

**Competition documentation for an open public competition to receive grants from the  
Russian Science Foundation for the priority areas of the Russian Science Foundation  
“Performing basic scientific research and exploratory scientific research in high-priority  
research topic areas”**

1. The competition to receive grants from the Russian Science Foundation for the priority activity of the Russian Science Foundation “Performing basic scientific research and exploratory scientific research in high-priority research topic areas” (hereinafter – competition, grants) shall be conducted in accordance with the Procedure for the competitive selection of research and technical programmes and projects submitted for a competition of the Russian Science Foundation based on the decision of the Management Board of the Russian Science Foundation (hereinafter – the Foundation) (Protocol No. 14 dated 3 July 2015).

2. The source of the Foundation’s grants shall be the property contribution of the Russian Federation to the Russian Science Foundation.

3. The grants shall be allocated for scientific and technical programmes and projects as well as basic scientific research and exploratory scientific research (hereinafter the projects and scientific research) in 2016-2018 with the subsequent possible extension of the project completion period by one or two years for the following branches of knowledge:

01 Mathematics, Computer and Systems Sciences;

02 Physics and Space Science;

03 Chemistry and Materials Science;

04 Biology and Life Sciences;

05 Basic Research for Medicine;

06 Agricultural Sciences;

07 Earth sciences;

08 Humanities and Social Sciences;

09 Engineering Sciences.

The scientific research (project) should be aimed at resolving specific issues<sup>1</sup> within the framework of one of the scientific priorities established by the Foundation’s Board of Trustees for the competition and driven by issues of the socio-economic development of the country and society (see list below); the anticipated result of the research (project) should be on a world-class level and make a significant contribution to resolving key problems of the established scientific priority:

P9 Potentially productive industrial biotechnology;

P10 Electrochemical and thermoelectric energy technologies;

P11 Intelligent technology in robotics and mechatronic systems;

P12 Reduction of the risk of occurrence and the impact of natural and man-made disasters;

P13 Restorative, regenerative, and adaptation medicine;

P14 Potentially productive quantum communication and computation;

P15 New agricultural technology of management of key links of the food chain in order to optimize the alimentation of the Russian population;

P16 Neurotechnology and cognitive research.

4. Projects by research teams may take part in the competition regardless of the project leader’s (hereinafter – project leader), position, academic degree or citizenship or the form of incorporation or ownership of the organisations with which the project leader and research team members have employment or civil relations.

5. The grants shall be provided to the research team on a free and non-refundable basis according to the competition results under the terms specified by the Foundation via Russian research organisations, Russian higher educational organisations, their branches and international research organisations (interstate and intergovernmental) located on the territory of the Russian Federation on whose core the projects will be implemented (hereinafter the organisation).

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<sup>1</sup>Listed in Point 1.2 of Form 1 in Appendix № 1.

6. The project leader may not be a scientist who serves as the leader of a project (leader of an area of the organisation's integrated research programme) that was previously supported by the Foundation but not completed as of the application submission date.
7. A scientist who is in any way involved in the implementation of two or more projects (including an area of the organisation's integrated research programme) that were previously supported by the Foundation but not completed as of the application submission date may not be a member of the project research team.
8. The project leader and research team members may be employees of the organisation or other persons hired to implement the project who have employment or civil relations with the organisation over the duration of the practical implementation of the project. The project leader must have employment relations with the organisation at which employment must become full-time for the leader over the entire duration of the practical implementation of the project.
9. Over the five years preceding the competition<sup>2</sup>, the project leader must have the following number of publications in Russian and foreign peer-reviewed scientific journals indexed in the Web of Science or Scopus<sup>3</sup>:
- a) for branches of knowledge 01, 04-07, 09 indicated in point 3 of this competition documentation – at least five different publications;
  - b) for branches of knowledge 02, 03 – at least seven different publications;
  - c) for branch of knowledge 08 – at least three different publications.
10. The size of one grant shall range from 4(four) to 6 (six) million roubles annually.
11. The Foundation may alter the amount of annual funding in the event of a reduction in the size of the Russian Federation's property contribution to the Russian Science Foundation or according to a decision by the Foundation's Management Board adopted based on the results of an expert evaluation of reports submitted on the implementation of the project and the proper use of the grant by its recipient.
12. The percentage of the research team members directly engaged in performing the scientific research who are age 39 or under must be at least 50 (fifty) percent of the total number of team members during the entire period of the project's practical implementation<sup>4</sup>. Each member of the research team should receive compensation for work done on the project. The total amount of a research team member's compensation may not exceed 30% of the amount of the entire research team's annual compensation<sup>5</sup>. The amount of the annual compensation of all researchers under the age of 39 (inclusively) who are research team members may not be less than 35% of the amount of the entire research team's annual compensation. The total number of research team members (including the project leader) may not exceed 10 persons<sup>6</sup>.
13. The project leader shall be entitled as the leader<sup>7</sup> to submit only one application to take part in a particular competition. There shall be no restriction on the number of projects that one organisation may implement.
14. It shall not be permitted to submit to the Foundation a project that is similar in scope to a project which has been concurrently submitted for the competitions of the Foundation or other research foundations or organisations or which is currently being implemented using the funds of foundations or organisations, a government (municipal) objective or development programmes funded by the federal budget. If these conditions are violated, the Foundation shall discontinue funding for the project regardless of its stage of implementation with the simultaneous recovery of the funds paid to the grant recipient in the prescribed manner.

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2 During the period from 1 January 2010, up until the due date for competition applications.

3 List of publications is in Point 2.9 of Appendix № 1.

4 The composition of the research team is outlined in Point 1.8 of Appendix № 1.

5 Including the guarantees established by Russian law, deductions for premiums for compulsory pension insurance, compulsory medical insurance, compulsory social insurance in the event of temporary disability or maternity, for compulsory social insurance against occupational injury and illness.

6 The number of research team members is indicated in Point 1.8 of Appendix № 1.

7 Number of other projects where they are indicated as an investigator is not limited. Violating the terms of this point will result in rejection of the application at any stage.

15. The projects supported as a result of the competition may not contain information that constitutes a state secret or other restricted information that is to be protected in accordance with the legislation of the Russian Federation.
16. A mandatory condition for the provision of the grant by the Foundation shall be the undertaking of the following obligations by the research team:
- 16.1. To make the results of their scientific research part of the public domain in accordance with the legislation of the Russian Federation by publishing them in peer-reviewed Russian and foreign scientific journals.
- 16.2. Publish<sup>8</sup> the following information in peer-reviewed Russian and foreign scientific journals during the practical implementation of the project:
- a) for branches of knowledge 01-07, 09 indicated in point 3 of this competition documentation – at least eight publications in journals indexed in the Web of Science or Scopus;
- b) for branch of knowledge 08 – at least four publications in journals indexed in the Web of Science or Scopus.
- 16.3. When publishing the results of any research work performed as part of a project supported by the Foundation, to mention the financial support received from the Foundation and the organisation.
- 16.4. To confirm summaries for the project being supported and relevant project implementation reports with the publication of the Foundation, including on the Internet.
- 16.5. To confirm the possible international expert evaluation of the application submitted for the competition.
17. Applications for the Foundation's competition shall be submitted by project leaders using the forms in accordance with Appendix 1 to this competition documentation in two forms – electronically (via the Foundation's information and analytical system (hereinafter the IAS)) and in hard copy form (printed from the IAS) whose contents must be identical. Applications shall be submitted to the Foundation in Russian with individual fields of the application forms to be completed in English (only where specifically indicated).
18. Applications shall be completed using the Foundation's IAS on the Internet at the address <http://grant.rscf.ru><sup>9</sup>. After the registered application number is received by the IAS, the project leader should print and submit one hard copy of the application and additional materials to the Foundation no later than 12:00PM (Moscow time) on 22 September 2015 at the following address: Moscow, GSP-2, 109992, ul. Solyanka, d. 14, str. 3. The project leader shall independently choose the method for delivering the application materials to the Foundation that ensures they are received by the Foundation by the required deadline
19. The hard copy of the application must be bound and affixed with the organisation's seal, while the relevant forms must be personally signed by the project leader, the core members of the research team (primary investigators) and the head of the organisation (authorised representative acting on the basis of a power of attorney)<sup>10</sup>.
20. Applications sent to the Foundation will not be returned.
21. The following will not be accepted for the competition:
- a) applications finalized and/or submitted to the Foundation which violate the requirements of points 17, 18, 19 of this competition documentation;
- b) applications finalized and submitted to the Foundation which violate the requirements for content of the applications for participation in the competition as set out in the announcement of the competition and competition documentation;
- c) applications for which the hard copy differs from the electronic version registered in the IAS;

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<sup>8</sup> The number of planned publications is indicated in Point 1.11 of Appendix № 1.

