 16.06.2024. URL: <https://www.atomic-energy.ru/news/2024/07/16/147672>

3. Gibney E. CERN prepares to expel Russian scientists — but won't completely cut ties // Nature, September 18, 2024. DOI: <https://doi.org/10.1038/d41586-024-02982-6>

4. Bykova N. CERN on the path of disintegration // Monocle, No. 49, 02.12.2024. URL: <https://monocle.ru/monocle/2024/49/tsern-na-puti-raspada/>

5. Kryukov V. Ministry of Education and Science asks to extend the construction of three mega science projects // Vedomosti, 15.10.2024. URL: <https://www.vedomosti.ru/society/articles/2024/10/15/1068706-minobrnauki-prosit-prodlit-stroitelstvo-treh-proektov>

In terms of changes in country priorities, the past year was notable for Russia's presidency of BRICS and the simultaneous entry of four new members — Egypt, Iran, UAE and Ethiopia. All this gave rise to a discussion on new priorities and forms of Russia's scientific and technological cooperation with the enlarged BRICS.

In terms of the prospects for S&T cooperation, the alliance is limited by the weak capacity of the new BRICS countries. In all countries, science complexes rely mainly on public funding, while the contribution of the business sector ranges from 4% (Egypt) to 30% (Iran) of total R&D expenditures.<sup>1</sup> In terms of the number of researchers per 10,000 employed in the economy, Iran is the leader among the new BRICS countries (49 full-time equivalents), which is close to Russia's figure of 55,<sup>2</sup> but in absolute terms the new BRICS countries are not comparable to Russia.

In recent years, the new BRICS countries have significantly increased their publication activity, but the dramatic growth is due to a low initial base. It is worth noting that these countries actively use international cooperation to increase the number of publications, sometimes to the detriment of scientific ethics. Russia and Iran significantly outnumber the new group of countries, but the gap is narrowing amid a decline in the number of Russian publications in the last two years.

The attempt to diversify partners for S&T development is understandable, but it is more profitable to cooperate with equal or superior partners, or with those who have complementary expertise. Scientific cooperation is a partnership, not a relationship of helping and receiving help. This configuration of relations is certainly possible, but is unlikely to be able to significantly strengthen the S&T studies of the donor country.

Among the traditional BRICS countries, China and India have strengthened their positions as Russia's main partners in international scientific cooperation.<sup>3</sup> The gradual weakening of ties with unfriendly jurisdictions continued. The "abolition" of cooperation inflicts clear damage to certain areas of research not only in Russia, but also in world science. Arctic research is a convincing example. The exchange of data between Western and Russian scientists has slowed to a trickle, interrupting work on many projects. Western scientists' understanding of changes in the Arctic has become skewed toward North America and Europe, which means that there is no realistic view of the processes taking place. As foreign scientists themselves note, this situation has already led to a crisis in climate science.<sup>4</sup>

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1. For Ethiopia and the UAE, data by sources of R&D funding are not available. Source: Science Indicators: 2024: Statistical Collection. MOSCOW: ISSEK HSE., 2024. C.366.

2. Science Indicators: 2024: Statistical Collection. M ISSEK HSE, 2024. P. 379.

3. *Matthews D.* China becomes Russia's biggest collaborator after war decimates science ties with the west. Science | Business, 22 February 2024. URL: <https://sciencebusiness.net/news/international-news/china-becomes-russias-biggest-collaborator-after-war-decimates-science-ties>

4. *Judah J.* Russia's Warming Arctic Is a Climate Threat. War Has Shut Scientists Out of It// New York Times, October 22, 2024. URL: <https://www.nytimes.com/2024/10/22/climate/russia-alaska-arctic-global-warming.html>

In a number of areas, Russian scientists are being replaced, but it is a complex process. For example, a survey of French scientists showed that they were willing to look for circumventing ways, for example, to communicate with Russian colleagues when they leave Russia for other countries.<sup>1</sup> However, all this creates additional difficulties and barriers. Over time, Russian colleagues began to be replaced by scientists from other countries. It is likely that the need for renewed cooperation may subsequently diminish.