<sup>9</sup> The application processing cycle consists of the following stages: applicant registration (if this was not done earlier, including individual registration of the project leader and up to three main research team members), filling in applicant information in the IAS, preparing application, registration of application.

<sup>10</sup> If the application is signed by an authorized representative, the power of attorney (copy of the power of attorney, certified by the organisation's seal) should be attached to the printed copy of the application.

d) applications for which the hard copy versions are received by the Foundation after the established deadline has lapsed;

e) applications that contain information which is noncompliant with applicable requirements of paragraphs 3, 5–7, 9, 10, 12–16, 32, 34, 36 of the present Competition Documentation.

22. The Foundation shall notify the project leader via the IAS about the registration of the application, the receipt of the hard copy of the application and the results of the competition.

23. The project leader has the right to rescind their application if they submit a corresponding written notification to the Foundation.

24. The project leader shall be entitled to make changes to an application submitted for a competition only in the form of its withdrawal in accordance with clause 23 of this competition documentation and the submission of a new application for the competition by the required deadlines.

25. Applications eligible for the competition shall undergo an expert evaluation in accordance with the Procedure for the expert evaluation of scientific and technical programmes and projects submitted for a competition of the Russian Science Foundation and the Criteria for the competitive selection of scientific and technical programmes and projects submitted for the Russian Science Foundation's competition<sup>11</sup>. Applications are sent for assessment according to the classifier codes for the branches of science indicated by the project managers in the applications.

26. The competition results shall be approved by the Foundation's Management Board by 15 December 2015.

27. A list of supported projects based on the competition results shall be published on the Foundation's website no later than 10 days after the competition results are determined.

28. Within 15 business days after the approval date of the competition results, the leaders of projects supported by the Foundation shall be sent via the IAS system the texts of the agreements for completion and signing in which the following information shall be indicated:

- the area of scientific research;
- the work plan and cost estimate of scientific research;
- the duty of the team leader to submit an annual report on the project's implementation;
- the duty of the organisation to provide the research team with the necessary facility, equipment and supplies as well as access to the available experimental base for scientific research;
- the duty of the organisation to conclude civil or employment (fixed-term) contracts with each member of the research team<sup>12</sup>;
- the duty of the organisation to pay research team members remuneration for work performed as part of the project under written orders from the project leader;
- the duty of the organisation to maintain separate records of grant expenditures and present reports on its proper use;
- the duty of the organisation to submit a report on the proper use of the grant;
- the conditions and procedure for the parties to terminate the agreement, including in the event the Foundation identifies the misuse of the grant;
- other rights and duties of the Foundation, the team leader and organisation associated with the use of the grant in compliance with the provisions of this competition documentation.

29. The amount of the Foundation's financial support for the project in the agreement may be reduced compared with the amount requested by the project leader in accordance with the decision of the Foundation's Management Board adopted on the basis of recommendations from the Foundation's Expert Council.

30. The Foundation may not conclude an agreement if its head is different compared to the materials of the relevant application that has undergone the expert evaluation procedure.

31. Within 15 business days after receipt via the IAS system of a draft agreement, the agreement signed by the Russian team leader and authorised representative of the organisation or a substantiated refusal by the project leader or organisation to sign the agreement must be submitted to the Foundation. The project leader shall independently choose the method for delivering the signed agreement to the Foundation that ensures it is received by the Foundation on time. If this

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11 Documents are published online at <http://rscf.ru/fonddocs>.

12 If such contracts were not previously concluded.

deadline is violated, the Foundation shall notify the project leader and organisation about the impermissible delay with the signing of the agreement. If the duly signed agreement is not received by the Foundation within the following 5 business days, the relevant project shall be excluded from the list of projects supported by the Foundation with the publication of a message about this on the Foundation's official website.

32. The grant may be used only for the purposes indicated in the agreement.

33. The identification of the misuse of the grant shall constitute grounds for the termination of the agreement and the return of the grant in the manner prescribed by the agreement.

34. The rights to the results of intellectual activity created when implementing the project shall belong to the investigators of this project. The Russian Federation may use for government needs the results of intellectual activity created when implementing the project on the conditions of a royalty-free, ordinary (non-exclusive) licence granted by the right holder to the relevant government customer with the payment of remuneration by the government customer to the authors of the results of the intellectual activity.

35. The organisation shall be responsible for the proper use of the grant.

36. The amount of the organisation's overhead expenses shall not exceed 10 percent of the amount of the grant.

## Form T. Cover sheet of application to the Russian Science Foundation

## 2016 Competition “Performing basic scientific research and exploratory scientific research in high-priority research topic areas”

Project name	Project number	
	Project type: P	
	Subject area:	
	Main classifier code:	
	Additional classifier codes:	
	SRSTI code:	
Last name, first name, patronymic (if applicable) of project leader:	Project leader phone number and e-mail:	
Full and shortened name of organisation via which project funding should come:		
Amount of project funding (thousands of roubles) in 2016 – _____	Year in which project begins: 2016	Year in which project ends <sup>13</sup> : _____
Last names, first names, patronymics (if applicable) of primary <sup>14</sup> investigators (full)		
	<i>(project leader not indicated in this section)</i>	
I ensure that no copyrights or other rights of third-parties were violated when preparing this application and/or consent was obtained from rights holders to present materials to the Foundation and for the Foundation to use them for examination and disclosure (in the form of application annotations).		
Project leader signature _____/_____/_____  Signature _____ bearing witness _____/_____/_____ please seal here	Date of application registration	

13 Only the following may be indicated: 2017 (for projects designed for 2 years); or 2018 (for projects designed for 3 years); other options will not be accepted.

14 Up to 3 main investigators regardless of the total number.

## Project Information

- 1.1. Project name  
*in Russian*  
*in English*

- 1.2. Scientific priority, specific objectives and key challenges:

### **P9 Potentially productive industrial biotechnology**

Objective P9-1. Technology for production of renewable raw materials including raw materials that are not traditional for biotechnology.

Crucial problems:

P9-1-1 Creation of valuable genotypes of plants with the use of bioengineering and conventional cell selection methods based on the growth rate and other specified characteristics.

P9-1-2 Development of the biotechnology for obtaining non-traditional renewable raw materials (new strains of microorganisms with desired properties and composition, plant transformants, cultured cells, tissues, plants, and animals).

P9-1-3 Creation of the industrial biotechnology for production of renewable raw materials (biomass of microalgae for the needs of fine chemicals, bio-energy, agriculture, food processing, and pharmaceutical industries as well as medicine).

P9-1-4 Creation of a technology for conditioning (preparation) of organic waste as a secondary resource for subsequent biotechnological processing in order to produce valuable products for various purposes.

Objective P9-2. The biotechnology for processing renewable raw materials.

Crucial problems:

P9-2-1 Creation of a biotechnology for processing renewable raw materials based on the metabolic engineering and synthetic biology methodology.

P9-2-2 Development of biocatalytic processes for processing renewable raw materials including unconventional raw materials.

P9-2-3 Creation of a biotechnology for complex processing of organic waste and its valorization in order to obtain products with a high added value.

Objective P9-3. Biotechnologies for manufacture of products with a high added value as an alternative to traditional technologies.

Crucial problems:

P9-3-1 Creation of a biotechnology platform for the synthesis of polymers and chemicals as well as the development of new materials (“green chemistry”).