The data on international cooperation of Russian scientists in 2024 confirm these fears. The number of international co-authored papers involving Russian researchers published in the first half of 2024 was about half the number published two years earlier.<sup>2</sup> The number of joint articles with scientists from the USA, Germany and the UK has halved at leading universities.<sup>3</sup> But large collaborations, which usually result from work at large research facilities, were the hardest hit. In light of CERN and other constraints, this is only natural.

The parameters of publication activity can be influenced by the policy of foreign publishers. The precedent of Elsevier publishing house, which started to notify about the transfer of funds paid by Russian authors for publication in the “golden” open access to support Ukraine, became noteworthy. The logical decision in this situation was the recommendation of the Interdepartmental Working Group of the Ministry of Education and Science not to publish in the journals of this publishing house. In addition, the journals of the “golden” open access publishing house Elsevier were excluded from the Russian “White List”.

The main obstacle for Russian authors to publish in “gold” open access journals is the need to pay for the article. Firstly, this implies substantial additional resources in the budgets of organizations or grant funds. Both would be difficult even in the absence of restrictions. Secondly, due to sanctions, there are technical difficulties in transferring funds abroad. One of the solutions may be the development of homegrown journals, primarily peer-reviewed journals, whose publications are available to a wider range of researchers.

Thus, several movements coexisted in the sphere of international cooperation. On the one hand, the position of the country’s leadership demonstrated readiness for broad cooperation with representatives of any country. On the other hand, the agenda of priority partnership with the BRICS countries was being implemen-

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1. *Ruffini P.-B.* Guerre en Ukraine, sanctions académiques et diplomatie scientifique // HAL Open Science. URL: <https://hal.science/hal-04110773>

2. *Zhang L., Cao Z., Sivertsen G., Kochetkov D.* Is collaboration with Russia really declining? Our analysis suggests not // Times Higher Education, September 15, 2024. URL: <https://www.timeshighereducation.com/blog/collaboration-russia-really-declining-our-analysis-suggests-not>

3. *Panova A., Matveeva N., Slepikh V., Sterligov I.* The scientific mission of universities: has the gap with the research sector been bridged? // Scientific Seminar of the Institute of Education of the National Research University Higher School of Economics of 26.03.2024. URL: <https://yandex.ru/video/preview/1237997766253120122>

ted. Finally, at the level of individual institutions, including publishing houses, their own restrictive measures were applied, which in general led to a reduction in international scientific cooperation of Russian scientists.

### 5.3.6. Effectiveness of scientific and technological activities

According to the Global Innovation Index, in 2024, Russia slipped several positions to 59<sup>th</sup> place in the world (for comparison, in 2023 the country was in 51<sup>st</sup> place, and in 2021 — in 45<sup>th</sup> place). The indicators of resources invested in innovation have sharply declined (the country has moved from 58<sup>th</sup> to 76<sup>th</sup> place), while the drop in performance was only three points in the rating (from 53<sup>rd</sup> to 56<sup>th</sup> place).<sup>1</sup>

First of all, such an indicator of resource provision as investments in research and development declined. Among the performance indicators, the number of scientific publications and the number of patent applications decreased, mainly due to non-residents. This is understandable: the top 5 countries that patented their developments in Russia are the USA, China, Switzerland, Germany and South Korea, i.e. all countries (except China) that imposed sanctions on Russia's technological development.

The weakest components of the Russian innovation system are the work of institutions (126<sup>th</sup> place) and the state of research infrastructure (76<sup>th</sup> place).