P9-3-2 Development of biosynthetic processes for the production of biologically active substances.

P9-3-3 Creation of the biotechnology to protect the environment (bioremediation).

P9-3-4 Development of biogeotechnologies to intensify mining.

Objective P9-4. Biotechnologies for production of pharmaceuticals and medical devices.

Crucial problems:

P9-4-1 Development of technologies for the production of pharmaceuticals by means of the microbiological synthesis.

P9-4-2 Creation of technologies for preparation of pharmaceuticals in eukaryotic systems, including in plants and animals (biofactories).

P9-4-3 Development of technologies for the production of new materials, including 3D and polymeric materials, to be used in medicine. P9-4-4 Creation of technologies for

targeted delivery of pharmaceuticals and production of sustained release dosage forms.  
P9-4-5 Development of new test systems for medical diagnostics.  
Objective P9-5. Biotechnologies of manufacture of food products and intensification of agricultural production and aquaculture.

Crucial problems:

P9-5-1 Development of technologies for the production of functional ingredients and food, approaches to bio-engineering of food raw materials that are characterized by a high nutritional and biological value and the absence of antinutritive factors and allergens.

P9-5-2 Perfection of technologies of control of safety and quality of food products.

P9-5-3 Development of biotechnologies (genomic and post-genomic approaches) for the purposes of creation of new as well as improvement of existing animal breeds and varieties of useful plants.

P9-5-4 Creation of biologics that enhance the efficiency of agricultural production (feed additives, bio-fertilizers, growth stimulants, bio-pesticides etc.).

P9-5-5 Development of new molecular and biological methods for assessment of the physiological state, the immune status, and the sustainability of marine organisms.

P9-5-6 Development of technologies for monitoring of populations of harvested species of aquatic organisms in order to maximize the efficiency of the organization of their commercial harvesting, selection for artificial reproduction and genetic manipulation, and prevention of the degradation of the gene pool.

## **P10 Electrochemical and thermoelectric energy technologies**

Objective P10-1. Development of next-gen electrochemical generators.

Crucial problems:

P10-1-1 Development of scientific bases and creation of highly efficient and cheap membranes (proton- and oxygen-conductive membranes) and catalysts (without, or with a reduced content of, expensive materials) for fuel elements.

P10-1-2 Massive improvement of the characteristics of lithium-ion batteries by creating new electrode materials with a high rate of charge/discharge and new electrolytes that are capable of operating over a wide temperature range.

P10-1-3 Development of new types of batteries with high energy density (lithium-air, lithium-oxygen, sodium-ion, magnesium-ion etc.) and competitive economic indicators.

P10-1-4 Resolution of problems of heat and mass transfer in fuel elements and batteries with high specific power and capacity characteristics.

P10-1-5 Development of new technologies and robotic systems for assembly of fuel elements and batteries with the aim of radically reducing their cost under the conditions of mass production.

P10-1-6 Development of the new high-performance technology for hydrogen generation from a wide range of hydrocarbons (natural gas, LPG etc.) and alcohols (bioalcohols) at lower temperatures as well as by means of gasification of solid fuels.

P10-1-7 Development of new efficient technologies for hydrogen storage.

Objective P10-2. Creation of thermoelectric converters with a high efficiency.

Crucial problems:

P10-2-1 Development of scientific bases for thermoelectric conversion based on new functional nanomaterials, including nanowires and nanotubes, nanocrystalline structures etc.

P10-2-2 Resolution of problems of heat and mass transfer in thermoelectric and hybrid systems.

P10-2-3 Development of new thermoelectric conversion technologies on the basis of low-grade heat of the solar thermal spectrum, thermal and nuclear power plants, waste



incineration heat, low-grade heat during operation, and the heat of geothermal energy sources.

P10-2-4 Development of thermodynamic principles and flowsheets of thermoelectric conversion for various temperature levels, including operation heat of electrochemical cells and hybrid systems of a new generation.

## **P11 Intelligent technology in robotics and mechatronic systems**

Objective P11-1. Development of adaptive control systems to be used in a dynamic environment.

Crucial problems:

P11-1-1 Development of methods of adaptive control of traffic of robots and their groups (multi-agent robotic systems) under the conditions of uncertainty and significant external disturbances;

P11-1-2 Development of real-time databases for the purposes of representation of knowledge in robotic systems;

P11-1-3 Development of methods of intelligent analysis as well as management and forecasting of operation of robotic systems;

P11-1-4 Development of methods, diagrams, and procedures for detecting malfunctions and failures of control systems for robotic systems as well as statistical analysis of these failures;

P11-1-5 Remote robotics. Development of a concept of building, structure, types, organization of communication, of control algorithms for autonomous robotic technology systems that are located at considerable distances (thousands of kilometers on the Earth and hundreds of thousands of kilometers in space).

Objective P11-2. Development of the human–robot interface.

Crucial problems:

P11-2-1 Development of new non-invasive sensor systems, including force-torque sensing, electroencephalography, and electromyography;

P11-2-2 Development of algorithms for natural speech recognition and synthesis;

P11-2-3 Synthesis of algorithms for recognition of specific scenarios of human behavior based on visual information in order to monitor the status of employees, the chronically ill and the elderly as well as for the purposes of prevention of aggression in public places;

P11-2-4 Development of high-speed methods of training for robots (simulators).

Objective P11-3. Sensory systems and information processing algorithms.

Crucial problems:

P11-3-1 Development of high-performance, small-size, and low-cost technical vision systems for robotic systems;

P11-3-2 Development of small-size and high-precision sensors for force-torque information for robotic systems;

P11-3-3 Development of methods for processing sensory information for the problems of simultaneous localization and mapping;

P11-3-4 Development of intelligent methods of analysis of sensory information, including pattern recognition algorithms under the conditions of uncertainty and significant dynamics of the environment;

P11-3-5 Development of methods for aggregation of information from heterogeneous sensors with due consideration of differences in their dynamic and information characteristics;

P11-3-6 Development of methods for automatic sensor calibration and evaluation of kinematic, elastostatic, and dynamic parameters of robotic systems under the conditions of significant dynamics of the environment;

P11-3-7 Development of new types of sensors for robotic systems.  
Objective P11-4. The element base of robotic and mechatronic systems.

Crucial problems:

P11-4-1 Improvement of the element base of robotic systems (increase in performance, computing power, reliability, energy efficiency, resistance to various influences etc.);

P11-4-2 Improvement and development of new structural materials (reduction of the cost and the speed of manufacture; performance improvement etc.);

P11-4-3 The use of batteries of high energy density;

P11-4-4 Development of recovery technologies and application of renewable energy sources in robotics;

P11-4-5 Planning of energetically optimal trajectories with due consideration of the working environment characteristics;

P11-4-6 Development of energy-efficient kinematic circuits for walking, manipulation, flying, surface, and underwater robots;

P11-4-7 Improvement of the efficiency of locomotion system, including the use of passive actuators.

Objective P11-5. Development of effective means of movement of robotic systems and methods of their interaction with external objects.

Crucial problems:

P11-5-1 Improvement and development of new types of engines and manipulators for robotic systems;

P11-5-2 Development of new principles of movement in space (the use of wind, waves, currents, planning in water or ascending air etc.);

P11-5-3 Development of new principles of interaction with objects (use for manipulation and exposure to electromagnetic fields, streams of gas or liquid, electrical discharges etc.).

Objective P11-6. Bionic technology in robotic systems.

Crucial problems:

P11-6-1 Creation and development of new types of propulsion and data analysis systems based on bionic principles (fish fins, dragonfly eyes, butterfly wings etc.);

P11-6-2 Imitation of principles of movement of living organisms (walking machines, drones with flapping wings etc.);

P11-6-3 Application of the principles of echolocation of bats, dolphins, and other biological specimens;

P11-6-4 Research of the interaction of groups of dolphins, shoals of fish, and other congregation animals.

Objective P11-7. Coordinated management of teams of robots (multi-agent robotic systems); provision for reliable and uninterrupted communication in robotic systems; self-training and self-programming.

Crucial problems:

P11-7-1 Development of methods for managing groups of robots, including networked variable topology systems;

P11-7-2 Precision manipulation of large and massive objects;

P11-7-3 Development of communication algorithms and protocols to be used between agents in a team of robots subject to the limitations of network bandwidth, and activity of transceivers and energy costs;

P11-7-4 Development of algorithms for the distribution of tasks between the agents of the system based on their current state.

P11-7-5 Development of reliable and uninterrupted communication between a robot and an operator and between two robots (for multi-agent systems) in the presence of uncertainty and unpredictable interference;

P11-7-6 Fundamental problems of communication under the coherent operation of a group of robots, including operation with decentralized management;

P11-7-7 Self-training and self-programming systems.

Objective P11-8. Biomedical applications of robotic systems.

Crucial problems:

P11-8-1 Creation and development of interfaces between the robotic device and the living organism (the control unit of the robotic arm with the use of artificial neural impulses, an artificial eye that transmits information directly to the brain etc.);

P11-8-2 Creation of molecular bio-robots that are designed for targeted delivery of drugs into the specific areas of the body;

P11-8-3 Creation of tactile feedback between the robot arm and the surgeon in the course of a surgery;

P11-8-4 Development of surgical systems combined with imaging techniques (CT, MRI, ultrasound) in order to improve diagnosis and positioning;

P11-8-5 Improvement of telemedicine technologies, which make it possible to provide robotic medical care to patients in difficult areas, as well as to train medical staff to operate such systems;

P11-8-6 Development of an intelligent adaptive system for training of robots in typical surgical procedures in various fields of surgery;

P11-8-7 Improvement of performance of robotic systems aimed at reducing the size of / increasing the mobile devices and subsequent reduction in the degree of invasiveness;

P11-8-8 Synthesis of algorithms for recognition of specific scenarios of human behavior based on visual information in order to monitor the status of employees, the chronically ill and the elderly as well as for the purposes of prevention of aggression in public places.

## **P12 Reduction of the risk of occurrence and the impact of natural and man-made disasters**

Objective P12-1. Comprehensive monitoring of the main characteristics of the environment and the climate.

Crucial problems:

P12-1-1 Development of a common observation system for catastrophic events and their possible development areas;

P12-1-2 Creation of an environmental monitoring system for aquatic and terrestrial ecosystems; P12-1-3 Provision for the combined use of the data of satellite and ground-based instrumental observations;

P12-1-4 Creation of information systems of automatic processing of combined monitoring data and early prevention of emergencies;

P12-1-5 Development of new methods and algorithms for remote sensing data assimilation in atmospheric and climatic models.

Objective P12-2. Development of methods and means of forecasting of emergencies and reducing the risks of their occurrence.

Crucial problems:

P12-2-1 Search for statistically significant relationships between the frequency of man-made accidents and various geophysical and cosmic factors;

P12-2-2 Research of external causes of man-made accidents and improvement of the methods of forecasting and prevention;

P12-2-3 Improvement of forecast models for extreme meteorological and hydrological events.

Objective P12-3. Research of economic, political, and social impacts of the global climate change.

Crucial problems:

P12-3-1 Improvement of methods of evaluation, prediction, and reduction of anthropogenic impacts on the environment and the climate;

P12-3-2 Development of effective regional climatic models that are targeted for practical application in various industries;

P12-3-3 Analysis of the impact of current and future climate changes on efficiency, safety, and reliability of the power supply, transport, building infrastructure, agriculture, and forestry systems;

P12-3-4 Development of scientific bases for the formation of Russia's position in the system of international obligations for the protection of the atmosphere and the climate.

P13 Restorative, regenerative, and adaptation medicine

Objective P13-1. Surgical technologies.

Crucial problems:

P13-1-1 Development of various types of reconstructive surgery. Development of new materials and devices for reconstructive surgery.

P13-1-2 Creation of new technologies for organ and tissue transplants. Research of various aspects of healing and rejection of transplanted structures. Simulation of solid organ transplantation in an animal model.

Objective P13-2. Therapeutic techniques.

Crucial problems:

P13-2-1 Creation of pharmaceuticals and technologies that accelerate the natural regenerative processes in the body. Development of products (drugs) for cell therapy. Development of synthetic pharmaceuticals that effectively mimic the regenerative activity of cell drugs.

P13-2-2 Development of new methods of substitution therapy. Creation of synthetic analogs of natural biologically active molecules.

Objective P13-3. Creation of artificial organs and tissues.

Crucial problems:

P13-3-1 Development of new implantable devices for long-term replacement of the functions of organs and tissues. Resolution of the problems of biocompatibility and bioreplaceability. Search for new synthetic biodegradable materials. Bioceramic composite structures with desired properties for the recovery of supporting tissues. Creation of tissue and organ equivalents.

P13-3-2 Development of extracorporeal (external) devices designed to compensate for lost organs and for their functions. Increase in mobility and autonomy of such structures.

Objective P13-4. Social, humanitarian, institutional and other aspects.

Crucial problems:

P13-4-1 Development of precautionary measures for age, anthropogenic, and iatrogenic loss of organs and their functions.

P13-4-2 Improvement of various methods of rehabilitation aimed at restoring the body after serious diseases, injuries, iatrogenic effects etc.

P13-4-3 Development of technical and humanitarian activities aimed at improving employment and social integration of people with disabilities. Creation of a complex of methods for training individuals with lost functions of organs and tissues.

P13-4-4 Development of campaigns aimed at improving the perception of people with disabilities in society.

P13-4-5 Development of mathematical models for restorative, regenerative, and adaptation medicine.

P14 Potentially productive quantum communication and computation

Objective P14-1. Scientific and technical problems in the field of quantum communication.

Crucial problems:

P14-1-1 Development of new protocols of quantum communication and quantum cryptography; research of their properties; experimental implementation;

P14-1-2 Development of methods of preparation, measurement, control, and conversion of quantum states of the light, including high-dimensional states, macroscopic entangled states etc.

P14-1-3 Search for and exploration of effective light-matter interfaces, exploration of the interaction of non-classical states of the light with individual quantum objects and ensembles.

P14-1-4 Development of principles and methods of quantum metrology;

P14-1-5 Development of a relativistic quantum information and quantum communication theory by combining the concepts of the relativistic quantum theory and the theory of information.

Objective P14-2. Scientific and technical problems in the field of quantum computation.

Crucial problems:

P14-2-1 Spin states in specially designed condensed environments with specially created ensembles of atoms or molecules with electron or nuclear spins. For example, these states may include fine donors, or NV complexes in diamonds in isotopically pure  $^{28}\text{Si}$  etc.;

P14-2-2 The states of the ensemble of ions, neutral atoms, or molecules (including highly excited Rydberg states) in electromagnetic (e.g., optical) traps or inert environments;

P14-2-3 Semiconducting and superconducting quantum multicomponent structures that demonstrate relaxation to the ground state by means of “quantum annealing,” including the phenomena and the devices based on hybrid semiconducting or superconducting quantum structures with included weakly interacting molecules;

P14-2-4 Optical-nanomechanical and magnetic-quantum nanomechanical systems;

P14-2-5 States of linear and nonlinear optical (including microwave) systems in solid resonators;

P14-2-6 Conditions of specially synthesized molecular and supramolecular systems, such as polynuclear complexes and hybrid systems with the division of the charge; P14-

2-7 Topological quantum conditions, condensates of various particles and quasiparticles, structures based on new carbon materials etc.

Objective P14-3. Scientific and technical problems in the field of architecture and algorithms and quantum computation.

Crucial problems:

P14-3-1 Development of quantum computing algorithms (including the algorithms for quantum simulations and quantum tomography; quantum error correction for compensation for the loss of coherence; assessment of the accuracy);

P14-3-2 Development of architectural and program principles of hybrid supercomputers that contain quantum valuator;

P14-3-3 Development of methods for collecting and analyzing large amounts of data from quantum computing devices with the use of supercomputers;

P14-3-4 Qualitative and quantitative characterization of entangled multiqubit quantum states as the main information resource in quantum informatics;

P14-3-5 Synthesis and optimization of quantum circuits (including the synthesis of reversible circuits for computing Boolean functions, reduction of the depth of the quantum circuits; quantum technology for testing and repair of crystal-based digital circuits).