According to preliminary estimates for 2024, academic productivity, which is assessed mainly by the number of publications and citations, has decreased primarily due to articles in reputable international journals.<sup>2</sup> In addition, the practice of publication citation fraud has spread, and therefore the number of retracted articles has increased.<sup>3</sup>

In general, the emphasis is gradually shifting to publications in Russian journals, which makes academic results less accessible to the international academic community and may reduce the overall impact of Russian research over time. The “White List” of journals has become a key factor in assessing performance. In November, the Russian Government adopted Resolution that stipulates that in government acts, where there are references to articles in journals from the Web of Science and Scopus databases, they should be replaced by references to “arti-

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1. Russian Federation ranking in the Global Innovation Index 2024 // WIPO. URL: <https://www.wipo.int/gii-ranking/en/russian-federation>
  2. *Panova A., Matveeva N., Slepikh V., Sterligov I.* The scientific mission of universities: has the gap with the research sector been bridged? // Scientific Seminar of the Institute of Education of the National Research University Higher School of Economics 26.03.2024. URL: <https://yandex.ru/video/preview/1237997766253120122>
  3. *Chawla D. S.* The citation black market: schemes selling fake references alarm scientists // Nature, August 20, 2024. Doi: <https://doi.org/10.1038/d41586-024-01672-7>

cles from the White List of journals”.<sup>1</sup> The “White List” should be used for a variety of purposes and levels of evaluation: in competitions for grant funding, in the selection of objects of the National Electronic Library, for access to centers for collective use of scientific equipment and unique research facilities.

So far, the “White List” is dominated by foreign publications,<sup>2</sup> including open access. Among the open access journals, more and more Russian articles are published by publishing houses of mixed reputation,<sup>3</sup> such as MDPI, which has an easier peer-review procedure.

According to Clarivate estimates, among the G20 countries, Russia is characterized by co-shrinking international academic cooperation, continued specialization in physics and mathematics, a fairly high level of citations in medical patents, with low citation rates in general. Moreover, 25% of Russian articles indexed in the Scopus database have never been cited (*Table 10*).

In the field of technological innovation, according to a survey of 66 high-tech companies conducted in August 2024 by the National Research University Higher School of Economics in cooperation with the Russian Union of Industrialists and Entrepreneurs,<sup>4</sup> the absolute majority of companies (91%) invest their own funds in innovation and perform the work in-house. Almost half of the companies (44%) cooperate with state universities and research institutes, which is a good indicator, and 33% cooperate with private research organizations.

Significantly, expenditures on innovation have been growing: this was noted by 38% of respondents. The main factors restraining the growth of companies’ R&D expenditures are the shortage of own funds (48% of respondents), uncertain economic situation (32%) and insufficient state support for R&D (28%). The problems, according to qualitative assessments, are also related to the lack of technical engineers.<sup>5</sup> In this regard, the federal project “Advanced Engineering Schools”,<sup>6</sup> initiated

1. Decree of the Government of the Russian Federation of 06.11.2024 No. 1494 “On Amendments to Certain Acts of the Government of the Russian Federation”. URL: <http://publication.pravo.gov.ru/document/0001202411070053>
2. Now the list includes 29.1 thousand publications, of which about 1 thousand are Russian language. Source: Petrova V. Science is added sovereignty. Kommersant, 26.08.2024. C. 2. URL: <https://www.kommersant.ru/doc/6917983>
3. Panova A., Matveeva N., Slepykh V., Sterligov I. The scientific mission of universities: has the gap with the research sector been bridged? // Scientific Seminar of the Institute of Education of the National Research University Higher School of Economics of 26.03.2024. URL: <https://yandex.ru/video/preview/1237997766253120122>
4. Gershman M., Evseeva M., Kameneva E., Glukhova M., Yakovleva L. Business plans to boost investments in R&D. Science. Technologies. Innovations. Express information. HSE, 24.09.2024. URL: <https://issek.hse.ru/news/965772399.html>
5. Kibernovich A. Alevey Khokhlov: Technologists and inventors are almost extinct in the country // Expert, 06.03.2024. URL: <https://expert.ru/mnenie/aleksey-khokhlov-v-strane-pochti-vymerli-tekhnologii-izobretateli/>
6. Advanced engineering schools // Ministry of education and science of Russia. URL: <https://engineers2030.ru/>