Objective P14-4. Objectives aimed at creating a component framework for quantum technologies.

Crucial problems:

P14-4-1 Design and creation of photon sources, including one-, two- and N-photon sources; creation of photon detectors, including a one-photon detectors; creation of optical and microwave amplifiers with a quantum level input noise, high-Q chip-based resonators, quantum systems for coherent photon conversion etc.;

P14-4-2 Design and creation of new materials and basic elements for the problems of quantum communication and quantum information processing, including photonic materials, structures, and light-guiding structures for the purposes of generation of specific quantum states of the light;

P14-4-3 Design and creation of quantum memory systems (including photon memory systems) and creation of a practically significant quantum memory with a high efficiency, a long lifetime, a high information capacity, and operability at room temperature;

P14-4-4 Creation and development of quantum generators for random bit sequences;

P14-4-5 Design and creation of quantum interfaces, i.e. elements that are used to define the initial, pre-calculation, state of qubits and the elements of reading of quantum states of qubits after calculation. (For example, single-electron transistors with a coulomb blockage or devices based on spin-dependent transport and spin-dependent reactions can be used to read the state of spin-based qubits.);

P14-4-6 Creation and development of “quantum wires” to transfer quantum states between registers in a quantum computer.

### **P15 New agricultural technology of management of key links of the food chain in order to optimize the alimentation of the Russian population**

Objective P15-1. Research and development of new approaches to assessment and mobilization of genetic resources of plants, animals as well as water and soil biota in order to ensure diversity and safety of food products.

Crucial problems:

P15-1-1 Creation of new approaches to assessment and sustainable use of plant genetic resources based on the synteny with an involvement of the genetic potential of wild plant species; subsequent development of the methods of genome sequencing.

P15-1-2 Development and implementation of methods for genomic selection for the purposes of accelerated creation of varieties of plants and for compliance with the needs of the population of Russia for high-quality food products.

P15-1-3 Creation of methods of engagement of regulatory factors (identification of major genes, exploration of their structures and functions), including hosting, into the selection for the purposes of spatial and temporal localization of the expression of target genes that determine the development of plants for the regulation of productivity and product quality.

P15-1-4 Exploration and expansion of the genetic diversity of animal species, including species with technologically useful features, with the use of methods of molecular genotyping and technologies of genomic breeding and genetic engineering.

P15-1-5 Development of the basic units of the natural aquatic resource of widespread screening based on molecular genetic identification tools; 100%-probability establishment of the origin of individuals, lines, populations, and finished fish products.

P15-1-6 Mobilization of the function resource in the soil metagenome in order to increase crop productivity. Search for new genetic reserves of the soil microbiome that can provide alimentation to plants, protect them from pathogens, and ensure reproduction of soil fertility.

Objective P15-2. Mobilization of genetic reserves of plant-microbe systems for the Russian agricultural sector.

Crucial problems:

P15-2-1 Evaluation and development of methods of the practical use of genetic reserves of interaction of plants and microorganisms in agrocenoses.

P15-2-2 Search for mechanisms of adequate variability of microorganisms in vegetation and microbial systems.

P15-2-3 Exploration of the self-organization process of plant cells that is associated with the formation of temporary cell organelles of microbial origin.

P15-2-4 Exploration of the integrating role of microorganisms in the formation of the agrocenotic community.

P15-2-5 Exploration of mechanisms of regulation of plant growth and development due to interaction with other organisms.

P15-2-6 Creation of new strains of microorganisms as a basis for the manufacture of modern biological products for the purposes of optimization of power alimentation, growth and development stimulation, and protection against plant pathogens by including the isolated strains into the microbe-plant systems.

Objective P15-3. Green chemistry in the agrotechnology.

Crucial problems:

P15-3-1 New approaches to combat diseases of agricultural plants and animals on the basis of natural factors of regulation of the number of pathogens and the use of methods of formation of microbiome that provides for homeostasis in a wide range.

P15-3-2 Search for new methods to increase the efficiency of fertilizer use, optimize the nutrient cycling, conserve and accumulate the humus, which all contribute to the yield in agricultural crops and livestock productivity.

P15-3-3 Search for new effective methods of formation in vivo of the specified qualitative and functional characteristics of the agricultural raw materials of vegetable and animal origin as well as for the humane treatment of farm animals and poultry and manufacture of organic products.

P15-3-4 Development of ways to assess the natural diversity of the soil metagenome in Russia, its description and use for the purposes of isolation of the useful forms of microorganisms, a comprehensive assessment of fertility, and predictions of future stresses in order to prevent them.

P15-3-5 Electrophysical techniques as a tool for green chemistry in agro-food technologies aimed at creating environmentally friendly industries.

P15-3-6 Biologics that enhance the efficiency of agricultural production (feed additives, bio-fertilizers, growth stimulants, bio-pesticides etc.) that are processable in production and application and that are competitive in the global market.

Objective P15-4. New solutions in the technologies of storage and processing of agricultural raw materials.

Crucial problems:

P15-4-1 Research of the mechanisms of metabolic changes in plant and animal raw materials that ensure their resistance to oxidation; search for new effective methods of permanent preservation of the freshness of agricultural raw materials and food products.

P15-4-2 Electrophysical techniques as a tool for improvement of the efficiency of technologies of storage and processing of food raw materials.

P15-4-3 The technology of remote monitoring and control of the physiological state and management of the metabolism of living biological products.

P15-4-4 Development of methods for monitoring and control of the microbiome of the surface of fruits and vegetables, their storing and embryonic tissues in the course of storage in order to suppress them by means of biocontrol of plant pathogens and to increase the yield of marketable products.

P15-4-5 Search for and identification of biomarkers for assessment and targeted impact on a plant or animal cell for the purposes of preservation of a food product at all the stages of its life cycle; bioinformatics.

Objective P15-5. Biotechnology of food production with the use of new-generation improved agricultural raw materials.

Crucial problems:

P15-5-1 New methods for preparation of functional food ingredients and products. Bioengineering of food raw materials that are characterized by high nutritional and biological values and absence of antinutritive factors and allergens.

P15-5-2 Research of modeling of food products, including the factors of increase in their metabolic adequacy as well as specific and nonspecific biocorrectors (food combinatorics).

P15-5-3 New methods of accelerated creation of food products based on varieties of plants and breeds of animals that have been received with the use of methods of biotechnology and classical breeding.

P15-5-4 The biotechnology of food waste processing and the non-waste biotechnology for processing renewable raw materials.

P15-5-5 Biotechnological processes for the purposes of processing of agricultural raw materials and manufacture of new products with an increased food and biological value with the use of high-level recombinant and mutant strains and consortia of microorganisms that produce enzymes, essential amino acids, vitamins, and other biologically active substances.

Objective P15-6. Development and improvement of the risk assessment system, the methods for preparation and detection of transgenic organisms, their identification and quantification of GMO ingredients and contaminants in food.

Crucial problems:

P15-6-1 Research of molecular mechanisms of action of new contaminants of food products in order to justify the levels of exposure and the regulations for their content; impact of the level of application and combination of known components; improvement of the monitoring system.

P15-6-2 Creation of highly sensitive, selective, and precise methods for the purposes of detection, identification, and quantification of a wide range of contaminants of food products.

P15-6-3 Development of a safety assessment system for food products, including products manufactured with the use of biotechnology and nanotechnology as well as modern genomic, proteomic, and metabolomic methods, with the use of plant-based GMOs (second and third generation) and animal and microbial GMOs, nanomaterials and nanotechnology; development of a methodological framework (regulation of approaches to safety assessment, development of new research methods and new experimental models, and search of informative biomarkers) and a monitoring system (development of algorithms and methods for identification and quantification of new types of GMOs, including genetically modified organisms, and nanomaterials in food products).



P15-6-4 Development of approaches to the creation of new varieties of transgenic plant varieties and animal species on the basis of DNA modification in order to manufacture products with the desired properties.

P15-6-5 Exploration of the main groups of food allergens; determination of their maximum permissible content in food; development of a methodology to identify, control, and eliminate these allergens.

## **P16 Neurotechnology and cognitive research**

Objective P16-1. Exploration of the fundamental operation mechanisms of the brain and cognitive function in health and disease.

Crucial problems:

P16-1-1 Mapping of the brain; neuroimaging and neurophysiological studies of human cognitive functions, including the mechanisms of perception and multi-modal integration, mind, emotions and motivations, working and long-term memory, language, thinking, planning, purposeful activity, forecasting of general and specific cognitive abilities.

P16-1-2 Creation of fundamentally new approaches to early (pre-clinical) diagnosis of pathologies that are associated with impaired cognitive functions, including innovative technologies for monitoring the structural and functional state of the nervous system, various methodologies of molecular profiling, creation of appropriate models etc.

P16-1-3 Search for new drug development targets and research of the molecular genetic mechanisms of cerebation; provision for the cognitive function in health and disease including genetic and epigenetic bases for development and plasticity of the nervous system; molecular genetic coding of the specificity of neural phenotypes, networks, and regions of the brain; the genetic basis of genetic specificity of nervous systems, including the human brain; population genetic and epigenetic studies of structural and functional variability of the human brain and the cognitive processes.

P16-1-4 Clarification of cellular mechanisms of information processing and storage, including the role of the synaptic plasticity, the neuronal coding of long-term memory, the neuroglial interactions, the neurogenesis and incorporation of new neurons into functional neural networks as well as processes of the aberrant neuronal plasticity and apoptosis.

P16-1-5 Establishment of neuro-architectural bases of cognitive functions, including functional neuromapping and reconstruction of cognitive maps of the brain, construction of structural and functional connectograms, multimodal visualization, and analysis of the structure and the activity of neural networks; construction of dynamic and effective connectoms and the study of their association with cognitive architectures.

P16-1-6 Mathematical modeling of neuronal coding of cognitive information, including theoretical models of coding of signals of the brain at different levels of its organization; large-scale models of neural networks; models of the network dynamics; the development of biologically inspired cognitive architectures, neuromorphic computing algorithms; the use of local ductility and distributed memory diagrams in these algorithms. Development of combined oscillatory and neural-network models of cognitive processes (memory, attention, perception, learning etc.). Exploration of the principles of functioning of the systems that govern the interaction of sensory and cognitive processes.

Objective P16-2. Development of new methods of research and directed modulation of cognitive functions.

Crucial problems:

P16-2-1 Development of methods and programs for the purposes of analysis of neurocognitive data, including means for detecting and decoding the signals of neuronal

activity, processing of multichannel registration data, including real-time processing, operation of computer atlases and digital models of the brain, analysis of images and three-dimensional data arrays on the structural and the functional organization of the brain correlated with cognitive tests and behavioral analysis.

P16-2-2 Development of new methods of targeted modulation of neuronal activity and brain functions, including new tools of elective biochemical and pharmacological modulation, chemical, thermal, and optic genetics, electromagnetic and ultrasonic modulation, non-invasive brain stimulation, regulation of the activity of neurons in the brain with the use of implantable devices.

P16-2-3 Prediction of human behavior through the analysis of various neurophysiological parameters, including the establishment of model systems, the development of special equipment etc. Determination of the mechanisms of incentive impact on subsequent human behavior (transition of interest, emotional response etc.).

Objective P16-3. Development of new complementary and substitutive technologies for the purposes of improvement of human cognitive abilities.

Crucial problems:

P16-3-1 Neurointerface technology development, including development of new types of non-invasive man-machine interfaces based on the use of multimodal sources of information on brain activity (EEG, EMG, eye movements etc.); development of new decoding technology for the control of cognitive brain signals; development of new technologies for implanted neurointerfaces, including development of fiber neurointerfaces for optogenetics, telemetry and biofeedback systems based on the feedback; development of artificial sensory organs and devices that enhance the sensory capability of humans as well as reconstruction of the functional structure of the human brain based on encephalography etc. Development of methods, algorithms, and programs for the formation of direct models of electrical activity of the human brain.

P16-3-2 Development of artificial cognitive systems, including development of new paradigms and theories of and neuro-computers and biosimilar neural networks, large-scale simulators of neural networks, specialized architectures for neuromorphic computing, neuro-computers and neurochips, memristor devices, and other emulators, plastic synapses, neuromorphic controllers, and systems for neurorobotics, biocomputing etc.

Objective P16-4. Clinical and humanitarian aspects.

Crucial problems:

P16-4-1 Neurocognitive research of mental development and mastery of knowledge, including studies of development of attention and working memory, language development, and acquisition of mathematical skills; study of brain responses to different categories of knowledge, including responses in the sensitive period of development of the brain; maturation of neuroimaging variability of the cognitive brain systems and the disturbance of their development; development of new approaches that improve the efficiency of training, including approaches that use neuro-feedback systems.

P16-4-2 Clinical studies of cognitive functions and their disturbances, including the studies with the use of PET and MRI, tractography and connectomics methods, functional imaging in diseases and injuries of the brain, instruments for functional neurosurgery, therapeutic brain stimulation, invasive methods of recording of cellular activity as well as new approaches based on magnetic, acoustic, and optical modalities. Creation of new methods of medical diagnosis that allow for modeling and reconstructing the functional structure of the human brain according to multi-

encephalography data. Development of new methods of recognition of an abnormal brain activity.

P16-4-3 Neurocognitive research in socio-humanitarian disciplines, including research in the neurocognitive provision for interpersonal communication, education, social relationships, decision-making mechanisms in neuroeconomics situations; neurocognitive study of the formation and the dynamics of social memory, the differences of work and organization of the brain under different social strategies as well as professional and cultural specialization.

P16-4-4 Study of national and regional particularities of behavioral stereotypes (mentality) of the residents of the Russian Federation that affect their everyday life, positive and negative perceptions of reality, commission of rational and irrational actions, adoption of important social and economic decisions, reactions to uncertainty and crises, as well as various types of motivation etc.

1.3. Justification of the project topic's conformity to the scientific priority and corresponding objective, importance and significance of the project's implementation for resolving specific key problems.

*in Russian*

*in English*

1.4. Priority areas of development in science, technology and engineering in the Russian Federation, critical technology<sup>15</sup>:

1.5. Key words (no more than 15 terms)

*in Russian*

*in English*

1.6. Project annotation <sup>16</sup> (not more than two pages; including brief description of the relevance and scientific originality)

*in Russian*

*in English*

1.7. Anticipated results and their significance<sup>17</sup> (indicates the anticipated results and their scientific and social significance [evaluated in terms of conformity with planned results at the world-class level of research, possibility of practical use of the project's planned results in economic and social areas, contribution to resolving the specific tasks and key issues of scientific priority as indicated in the application])

*in Russian*

*in English*

1.8. The composition<sup>18</sup> of the research team will include:

\_\_\_ project investigators<sup>19</sup> (including the leader), which includes

\_\_\_ investigators under the age of 39, of which:

\_\_\_ are full-time post-graduate students, junior scientific assistants, interns, residents, or undergraduate students.

1.9. The planned structure of the research team with the last names, first names and patronymics (if any) of the team members, their ages at the time of application, academic credentials, professions and primary places of work, type of relationship with the organisation (employment contract, civil contract) during the time that the project is being carried out.

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15 Indicated according to the list (Russian Presidential Order №899 dated 7 July 2011) in the event that the project topic is related to one of the priority areas and makes a contribution to the development of Russia's critical technology.

16 This information may be published on the Foundation's website on the Internet.

17 This information may be published on the Foundation's website on the Internet.

18 The research team's failure to comply with the requirements in Point 12 of the competition documentation is grounds for rejection of the competition application.