*Table 10*

**Key parameters of Russia's research performance  
among G20 countries, for 2024**

Parameter	Outcome
Cooperation	Below average, decline in 2022–2023 and loss of the most productive collaborations, which were with the U. S. and Germany; main partner is China
Citation level	High citation index in medical patents, 1.7 above the world average, due to international cooperation
Focus	Focus on math and physics, about 1.7 times the average for G20 countries
Influence	Around 25% of Russian articles were not cited even once

*Source: Rogers G. The annual G20 scorecard — Research and innovation performance 2024. Executive summary. ISI, Clarivate, 2024. DOI: 10.14322/isi.grr.annual.g20.scorecard.2024*

by the Ministry of Education and Science of the Russian Federation. The federal project “Advanced Engineering Schools” initiated by the Ministry of Education and Science, which involves 50 universities and more than 150 high-tech companies, may contribute to a faster solution of this problem.

Among the government initiatives, it is also worth noting the resumption of the competition to award high-tech companies the status of “national champions”. In 2024, 19 companies received this status, and the total number of “national champions” increased to 125.<sup>1</sup> Such companies contribute to the growth of high-tech exports, and transnational companies based in Russia should be formed on their basis. To participate in the competition for the status, companies must demonstrate at least 10% growth in average annual revenue over the last three years, and R&D expenditures of at least 5% of total revenue

Thus, while the efficiency of scientific activity has declined and a number of specific problems related to sanctions restrictions have emerged, in the field of technological development sanctions, on the contrary, have pushed companies to increase investment in R&D and expand cooperation with universities and research institutes.

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In 2024, the legislative framework was being formed and the practical reorientation of the S&T studies into the mobilization model of development began. In accordance with this, the management system in the field of science and technology was

1. Mekhanik A. National champions — 2024 // Stimul online, 31.05.2024. URL: <https://stimul.online/articles/sreda/natsionalnye-chempiony-2024/>

restructured. Priority directions and the most important science-intensive technologies were defined, and the first 8 national projects were formed for their development. The goal of ensuring technological sovereignty through the implementation of such projects was gradually transformed into the goal of achieving technological leadership, including through cooperation with friendly countries.

Meanwhile, all strategic documents emphasized the importance of fundamental science, the need for research on a broad front, which should provide new knowledge and, therefore, the basis for breakthrough technologies. In fundamental research it is important to have a modern infrastructure, including expensive mega science facilities. Expenditure for these purposes will increase in the structure of budget expenditures on R&D. In addition, growing attention is being paid to the support of young scientists. There are reasons for this — the average generation of scientists remains small, hence, not enough young people pursue scientific careers, and, in addition, emigration sentiments among young people are the strongest.

The role of RAS has grown in the logic of the policy for the development of fundamental research and, at the same time, the realization of priority scientific and technological studies. Most likely, the RAS position will become even stronger after the adoption of the law on the creation of the Board of Trustees, which will be headed by the President of the Russian Federation. The Academy leadership has proposed a new mechanism of selection and financing of scientific projects, which should ensure the implementation of research on a broad front and at the same time eliminate duplication. This approach has risks, as it may stimulate the growth of monopolization of topics by individual scientific institutes, which will lead to a decrease in competition and, consequently, in scientific performance.

In the field of international scientific cooperation, the reorientation towards new partners, primarily from the BRICS countries, continued, in other words, the actual situation was generally in line with the priorities of the adopted Strategy for Scientific and Technological Development. The termination of the work of Russian institutes at the CERN facilities did not entail a symmetrical response from Russia, and Russian mega science facilities are open for international cooperation.

The efficiency of science, expressed in the number of articles and their citation rate, fell, including as a result of restrictions on the part of individual journals and publishing houses. In the field of technological development, on the contrary, there was a positive dynamic of growth of investments in R&D. This process is indirectly confirmed by the structure of patenting, which was characterized by an increase in the share of domestic applicants. Cooperation of companies with scientific organizations and universities has also expanded. Thus, there is an opportunity to develop prospective and applied scientific research at the expense of private investments.