19 Regardless of whether the investigator has labor or civil-legal relations with the organisations.

- 1.10. Expected amount of project funding for the years (in thousands of roubles): 2016 - \_\_\_\_\_, 2017 - \_\_\_\_\_, 2018 - \_\_\_\_\_.
- 1.11. According to the results of the project and during its execution, the research team will publish<sup>20</sup> in Russian and foreign peer-reviewed scientific journals at least \_\_\_\_\_ publications, of which \_\_\_\_\_ will be in journals indexed in the Web of Science and Scopus; \_\_\_\_\_ in Russian-language journals, including the Russian Science Citation Index; \_\_\_\_\_ theses.
- 1.12. The number of publications from research team members over the past five years<sup>21</sup>, preceding the competition, \_\_\_\_\_, of which \_\_\_\_\_ – were published in journals indexed in the Web of Science or Scopus.
- 1.13. Planned participation of the research team in international collaborations (projects) (if any).

The project leader confirms that

- He will maintain employment relations with the organisation during the entire duration of the project's implementation;
- when publishing the results of any scientific work performed within the framework of project supported by the Foundation, he and his research team will indicate that financial support was received from the Foundation and the organisation, as well as agree to the Foundation publishing an annotation and anticipated results of the supported project, and any related reports on the project on the Internet;
- except for the Foundation grant, the project shall not have any other sources of funding during the entire period while it is being implemented;
- the project shall not be similar to any other project which is also being simultaneously entered in competitions being held by scientific foundations or other organisations;
- the project does not contain information consisting of state secrets or which relates to any other restricted-access information protected by the laws of the Russian Federation;
- the percentage of research team members aged 39 or under must be at least 50 percent of the total number of team members during the entire period of the project's practical implementation;
- he will present an annual report on the project's implementation.

### **Project leader's signature**

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20 Data is provided for the entire duration of the project. Reducing the number of publications with regard to the threshold established in Point 16.2 of the competition documentation is grounds for rejecting the competition application.

21 In the period from 1 January 2010 up until the date that the competition announcement was published.

## Project Leader Information

- 2.1. Last name, first name, patronymic (if applicable)  
*in Russian*  
*last name and initials in English*
- 2.2. Date of birth (*date, month, year*)
- 2.3. Citizenship
- 2.4. Academic degree, year awarded<sup>22</sup>
- 2.5. Awards and prizes for scientific activity, membership in leading scientific communities (if any), participation on editorial boards of leading peer-reviewed scientific journals (if any).
- 2.6. Primary place of work at the time application is submitted – position, full name of the organisation (shortened name of the organisation)<sup>23</sup>.
- 2.7. Area of scientific interest – key words (*no more than 15 key words*)  
*in Russian*  
*in English*
- 2.8. Area of scientific interest - Foundation classifier codes
- 2.9. List of project manager's publications for the past five years preceding the competition and which meet the conditions of Point 9 of the competition documentation<sup>24</sup>.  
*in English*<sup>25</sup>  
 The list contains \_\_\_\_ publications in journals indexed in Web of Science, Scopus.
- 2.10. Project leader's major scientific results for the period since 2010 (*results should be verified using information from the application, for example – publications*)
- 2.11. Total number of publications during the period from 2010 \_\_\_\_, of which:  
 \_\_\_\_ – were published in journals indexed in the Web of Science or Scopus.
- 2.12. Additional list of *project manager's publication from the past five years (theses, copyrighted intellectual property, publications in leading peer-reviewed scientific journals, publications in journals indexed in citation systems Web of Science, Scopus; do not list more than 10 publications, provide link for Internet publications [mandatory for publications in indexed journals], indicate the impact factor of the scientific publication, if any [according to 2013 JCR Science Edition or 2013 JCR Social Sciences Edition])*.  
*in English*
- 2.13. Experience managing scientific research projects (*indicate name of foundation [organisation], number, name of project and completion periods for the past five years*).
- 2.14. Planned participation in scientific research projects (in any capacity) in 2016. Total number - \_\_\_\_, of which: acting as leader - \_\_\_\_, participating as investigator - \_\_\_\_, specifically:

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*(indicate the project funders or originators and the source of funding, for example – government task founder, grants from the RFFI, RGNF, FPI, RNF, other foundations,*

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22 If there are several academic degrees, indicate those which most closely correspond to the project topic.

23 At the time the application is submitted, the project leader may not be an employee of the organisation, but if he wins the competition, he should sign an employment agreement with the organisation.

24 It is sufficient to provide links to publications in an amount equal to the established threshold in the competition documentation. A mismatch between the number of publications in the list and/or listed in the lines below and the requirements of Point 9 of the competition documentation is grounds for rejection of the competition application.

25 For Russian names, information is provided in Russian and with a translation in English. It should be understandable that it is one and the same document (*for example, by adding the word "translation"*).

*government contracts [client, program], other business contracts, other grants or subsidies).*

- 2.15. Proportion of working time planned to be devoted to management of the project in the event that it wins the Foundation competition - \_\_\_\_\_ percent<sup>26</sup>.
- 2.16. Participation in educational activities (*indicate information on managing post-graduate students, developing and giving new educational courses in Russian and foreign universities*).
- 2.17. Mailing address
- 2.18. Telephone number
- 2.19. E-mail address
- 2.20. Participation in project: Project leader
- 2.21. Files with additional information<sup>27</sup> (*resume, other additional information which the project leader thinks may be useful for making a decision to justify funding for the project*).  
*in Russian (separate file) and English*

I am familiar with and agree to the terms of the Russian Science Foundation's competition. I confirm my participation in the project.

I give my consent <sup>28</sup> for the personal data which I indicated above to be used (this includes collection, systematization, accumulation, storage, adjustment, use and elimination) by the Russian Science Foundation (address: Moscow, ul. Solyanka, d. 14, str. 3) in order to perform an evaluation of the application and prepare analytical materials for the competition for the period up until the liquidation of the operator (Foundation). This consent may be revoked by me in written form.

Certifying document \_\_\_\_\_

\_\_\_\_\_  
*(type, number, date submitted, issuing authority, filled in by hand)*

### **Project leader's signature**

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<sup>26</sup> Meaning – from full-time employment within the framework of employment or civil-legal agreements, i.e. spare time outside of one's main working time which is devoted to working on the project should also be accounted for.

<sup>27</sup> In PDF format, up to 3 MB.

<sup>28</sup> In accordance with the requirements of Federal Law №152-FZ "On Personal Data" dated 27.07.2006.

Project Investigator Information<sup>29</sup>

- 2.1. Last name, first name, patronymic (if applicable)  
*in Russian*  
*last name and initials in English*
- 2.2. Date of birth (*date, month, year*)
- 2.3. Citizenship
- 2.4. Academic degree, year awarded<sup>30</sup>
- 2.5. Awards and prizes for scientific activity, membership in leading scientific communities (if any), participation on editorial boards of leading peer-reviewed scientific journals (if any).
- 2.6. Primary place of work at the time application is submitted – position, full name of the organisation (shortened name of the organisation)
- 2.7. Area of scientific interest – key words (*no more than 15 key words*)  
*in Russian*  
*in English*
- 2.8. Area of scientific interest - Foundation classifier codes
- 2.9. Total number of publications during the period from 2010 \_\_\_\_, of which: \_\_\_\_ were published in journals indexed in the Web of Science or Scopus.
- 2.10. Project investigators' list of publication from the past five years (*theses, copyrighted intellectual property, publications in leading peer-reviewed scientific journals, publications in journals indexed in citation systems Web of Science, Scopus; do not list more than 10 publications, provide link for Internet publications [mandatory for publications in indexed journals], indicate the impact factor of the scientific publication, if any [according to 2013 JCR Science Edition or 2013 JCR Social Sciences Edition]*).  
*in English*<sup>31</sup>
- 2.11. Experience managing and participation in scientific research projects (*indicate name of foundation [organisation], number, name of project and completion period for the past five years*).
- 2.12. Planned participation in scientific research projects (in any capacity) in 2016. Total number - \_\_\_\_, of which: acting as leader - \_\_\_\_, participating as investigator - \_\_\_\_, specifically:
- 
- (*indicate the project funders or originators and the source of funding, for example – government task founder, grants from the RFFI, RGNF, FPI, RNF, other foundations, government contracts [client, program], other business contracts, other grants or subsidies*).
- 2.13. Proportion of working time planned to be devoted to participation in this project in the event that it wins the Foundation competition - \_\_\_\_ percent<sup>32</sup>.
- 2.14. Participation in educational activities (*indicate information on managing post-graduate students, developing and giving new educational courses in Russian and foreign universities*).
- 2.15. Telephone number, email address.

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29 This form should be completed only by the main investigators named in Form T (up to three persons).

30 If there are several academic degrees, indicate those which most closely correspond to the project topic.

31 For Russian names, information is provided in Russian and with a translation in English. It should be understandable that it is one and the same document (*for example, by adding the word "translation"*).

32 Meaning – from full-time employment within the framework of employment or civil-legal agreements, i.e. spare time outside of one's main working time which is devoted to working on the project should also be accounted for.

2.16. Participation in the project: Main project investigator.

I am familiar with and agree to the terms of the Russian Science Foundation's competition. I confirm my participation in the project.

I give my consent<sup>33</sup> for the personal data which I indicated above to be used (this includes collection, systematization, accumulation, storage, adjustment, use and elimination) by the Russian Science Foundation (address: Moscow, ul. Solyanka, d. 14, str. 3) in order to perform an evaluation of the application and prepare analytical materials for the competition for the period up until the liquidation of the operator (Foundation). This consent may be revoked by me in written form.

Certifying document

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*(type, number, date submitted, issuing authority, filled in by hand)*

**Project investigator's signature**

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33 In accordance with the requirements of Federal Law №152-FZ "On Personal Data" dated 27.07.2006.



**Organisation Information**

(for organisations through which funding will be provided)

- 3.1. Full name (*in accordance with registration documents*)
- 3.2. Abbreviated name
- 3.3. Name in English
- 3.4. Form of legal entity's incorporation (*as indicated by the OKOPF*)
- 3.5. Form of ownership (*as indicated by the OKFS*)
- 3.6. Departmental affiliation
- 3.7. Tax ID number
- 3.8. Address
- 3.9. Physical address
- 3.10. Federal subject of the Russian Federation
- 3.11. Position, last name, first name, patronymic (if any) of the head of the organisation
- 3.12. Telephone number
- 3.13. E-mail address

The head of the organisation confirms that:

- I am familiar with the terms of the Foundation's competition and agree to funding of the project, if it is supported, through the organisation.

- the organisation fulfills its obligation to pay taxes at all levels of the government and makes compulsory payments to government extra-budgetary funds, is financially solvent, is not in the process of liquidation or reorganisation, has not been declared insolvent (bankrupt), its property has not been seized and its business activities have not been suspended.

- in the event that its application is selected as the winner, the organisation assumes the following responsibilities:

- to sign civil or employment (fixed-term) contracts with the research team members<sup>34</sup>;

- to pay compensation to the research team members for the work performed on the project, according to the project leader's instructions;

- to submit an annual report on the proper use of the Russian Science Foundation's grant.

The head of the organisation ensures:

- that the total amount of annual compensation paid to any one member of the research team does not exceed 30 percent of the amount of annual compensation for all research team members<sup>35</sup>;

- that the total amount of annual compensation for researchers under the age of 39 (inclusively) included in the research team will not be less than 35 percent of the amount of annual compensation for all research team members;

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<sup>34</sup> If such agreements were not previously signed.

<sup>35</sup> Including the guarantees established by Russian law, deductions for premiums for compulsory pension insurance, compulsory medical insurance, compulsory social insurance in the event of temporary disability or maternity, for compulsory social insurance against occupational injury and illness.

- that the research team will be provided with a workspace and access to an experimental base for performing scientific research.

**Project leader's signature**

**Signature of the head of the organisation** (authorized representative, acting on the basis of a power of attorney)<sup>36</sup>, **seal of the organisation.**

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<sup>36</sup> If the form is signed by an authorized representative of the organisation, the power of attorney (copy of the power of attorney, certified by the seal of the company) should be attached to the printed copy of the application.

**Scope of project**

- 4.1. Scientific issue which the project aims to resolve  
*in Russian*  
*in English*
- 4.2. Relevancy of the issue for the given subject area, scientific significance of resolving the issue  
*in Russian*  
*in English*
- 4.3. Specific objective within the framework of the issue which the project aims to resolve, its scope  
*in Russian*  
*in English*
- 4.4. Scientific originality of the assigned objective, rationale of the achievability of the assigned objective and possibility of receiving the anticipated results  
*in Russian*  
*in English*
- 4.5. Current state of research on the given issue, main directions of research in the science world
- 4.6. Main global scientific competitors
- 4.7. Proposed method and approaches, general work plan for the entire duration of the project's implementation and expected results (*write at least two pages; indicate expected specific results per year; general plan is given with a breakdown by year*)  
*in Russian*  
*in English*
- 4.8. Scientific potential of the research team for the project (*indicate results received previously, programs and methods already developed*)
- 4.9. List of equipment, materials, information and other resources that the research team has to implement the project (*describe the necessity of using them for implementation of the project*)
- 4.10. Work plan for the first year of the project's implementation (*indicate travel assignments for the project*).
- 4.11. Content of the work of each main project investigator planned for the first year of the project (*including the project leader*).
- 4.12. Specific scientific results anticipated by the end of the first year (*should summarize the possibility of Analysing the results and assessing the extent to which the declared work plan was fulfilled*).
- 4.13. List of equipment, materials, information and other resources for the project's implementation which is planned to be acquired using the grant (*describe the necessity of using them for implementation of the project*).
- 4.14. File 1<sup>37</sup> with additional information 1<sup>38</sup>
- 4.15. File 2<sup>39</sup> with additional information 2 (if the information included in File 1 is insufficient)

**Project leader's signature**

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37 With diagrams, photographs, sketches and other information on the content of the project. In PDF format, no larger than 3MB.

38 The text of the files containing additional information should be in Russian. An English translation is required if the applicant assesses that this information is essential for the reviewer.

39 With diagrams, photographs, sketches and other information on the content of the project. In PDF format, no larger than 3MB.

## Requested Funding for 2016

## 5.1. Planned Project Expenses

No.	Guidelines for Grant Spending	Total expenses (in thousands of roubles <sup>40</sup> )
	<b>TOTAL</b>	
1.	Compensation for project investigators	
2.	Payments for services from third-party organisations <sup>41</sup>	
3.	Expenses to acquire equipment and other property necessary for conducting research (including installation, commissioning and start-up training for employees and repairs)	
4.	Expenses on acquiring materials and components for conducting research	
5.	Other expenses for purposes of the project	
6.	Organisation's overhead expenses <sup>42</sup>	

## 5.2. Breakdown of planned expenses

**For Point 1** – indicates the amount of compensation (including for the leader, main investigators and other investigators engaged in working on the project), including guarantees established by Russian law, deductions for insurance premiums for compulsory pension insurance, compulsory medical insurance, compulsory social insurance in the event of temporary disability or maternity, for compulsory social insurance against occupational injury and illness.

**For Point 2** – list of planned agreements (accounts) with third-party organisations, indicating the subject and amount of each agreement.

**For Point 3** – list of planned purchases of equipment and other property needed to perform the research.

**For Point 4** – breakdown of planned materials and components.

40 No spaces, with one marker after the comma.

41 No more than 15 percent of the grant.

42 No more than 10 percent of the grant.

*For Point 5 – other expenses for implementing the project, including for travel. assignments, payments for communications and transportation services, expenses are **not broken down**.*  
*For Point 6 – expenses are **not broken down and not justified**.*

**Project leader's signature**

**Signature of the head of the organisation** (authorized representative, acting on behalf of a power of attorney)<sup>43</sup>, **seal of the organisation**.

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<sup>43</sup>If the form is signed by an authorized representative of the organization, the power of attorney (copy of the power of attorney, certified by the seal of the company) should be attached to the printed copy of the application.